6 Mobile Source Inventory (Vehicle)

6.1 Developing and Updating Method for Emission inventory

Mobile source inventory from vehicle exhaust gas is created with Microsoft Access (EmissionFromTransport Inv01 2015.mdb) based on the following formula. This detail is referred to Sector report for mobile source inventory. Regarding temporal change, hourly operating pattern by season is calculated by using the result of traffic count survey in major road.

$$E_{i} = \sum_{t=1}^{N_{t}} \sum_{L=1}^{N_{L}} \sum_{VT=1}^{N_{VT}} EF_{VTi}(V_{Lt}) \cdot tv_{VT,L,t}$$

E_i Annual emission of pollutant i (ton)

t time

 N_t Annual number of time (366 x 24=8,784 hours (in leap year), 365 x 24 = 8,760 hours (in normal year))

- L Link
- N_L Number of link
- VT Vehicle type
- N_{VT} Number of vehicle type

 $EF_{VTi} \quad \text{Emission factor by vehicle type of each pollutant}$

V_{Lt} Travelling speed by time by link

 $tv_{VT, L,t}$ Traffic volume by time by link by vehicle type

6.1.1 Collecting and Organizing Information on Activity Data

Traffic volume is activity data in emission inventory for vehicle. Traffic volume means the value multiplying traffic count by distance in a road section and this unit is "vehicle x km". In other words, traffic volume is the total mileage in a road section.

Therefore, it is necessary to obtain the information on the traffic count and road distance every link.

Link means the section that traffic count does not change extremely, such as the road between major intersections etc.

1 <u>Traffic Count</u>

The traffic count required to calculate emissions of pollutants by vehicle exhaust gas is not the traffic count at the intersection but the traffic count at the location that the traffic count between links assumes not to change.

In JICA technical cooperation project "Capacity Development Project for Air Pollution Control in Ulaanbaatar City in Mongolia", traffic count survey was conducted in 2010. However, after that time, traffic count survey has not been conducted. Therefore, it is desirable that conducting the traffic volume survey be proposed and the traffic count reflecting the latest traffic situation be measured.

Meanwhile, hourly traffic count has been measured with 52 VDSs by Traffic Control Center of UB city and this data is available. The accuracy of the VDS is validated by comparing the actual observation result with the traffic count using VDS and if there is no problem, it is possible to consider using the traffic count measured by VDS.

2 Road Distance

Obtain the GIS data of the road network in UB city. Urban Planning Department of the Capital City and Public Transportation Department of the Capital City (PTDCC) are considered as the main candidates for data acquisition. Since large-scale construction for relieving traffic congestion has also been implemented in recent years, it is necessary to obtain and update the latest road network data. If possible, it is preferable to obtain with line data (Polyline data).

In order to calculate the emissions from the main road, the major road from the acquired road network is necessary to be extracted. As the conditions of the major road, the presence or absence of the number of lanes and a median strip, and etc. be assumed, but setting according to the current traffic conditions is necessary. On the other hand, if having past road network data, you should check which road has been updated using the GIS tool, and if update of the main road is found, you should also update the previous road network data

6.1.2 Collecting and Organizing Information for Developing Emission Factor

6.1.2.1 Collecting and Organizing Information for Developing Emission Factor by Vehicle Type

Since vehicles are not manufactured in Mongolia, all the vehicles traveling in Mongolia are imported vehicles and most of them are manufactured in Japan and Korea. For that reason, apply Regulation of Exhaust Gas of Motor Vehicles in Japan to vehicles traveling in Mongolia. However, since there are the following situations in Mongolia, the ability to match the value of Regulation of Exhaust Gas of Motor Vehicles may is not demonstrated.

- The standard value of sulfur content of fuel used in Mongolia is higher than Japan.
- The fuel that was used in the past included lead.
- · Regular inspection and maintenance is not conducted compared with Japan

Therefore, the actual condition in Mongolia was decided to approximate by multiplying the emission factor of Regulation of Exhaust Gas of Motor Vehicles in Japan by the factor taking Mongolian situation into account.

On the other hand, exhaust gas measurement at the time of actual traveling was started using the on-board emission measurement system. The actual condition of emissions in Mongolia can be further approximated by using the measurement results.

The vehicle type composition ratio by Regulation year of Exhaust Gas of Motor Vehicles in Japan is necessary as the necessary information to create the emission factor by vehicle type. Vehicle inspection registration database that is managed at the vehicle inspection registration center is necessary as the original data to calculate the vehicle type composition ratio. Information such as vehicle type, engine type, manufacturing year, and import year etc. are registered one by one in this vehicle inspection registration database.

6.1.2.2 Collecting and Organizing Information for Developing the Emission Factor of Fugitive Road Dust

Emission factors for fugitive road dust are calculated using the emission factor model of AP-42. In AP-42, emission factor model differs between paved and unpaved roads. The outline of the coefficients of each formula is shown inTable 6-1 and Table 6-2.

The geometric mean of the analysis result of the sample that is actually collected on the road in UB city is applied as the amount of silt on the paved road.

1 Paved Road

$$\mathrm{EF} = \mathrm{k} \times \mathrm{sL}^{0.91} \times \mathrm{W}^{1.02} \times (1 - \frac{\mathrm{P}}{4\mathrm{N}})$$

Table 6-1 Coefficient Using the Calculation of the Emission Factor of Fugitive Road Dust in Paved Road

Coefficient	Contents	Value	Source
k	Particle size multiplier (g/VKT)	0.62	AP-42, Table 13.2.1-1, PM-10,
sL	Silt Loading (g/m2)	1.01	Results of Monitoring Activity on 30th May by
			considering the monitoring points.
	Winter Baseline	1	Coefficient in non-Winter season
	Multiplier(April – October)		
	November - March	0.25	Coefficient in Winter season
W	Average weight (tons) of	1.48	Weighted average of vehicle inspection data of
	vehicles traveling		UB, 2009
Р	Number of Wet Day (April –	37	http://geodata.us/weather/place.php?usaf=442920
	October)		&uban=99999&c=Mongolia&y=2010
	November - March	120	Since the road surface is frozen in winter season,
			the winter season, four months, is treated as wet.
Ν	Number of days in the averaging	214	
	period (April – October)		
	November - March	151	

2 Unpaved Road

$$EF = \left(\frac{k \times (s/12)^{a} \times (S/30)^{d}}{(M/0.5)^{c}} - C\right) \times 281.9 \times \frac{365 - RD}{365}$$

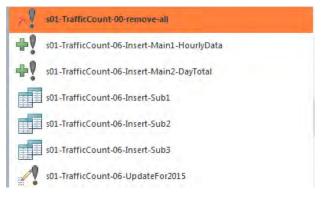
Table 6-2 Coefficient Using the Calculation of the Emission Factor of Fugitive Road Dust in Unpaved Road

Coefficient	Contents	Value	Source
k	Empirical constant (lb/VMT)	1.8	AP-42, Table 13.2.2-2, Public Roads, PM-10
а	Empirical constant	1	AP-42, Table 13.2.2-2, Public Roads, PM-10
с	Empirical constant	0.2	AP-42, Table 13.2.2-2, Public Roads, PM-10
d	Empirical constant	0.5	AP-42, Table 13.2.2-2, Public Roads, PM-10
s	Surface material silt content	1.8	AP-42, Table 13.2.2-3, Surface Silt Content %
	(%)		minimum value
М	Surface material moisture	13	AP-42, Table 13.2.2-3, Median value of "Public
	content (%)		Roads" maximum value
S	Mean vehicle speed (m/h)	4.349598	7km/h (Simple average of "Roads in ger areas, 4
			<pre>> count of lanes >= 2" of Travel Speed Survey)</pre>
С	Emission factor for 1980's	0.00047	AP-42, Table 13.2.2-4, PM-10
	vehicle		
RD	Annual number of rain and	157	http://geodata.us/weather/place.php?usaf=442920
	snow average days		&uban=99999&c=Mongolia&y=2010
			Since the road surface is frozen in winter season,
			the winter season, four months, is treated as wet.

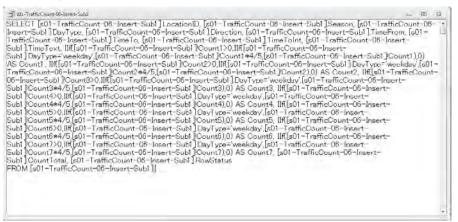
6.1.3 Developing and Updating Emission Inventory

6.1.3.1 Updating Traffic Count

To estimate the traffic count by link for the target year, after deleting the existing data with "s01-TrafficCount-00-remove-all" query, run the two add queries ("s01-TrafficCount-06-Insert-Main1-HourlyData" and "s01-TrafficCount-06-Insert-Main2-DayTotal") to calculate the traffic count by link by vehicle type using the traffic count data in 2010.



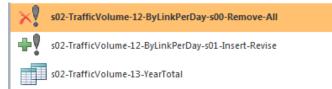
Since the number plate regulation on weekdays was not implemented at the time of the traffic count survey in 2010, in order to estimate the traffic count after 2012, calculate a value by multiplying the traffic count by vehicle type by 4/5.



In order to estimate the traffic count of target year, the coefficient of the expression of [Update To:] in each field of "s01-TrafficCount-06-UpdateFor2015" query is changed. The coefficient applies to the ratio of the number of vehicle inspection registration in target year to 2010.

s01-TrafficCou	unt-06-UpdateFor2015						- 0	53
101_TrafficCo * 10 Location Season Daytope Direction Timefo Timefo Timefo Timefo Count2 Count3 Count4 Count2 Count3 Count4 Count1 Tourt6 Count1 Tourt6 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count2 Count3 Count4 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count2 Count3 Count4 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count2 Count3 Count4 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count2 Count2 Count2 Count3 Count1 Count1 Count2 Count2 Count3 Count1 Count1 Count1 Count1 Count2 Count3 Count1 Count2 Count3 Count1 Count2 Count3 Count3 Count1 Count2 Count3 Count3 Count1 Count2 Count3 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count2 Count1 Count1 Count1 Count1 Count1 Count1 Count1 Count2 Count1 Cou	niD t n m nt t							
30								F
Field: Table: Ipdate To: Criteria: or:	Count1 t01_TrafficCount [Count1]*1.5678	Count2 t01_TrafficCount [Count2]#1.5678	Count4 t01_TrafficCount [Count4]*1.5678	Count5 t01_TrafficCount [Count5]*1.5678	Count6 t01_TrafficCount [Count6]*1 5678	Count7 t01_TrafficCount [Count7]*1.5678	CountTotal t01_TrafficCount [CountTotal]*1.5678	() () () () () () () () () ()

Calculate the daily traffic volume using the "t01-TrafficCount" table updated according to the above, and calculate the annual traffic volume by multiplying it by the annual number of days by season by weekday or holiday.



Sort the "t01-TrafficCount" table into a table of traffic count by vehicle type by time by weekday or holiday by season by link. After deleting the existing data with "s03-TrafficCountSerialized0-Remove-All" query, run "s03-TrafficCountSerialized1" query and add the result to "t03-TrafficCountSerialized" table. Do this work for queries 2 to 7 in the same way.



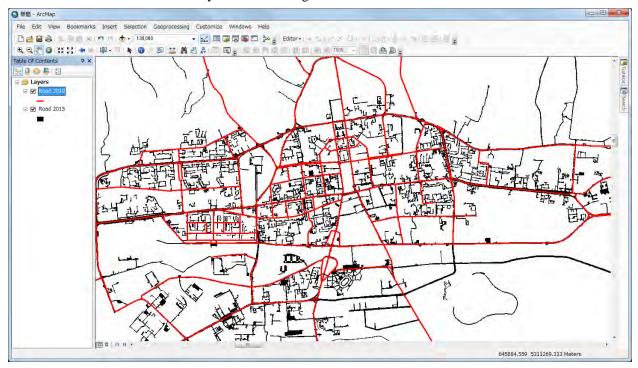
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Append To Table Name	e: t03_TrafficCo	ountSerialized		OK Cancel					

6.1.3.2 Updating Road Network

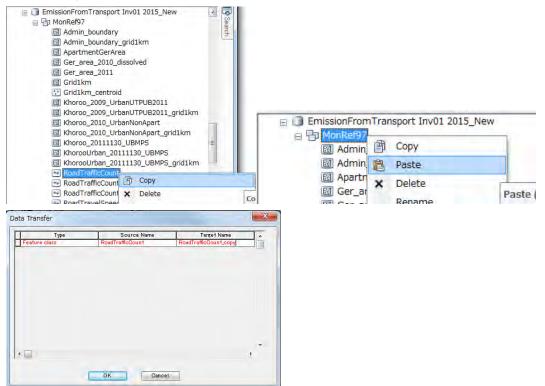
Browse

Current Database
 Another Database:

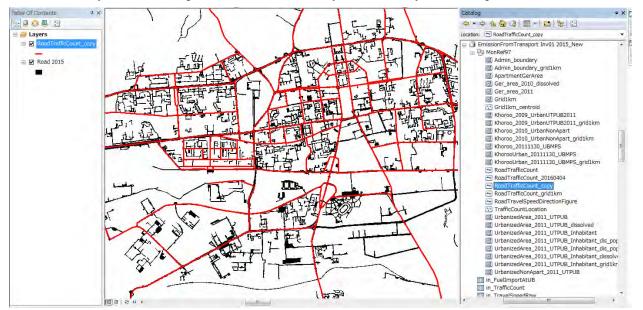
The existing road network and the newly acquired road network are overlapped on GIS software. If there is a road that is not included in the existing road network but is included in the newly acquired road network, a new road network is added to the layer of the existing road network.

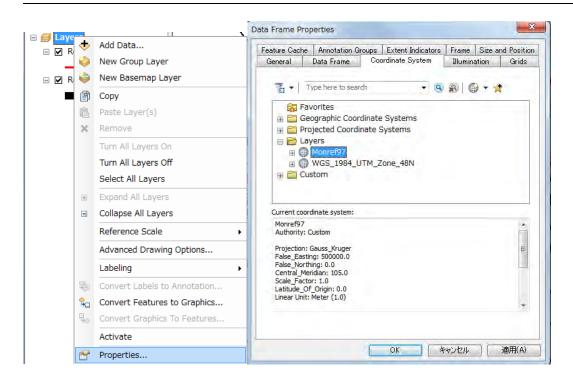


Make the copy of road network to modify and save the different name.

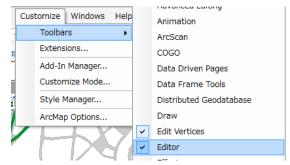


Layers of the new road and layers of the old road copied above are overwrapped and displayed. At this time, the coordinate system in the map is set to the coordinate system of the layer of the copied old road.

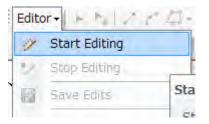




To edit the road network data, click [Customize]-[Toolbars]-[Editor] and show "Editor" toolbar.



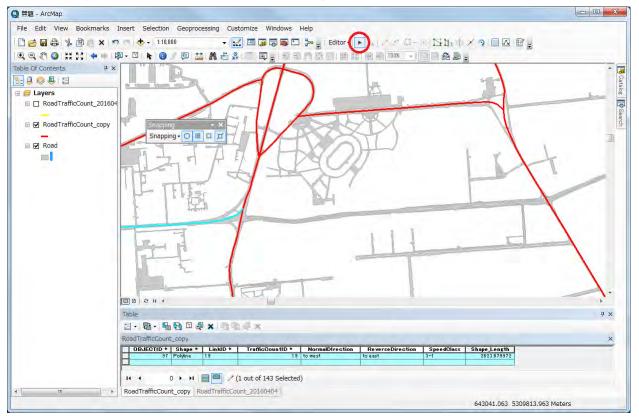
Click [Editor]-[Start Editing] in "Editor" toolbar.



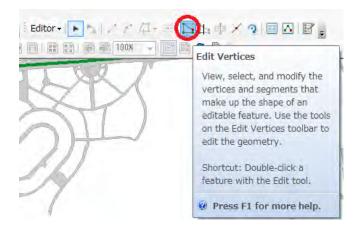
Select the layer of road network to edit and click [OK]. Also, when showing the right dialog, click [Continue].

his map contains data from more than or ease choose the layer or workspace to e		i Start editing er You may not be	countered one or more layers with warnings. e able to edit some layers if you continue.
Road RoadTrafficCount_copy		Name	Description
		(j) Road	Spatial reference does not match data frame.
Source	Туре		

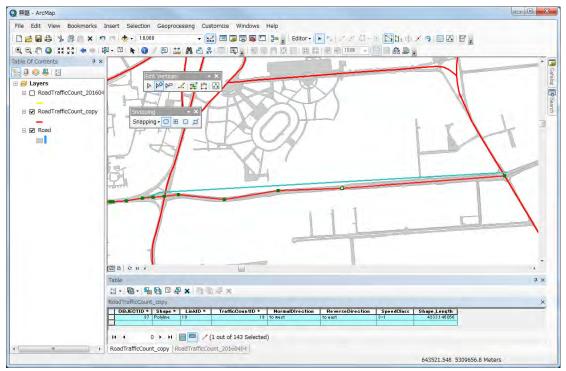
After selecting the icon in red circle, select the road to update. Color of selected road is changed to light blue.



To modify the selected road, click the icon in red circle. This icon has the function to modify the location and number of vertex of road.



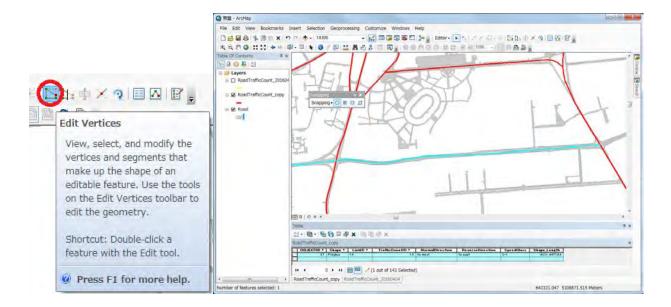
Green rectangle on line is vertex. When pointing vertex with a cursor, and clicking and moving the mouse, vertex moves.



To add new vertex between the existing vertices, after clicking the icon in red circle, point the line between the existing vertices with a cursor and click.



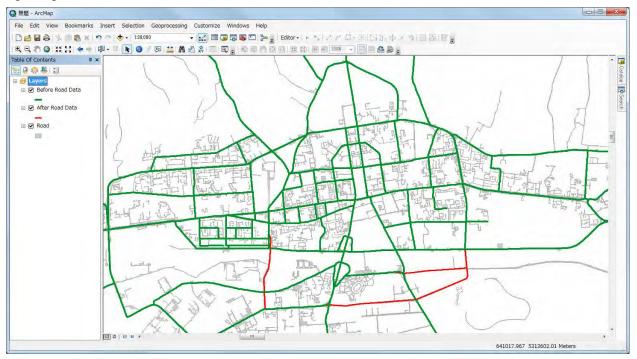
Click the icon in the following figure and complete the edit of vertex.



After completing to add the target road, save the layer by clicking [Save Edits] of [Editor] and complete the edit mode by clicking [Stop Editing].



Updating road network shows red line as follows.



6.1.3.3 Updating Vehicle Inspection Registration Data

Select [External Data] tab and select [Excel] in [Import & Link].



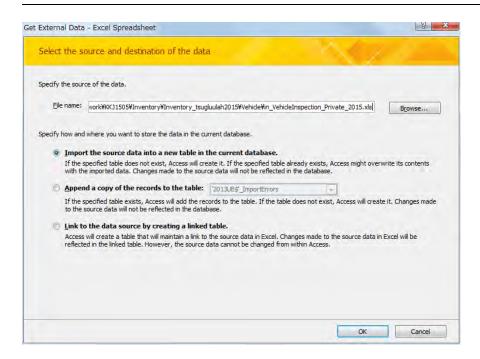
Click [Browse].

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necify the sour	ce of the data	
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Select the file you want to import (Here it is "in_VehicleInspection_Private_2015.xls").

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Check [Show Worksheets] is selected, select [Sheet1] sheet, and click [Next].

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2110	Хятад	BJD	WG120	Цахилгаа
2112	Хятад	Geely	JL7100x2	Инжектор
2116	БНСУ	Hyundai	Grace 15	Дизель ту
3067	БНСУ	Hyundai	Verna 1.4i 16V	Инжектор
3107	Япон	Toyota	Land Cruiser 100	Инжектор
3111	Япон	Mazda	Familia / 1.5 i (110 Hp)	Инжектор
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4104	Япон	Isuzu	Elf 1.6	Дизель ту
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2110	Хятад	BJD	WG120	Цахилгаа
2112	Хятад	Geely	JL7100x2	Инжектор
2116	БНСУ	Hyundai	Grace 15	Дизель ту
3067	БНСУ	Hyundai	Verna 1.4i 16V	Инжектор
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Select [Let Access add primary key.] and Click [Next].

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3	2107	ВНСУ	Hyundai	Sonata-II	Инжект
4	2110	Хятад	BJD	WG120	Цахилг
5	2112	Хятад	Geely	JL7100x2	Инжект
6	2116	БНСУ	Hyundai	Grace 15	Дизель
7	3067	БНСУ	Hyundai	Verna 1.4i 16V	Инжект
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9	3111	Япон	Mazda	Familia / 1,5 i (110 Hp)	Инжект
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Input the table name in the [Import to Table:] textbox and click [Finish].

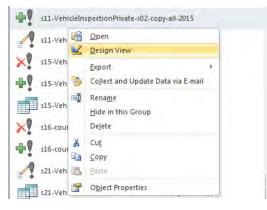
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Right-click "s11-VehicleInspectionPrivate-s02-copy-all-2015" query and click [Design View].



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The value in the [totalweight] column may exceed 50. Since the unit of this column is "ton" and the value exceeding 50 is not a realistic value as the weight of vehicle, all values exceeding 50 tons is regarded as 50 tons. So right-click "s11-VehicleInspectionPrivate-s11-totalweight>50ton" query and click [Design View].

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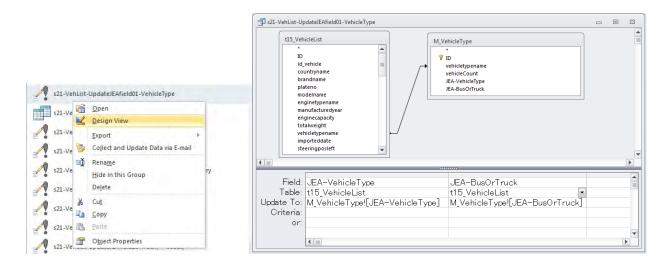
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6.1.3.4 Setting the Classification of Regulation of Exhaust Gas of Motor Vehicles in Japan

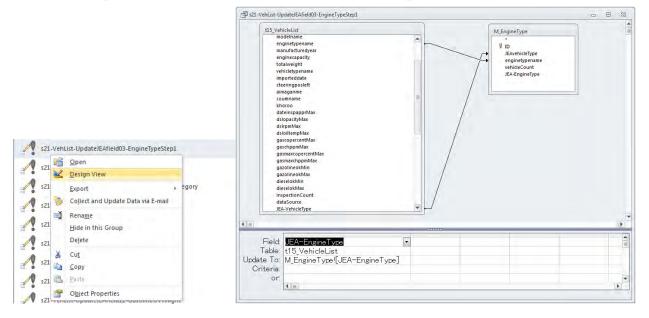
Set the classification of Regulation of Exhaust Gas of Motor Vehicles to each car in the table created above. First, initialize the value of the column of classification year Regulation of Exhaust Gas of Motor Vehicles in Japan and the coefficient taking into consideration the condition in Mongolia. Right-click "s21-VehList-InitializeJEAfield" query and click [Design View].

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Right-click "s21-VehList-UpdateJEAfield01-VehicleType" query and click [Design View]. In this query, set the vehicle type classification for each registered vehicle.



Right-click "s21-VehList-UpdateJEAfield03-EngineTypeStep1" query and click [Design View]. In this query, set the engine type in regulation of exhaust gas of motor vehicles in Japan to each registered vehicle.



Right-click "s21-VehList-UpdateJEAfield04-EngineTypeStep2" query and click [Design View]. In this query, set the symbol indicating no classification "@" to the column of vehicle engine type that is null when running "Step1".

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	bject Properties			

Right-click "s21-VehList-UpdateJEAfield05-EngineCapacityCategory" query and click [Design View]. In this query, classify the category according to the engine capacity of vehicle.

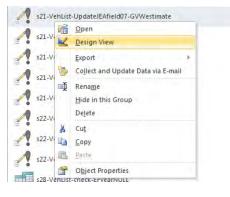
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🗊 s21-VehList-UpdateJEAfield05-EngineCapacityCategory	_ 0	23
[UPDATE t15_VehicleList SET t15_VehicleList.[JEA-EngineCapacityCategory] = IIf([JEA-EngineType]="G LPG",IIf(IsNull([enginecapacity])	iasoline and	^
[enginecapacity]>660,"Engine_GT_660cc","Engine_LE_660cc"),"@");		
		-

Right-click "s21-VehList-UpdateJEAfield06-EIWcategory" query and click [Design View]. In this query, classify the category of Equivalent Inertia Weight (EIW) in diesel passenger car.

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Right-click "s21-VehList-UpdateJEAfield07-GVWestimate" query and click [Design View]. In this query, estimate the Gross Vehicle Weight (GVW) of bus and truck.



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	Field: JEA-GVWestimated		•	
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	or:			•

Right-click "s21-VehList-UpdateJEAfield09-GVWcategory" query and click [Design View]. In this query, classify the category of GVW by vehicle type.

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		ID ID ID ID Id vehicle countryname Drandname plateno modelname enginetypename enginetypename Importeddate Field: JEA-GVWcategory Table: t15_VehicleList It5_VehicleList Iff(IsNull([JEA-GVWestimated]),"@",IIff([JEA-GVWestimated]<=1.7,"GVW light",IIff([JEA-EngineType]="Gasoline and LPG",IIff([manufactor)			
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Die	esel″0	r [JEA-EngineType]="Direc	t Injection Diesel",IIf([JEA–GVWestimated]>5,″GVW very 5 And [JEA–GVWestimated]<=3.5) Or [JEA–GVWestimated]<=2.5,″GVW middle″,″GVW	,	
he	a∨y ,‼† a∨y″)),ľ	(([manutacturedyear]>=2005 Null))))∙) And LUEA-GVWestimated(K-3.5) Ur LUEA-GVWestimated(K=2.5, GVW middle), GVW	1	
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Right-click "s21-VehList-UpdateJEAfield10-Truck(<=660cc)" query and click [Design View]. In this query, modify the category of EIW and GVW of truck of engine capacity less than 660cc.

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s •	21-Ve	hList-UpdateJEAfield10-Truck(<=660cc)			HidelsList 2. vehiste 2. vehiste					
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Right-click "s21-VehList-UpdateJEAfield10-Truck(<=660cc)" query and click [Design View]. In this query, change the vehicle engine type of direct injection diesel engines of light classification GVW "Direct Injection Diesel" to "Indirect Injection Diesel".

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s2E Delete s2E Cut s2E Copy s2E Passe s2E Object Properties	Field JEA-EngineType JEA-GVWcategory Table: 115 VehicleList 115 VehicleList Update To Criteria: "Direct Injection Diese!" "GVW light" or:	

Right-click "s21-VehList-UpdateJEAfield12-GasolineGVWlight" query and click [Design View]. In this query, update the GVW classification of gasoline vehicle less than 660cc to the symbol indicating no classification "@".

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Right-click "s21-VehList-UpdateJEAfield13-year" query and click [Design View]. In this query, copy and paste information of manufactured year ("manufacturedyear" column) to the column to classify the regulation year of exhaust gas of vehicle in Japan ("JEA-manufacturedyear" column).

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s22-VenList-Update/EAffeld13-year s22-VenList 2 Design View s22-VenList 2 Design View s22-VenList 2 Design View s28-VenList 2 Design View s28-VenList 2 Design View s28-VenList 2 Design View s28-VenList 2 Design View Hide in this Group	13_Vehicite.ist D IQ_vehicite country.mans bandnume pieteno modriuane empantgyremane mandature/opeal empantgyremane mandature/opeal vehicitypeane modriuane empantgyremane mandature/opeal vehicitypeane	
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Right-click "s22-VehList-UpdateJEAfield16-yearPrivateNonJapan" query and click [Design View]. In this query, update the regulation year of exhaust gas of vehicle in Japan for the vehicle manufactured in except Japan to "1" (before regulation).

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Right-click "s22-VehList-UpdateJEAfield17-EFyear" query and click [Design View]. In this query, set the regulation year of vehicle exhaust gas of vehicle by pollutant defined by vehicle type, engine type, engine capacity classification, EIW classification, GVW classification, and manufactured year.

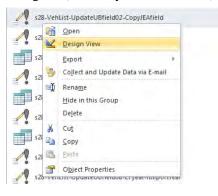
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6.1.3.5 Setting the Coefficient Considering the Condition of Mongolia

Right-click "s28-VehList-UpdateUBfield01-VehicleType" query and click [Design View]. In this query, set the vehicle type classification in UB city according to vehicle type classification in Japan and vehicle weight.

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Right-click "s28-VehList-UpdateUBfield02-CopyJEAfield" query and click [Design View]. In this query, copy and paste the regulation year of exhaust gas of vehicle in Japan set by "s22-VehList-UpdateJEAfield17-EFyear" query to the column for applying the regulation year of exhaust gas of vehicle in Mongolia ("UB-EFyear-NOx" etc.) and set "1" as initial value to the column of coefficient considered the condition in Mongolia ("UB-EFyear-NOx-r" etc.).

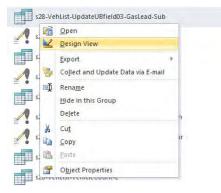


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1 Effect of Using Leaded Gasoline

Exhaust gas treatment equipment for gasoline vehicles imported before 2007 is considered to be deteriorated by leaded gasoline based on MNS217:87. Therefore, the emission factor in 1974, when leaded gasoline was sold in Japan, will be applied for gasoline vehicles imported before 2007.

Right-click "s28-VehList-UpdateUBfield03-GasLead-Sub" query and click [Design View]. In this query, extract the regulation year of exhaust gas of vehicle by pollutant in 1974.



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Right-click "s28-VehList-UpdateUBfield03-GasLead-Main" query and click [Design View]. In this query, change the regulation year of exhaust gas of vehicle applied in Mongolia for gasoline vehicle imported before 2007 to the regulation year of exhaust gas of vehicle in 1974 (the result of "s28-VehList-UpdateUBfield03-GasLead-Sub" query).

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2 Effect of Using the High Sulfur Gasoline

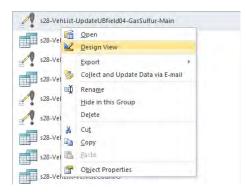
Since the gasoline currently sold in Mongolia exceeds the sulfur concentration standard required to Japanese vehicle after 2005, it is considered that the exhaust gas treatment device is deteriorating. For this reason, the emission factor of 2004 is applied to gasoline vehicles manufactured after 2005 and imported after 2007.

Right-click "s28-VehList-UpdateUBfield04-GasSulfur-Sub" query and click [Design View]. In this query, extract the regulation year of exhaust gas of vehicle by pollutant in 2004.

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Right-click "s28-VehList-UpdateUBfield04-GasSulfur-Main" query and click [Design View]. In this query, change the regulation year of exhaust gas of vehicle applied in Mongolia for gasoline vehicle manufactured after 2005 and imported after 2007 to the regulation year of exhaust gas of vehicle extracted by "s28-VehList-UpdateUBfield03-GasLead-Sub" query.



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3 Effect of Using the High Sulfur Diesel

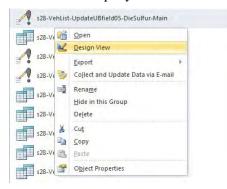
Since the diesel currently sold in Mongolia exceeds the sulfur concentration standard required to Japanese vehicle after 1997, it is considered that the exhaust gas treatment device is deteriorating. For this reason, the emission factor of 1996 is applied to gasoline vehicles manufactured after 1997.

Right-click "s28-VehList-UpdateUBfield05-DieSulfur-Sub" query and click [Design View]. In this query, extract the regulation year of exhaust gas of vehicle by pollutant in 1996.

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Right-click "s28-VehList-UpdateUBfield05-DieSulfur-Main" query and click [Design View]. In this query, change the regulation year of exhaust gas of vehicle applied in Mongolia for the vehicle manufactured after 1997 in Japan to the regulation year of exhaust gas of vehicle extracted by "s28-VehList-UpdateUBfield05-DieSulfur-Sub" query.

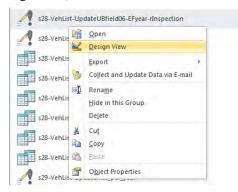


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			UB-EFyear-CO t15_VehicleList [s28-VehList-UpdateUBfield	JEA-EngineType t15_VehicleList 0! Like "*Diesel*"	JEA−manufacturedyear t15_VehicleList ▼ >=1997		

4 Effect of the travelling of the Vehicles that Have not Passed Vehicle Inspection

Many vehicles have high exhaust gas concentration. For that reason, for vehicle corresponding to Japan's inspection standard rejection⁷, double the emission factor and the fuel consumption rate for unregulated vehicles.

Right-click "s28-VehList-UpdateUBfield06-EFyear-rInspection" query and click [Design View]. In accordance with the above conditions, set the regulation year of exhaust gas of vehicle as "1" (before regulation) and double the coefficient taking into consideration the influence in Mongolia.



⁷ For gasoline vehicles: CO concentration> 1% or HC concentration> 300 ppm, for diesel vehicles: permeability> 40%

28-VehList-UpdateUBfield06-EFyear-rInspection		۰	23
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5 Effect of Inadequate Maintenance of Vehicle

Some vehicles running in the UB are the vehicles with insufficient maintenance. In Japan, there are investigations that vehicles with insufficient maintenance have 96% more air pollutants contained in exhaust gas than regularly maintained vehicles. Therefore, for vehicles imported before 2011, set the emission factor to add 96%.

Right-click "s28-VehList-UpdateUBfield08-EFyear-rImportYear" query and click [Design View]. In this query, 1.96 times the coefficients with Mongolian condition added to vehicles imported before 2011.

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6.1.3.6 Setting the Annual Traffic Volume by Vehicle Type

Right-click "s29-VehList-Update-km_per_year" query and click [Design View]. In this query, set the travel distance of all registered vehicle as 12,000km (passenger car).

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Right-click "s29-VehList-Update-km_per_year-PublicBus" query and click [Design View]. In this query, set the travel distance large-sized bus (assumed as public bus) as 76,578km.

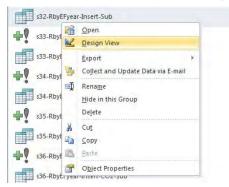
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s34-RbyEF) contraction of the second	or,	. *

Right-click "s29-VehList-Update-km_per_year-PublicMikro" query and click [Design View]. In this query, set the travel distance of micro bus as 57,098km.

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s34-Rbyery	ear-insert-HC-Sub		

6.1.3.7 Composition Ratio of Vehicle Type

Right-click "s32-RbyEFyear-Insert-Sub" query and click [Design View]. In this query, calculate the vehicle count and traffic volume by vehicle type.



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or:	4		ш					Þ	

Right-click "s32-RbyEFyear-Insert-NOx-Sub" query and click [Design View]. In this query, calculate the vehicle count, traffic volume, and averaged vehicle weight by vehicle type by the regulation year of exhaust gas of vehicle of NOx.

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Right-click "s32-RbyEFyear-Insert-NOx-Main" query and click [Design View]. In this query, calculate the vehicle type composition ratio of NOx by the regulation year of exhaust gas of vehicle and averaged vehicle weight. After clicking [Run] and executing, add this query result to "t31_RbyEFyear" table.



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Table: Sort:	km_per_yByEF countByType km_per_yByType RbyType: [km_per_yByEF]/[km_per_yByType] EFton: Ilf(([JEA-GVWcategory] s32-RbyEFyear s32-RbyEFyear s32-RbyEFyear EFton: km_per_yByEF countByType km_per_yByType RbyType Image: Image: Image: Image:	=″GVW	
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Right-click "s33-RbyEFyear-Insert-PM-Sub" query and click [Design View]. In this query, calculate the vehicle count, traffic volume, and averaged vehicle weight by vehicle type by the regulation year of exhaust gas of vehicle of PM.

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Right-click "s33-RbyEFyear-Insert-PM-Main" query and click [Design View]. In this query, calculate the vehicle type composition ratio of PM by the regulation year of exhaust gas of vehicle and averaged vehicle weight. After clicking [Run] and executing, add this query result to "t31_RbyEFyear" table.

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Right-click "s34-RbyEFyear-Insert-HC-Sub" query and click [Design View]. In this query, calculate the vehicle count, traffic volume, and averaged vehicle weight by vehicle type by the regulation year of exhaust gas of vehicle of HC.

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Right-click "s34-RbyEFyear-Insert-HC-Main" query and click [Design View]. In this query, calculate the vehicle type composition ratio of HC by the regulation year of exhaust gas of vehicle and averaged vehicle weight. After clicking [Run] and executing, add this query result to "t31_RbyEFyear" table.

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Right-click "s35-RbyEFyear-Insert-CO-Sub" query and click [Design View]. In this query, calculate the vehicle count, traffic volume, and averaged vehicle weight by vehicle type by the regulation year of exhaust gas of vehicle of CO.

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Right-click "s35-RbyEFyear-Insert-CO-Main" query and click [Design View]. In this query, calculate the vehicle type composition ratio of CO by the regulation year of exhaust gas of vehicle and averaged vehicle weight. After clicking [Run] and executing, add this query result to "t31_RbyEFyear" table.

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135-RbyEFyear-Insert-CO-Sub * UB-VehideType JEA-WohiteType JEA-BuyOrTruck JEA-BayOrTruck JEA-EngineCoachityCategory JEA-ENVicategory JEA-ENVicategory UB-EFyear-CO- UB-EFyear-CO- CountbyEF Km.per_y0yEF TonAverage	Type pe					A (0)
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or:	III					•
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or:						

Right-click "s36-RbyEFyear-Insert-CO2-Sub" query and click [Design View]. In this query, calculate the vehicle count, traffic volume, and averaged vehicle weight by vehicle type by the regulation year of exhaust gas of vehicle of CO2.

	EFyear-Insert-CO2-Sub							
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Right-click "s36-RbyEFyear-Insert-CO2-Main" query and click [Design View]. In this query, calculate the vehicle type composition ratio of CO2 by the regulation year of exhaust gas of vehicle and averaged vehicle weight. After clicking [Run] and executing, add this query result to "t31_RbyEFyear" table.

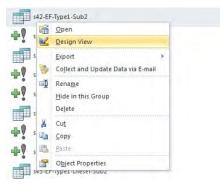
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542-EF-I	ype1-Sub			
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536-Rb	yEFyear-Insert-CO2-Sub	s32-RbyEFyear-Insert-Sub		
	8-VehicleType	UB-VehicleType countByType		
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	A-EngineType A-EngineCapacityCategory	<u>ii</u>		
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6.1.3.8 Calculation of Emission Factor by Vehicle Type

Right-click "s42-EF-Type1-Sub" query and click [Design View]. In this query, cross the table of vehicle type composition ratio by the regulation year of exhaust gas of vehicle and the table of travel speed.

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s45-E	Baste									
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42-EF-Type1-										- 0
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M_TravelS	Speed	t31_RbyEFyear		1						
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Right-click "s42-EF-Type1-Sub2" query and click [Design View]. In this query, calculate emission factor by joining to the coefficient table of emission unit by vehicle type by regulation year of exhaust gas of vehicle.

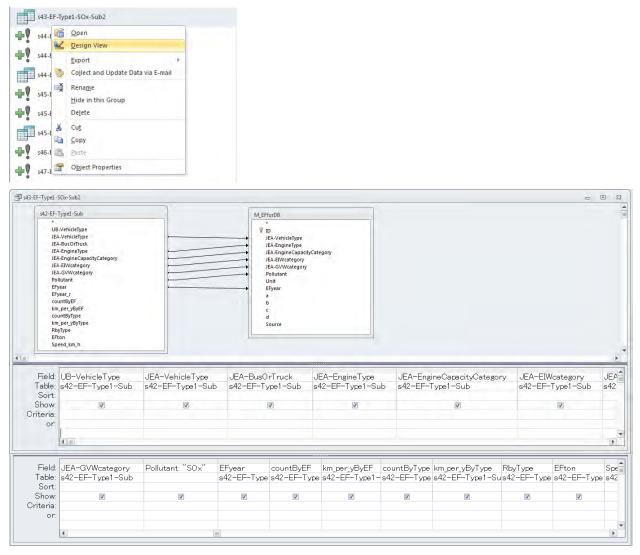


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Criteria: or:	4				Ш		•
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Right-click "s42-EF-Type1-Main" query and click [Design View]. In this query, organize the emission factor by pollutant by vehicle type by traffic speed.

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Right-click "s43-EF-Type1-SOx-Sub2" query and click [Design View]. In this query, calculate the emission factor of SOx by multiplying the ratio of sulfur content to carbon content in fuel by emission factor of CO2.



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Right-click "s43-EF-Type1-SOx-Main" query and click [Design View]. In this query, organize the emission factor of SOx by vehicle type by traffic speed.

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Right-click "s44-EF-Type1-Gasoline-Sub2" query and click [Design View]. In this query, calculate gasoline consumption factor by multiplying the coefficient calculated the carbon content in fuel by emission factor of CO2.

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Right-click "s44-EF-Type1-Gasoline-Main" query and click [Design View]. In this query, organize the gasoline consumption factor by vehicle type by traffic speed.

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Right-click "s44-EF-FuelRatio-Gasoline" query and click [Design View]. In this query, organize the gasoline consumption by vehicle type by traffic speed.

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Right-click "s45-EF-Type1-Diesel-Sub2" query and click [Design View]. In this query, calculate diesel oil consumption factor by multiplying the coefficient calculated the carbon content in fuel by emission factor of CO2.

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Right-click "s45-EF-Type1-Diesel-Main" query and click [Design View]. In this query, organize the diesel oil consumption factor by vehicle type by traffic speed.

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₽ ♥ 545-	EF-Ty	pe1-Diesel-Main	-	5-81-1 ypal -Oresel-Jub2 Dil. Venst Pype IEA-Venst Pype IEA-SystorYouch IEA-Engine Capacity Category IEA-Engine Capacity Category IEA-Environment IEA-En	-			
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Right-click "s45-EF-FuelRatio-Diesel" query and click [Design View]. In this query, organize the diesel consumption by vehicle type by travel speed.

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Right-click "s46-EF-Type1-TraVol" query and click [Design View]. In this query, set the coefficient of traffic volume by vehicle type by travel speed.

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Right-click "s47-EF-Type2-Sub" query and click [Design View]. In this query, organize the emission factor and fuel consumption factor by vehicle type.

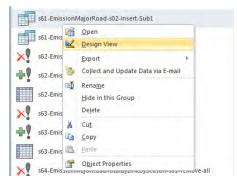
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Right-click "s47-EF-Type2-Main" query and click [Design View]. In this query, crate the table organized by "s47-EF-Type2-Sub" query.

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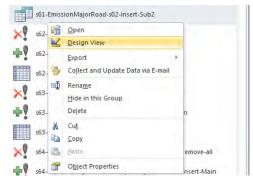
6.1.3.9 Calculation of the Emission of Vehicle Exhaust Gas from Major Road

Right-click "s61-EmissionMajorRoad-s02-insert-Sub1" query and click [Design View]. In this query, calculate the traffic count by link, season, weekday or holiday, hour, and vehicle type.



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Right-click "s61-EmissionMajorRoad-s02-insert-Sub2" query and click [Design View]. In this query, add averaged travel speed to "s61-EmissionMajorRoad-s02-insert-Sub1" query.



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Right-click "s61-EmissionMajorRoad-s02-insert-Main" query and click [Design View]. In this query, select the emission factor by pollutant from vehicle type and travel speed and calculate the emission by link, season, weekday or holiday, hour vehicle type, and pollutant.

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Right-click "s62-EmissionMajorRoadTotal-s02-insert-Sub1" query and click [Design View]. In this query, cross tabulation of the emission by link, season, weekday or holiday, hour vehicle type, and pollutant is conducted.

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Right-click "s62-EmissionMajorRoadTotal-s02-insert-Main" query and click [Design View]. In this query, add the result by "s62-EmissionMajorRoadTotal-s02-insert-Sub1" query to table.

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6.1.3.10 Calculation of the Emission of Vehicle Exhaust Gas from Minor Road

Right-click "s28-VehList-UpdateUBfield04-GasSulfur-Sub" query and click [Design View]. In this query, calculate the emission in minor road by multiplying the emission in major road by the ratio of traffic volume in minor road to traffic volume in major road in last year.

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Right-click "s72-EmissionMinorRoadTotalByGrid-s02" query and click [Design View]. In this query, calculate the emission by grid in minor road by multiplying the total emission in minor road by the population ratio by grid.

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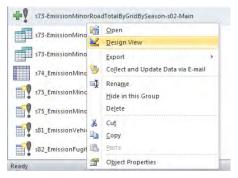
Right-click "s73-EmissionMinorRoadTotalByGridBySeason-s02-Sub1" query and click [Design View]. In this query, calculate the seasonal traffic volume by grid in minor road.

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Right-click "s73-EmissionMinorRoadTotalByGridBySeason-s02-Sub2" query and click [Design View]. In this query, calculate the total traffic volume in minor road.

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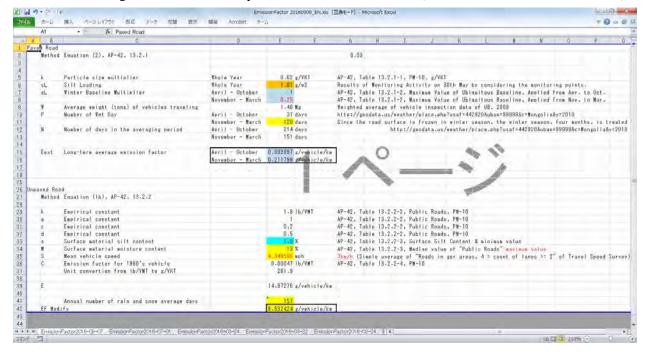
Right-click "s73-EmissionMinorRoadTotalByGridBySeason-s02-Main" query and click [Design View]. In this query, calculate the seasonal emission of grid by multiplying the emission of grid in minor road by the ratio of seasonal traffic volume to total traffic volume.



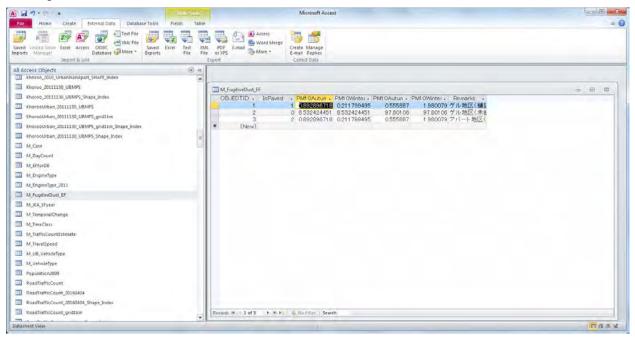
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6.1.3.11 Emission Factor of Fugitive Dust from Road

Calculate the emission factor of fugitive dust from road by inputting and updating the value of the calculation sheet for calculating the emission factor by the method shown in 6.1.2.2 (EmissionFactor_20160909_EN.xls).



Update the result of the above calculation sheet to [PM10_Autumn_Min] and [PM10_Winter_Min] columns in "M_FugitiveDust_EF" table



6.1.3.12 Calculation of Fugitive Dust Amount by Vehicle Travelling in Major Road

Fugitive road dust by road traveling is calculated by the following formula. In the database, we create queries to calculate this.

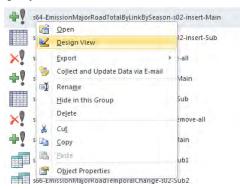
Figitive dust amount (ton) = traffic volume (unit x km) x fugitive emission factor of major road (g/unit x km)

Since the emission factor is seasonal, it is necessary to calculate traffic volume by season as well. This calculation formula is the same for the calculation of the fugitive dust in minor road.

Right-click "s64-EmissionMajorRoadTotalByLinkBySeason-s02-insert-sub" query and click [Design View]. In this query, cross tabulation of the emission by link by season is conducted.

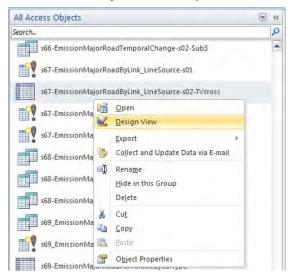
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Right-click "s64-EmissionMajorRoadTotalByLinkBySeason-s02-insert-Main" query and click [Design View]. Add table to the result of cross tabulation in "s64-EmissionMajorRoadTotalByLinkBySeason-s02-insert-sub" query.



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To cross tabulation of the traffic volume per 1km by link by season, right-click "s67_EmissionMajorRoadTotalByLinkLineSource-s02-TVcross" query and click [Design View].



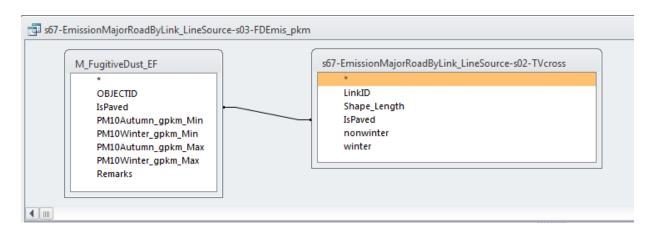
Show "t64_EmissionMajorRoadTotalByLinkBySeason" table on this query and set the output item as follows.

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To calculate the fugitive road dust per 1km by multiplying traffic volume by emission factor, right-click "s28-VehList-UpdateUBfield04-GasSulfur-Sub" query and click [Design View]. In this query, extract the regulation year of exhaust gas of vehicle by pollutant in 2004.

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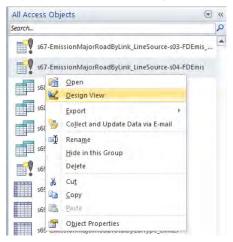
Join "s67_EmissionMajorRoadTotalByLink_LineSource-s02-TVcross" query and "M_FugitiveDust_EF" table on [IsPaved] column.



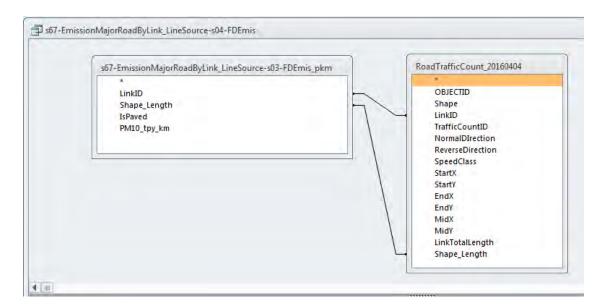
Set the output item as follows. Calculate the annual emission per 1km by summing the emission by multiplying the seasonal traffic volume by seasonal emission factor emission per traffic volume.

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		Shape_Length		PM10_tpy_km: Sum([nonwinter]*[PM10Autumn_gpkm_Min]+[winter]*[PM10Winter_gpkm_Min])	
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Calculate the annual fugitive road dust by link by multiplying the annual emission per 1km by the link length. Right-click "s28-VehList-UpdateUBfield04-GasSulfur-Sub" query and click [Design View].



Join "RoadTrafficCount_20160404" table, "s67-EmissionMajorRoadByLink_LineSource-s03-FDEmis_pkm" query on [LinkID] and [Shape_Length] column.



Set the output item as follows. Calculate the emission by multiplying the annual emission per 1km by link length. PM10 emission is the same as PM emission.

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Click [Design]-[Create Table]



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Make New Tal	ble	OK					
Table <u>N</u> ame:	able Name: t67_EmissionMajorRoadByLink_LineSource_FDEmis 💌						
Current Da	atabase	Cance					
Another D	atabase:						
E							
File Name:							

Click [Design]-[Run]



Click [Yes].



Create the input data table of fugitive road dust in major road for simulation.

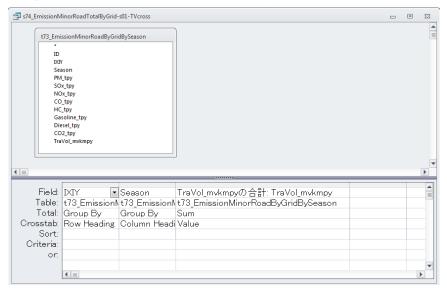
LinkID	🚽 Shape Leng 🗸	StartX 🚽	StartY 🚽	EndX 🚽	EndY 🚽	MidX 🚽	MidY 🚽	PM tpy 🚽	PM10_tpy 👻	
01	1044.023094	643072.6911	5313512,434	642957.6074	5314549.164	643017.8677	5314030.741	13,56640036		
01	2245.763941	642957.6074	5314549.164	643161.8106	5316777.705	643116.7758	5315660.633	29.18224024	29.18224024	
02	395.5026814	643072.6911	5313512.434	642709.134	5313389.335	642879.916	5313479.422	2.444424471	2.444424471	
02	397.5723472	642349.8118	5312542.938	642317.5325	5312153.035	642348.0633	5312345.429	2,457216146	2,457216146	
02	923.1456535	642709.134	5313389.335	642349.8118	5312542.938	642525.5759	5312967.613	5.705548740	5.705548740	
03	1209.605961	643264.9285	5312318.442	643072.6911	5313512.434	643175.1124	5312916.517	7.79639649	7.79639649	
04-1	525.119773	644003.8064	5312975.935	643580.2832	5313264.833	643816.3518	5313149.902	3.861315654	3.861315654	
04-1	548.1167005	644016.2185	5312430.67	644003.8064	5312975.935	644022.1812	5312704.663	4.030416877	4.030416877	
04-2	566.0409513	643580.2832	5313264.833	643072.6911	5313512.434	643325.0641	5313387.154	4.162217647	4.162217647	
05	268.4971198	650045.4804	5312880.068	649882.5456	5313092.888	649965.4221	5312987.825	1.768069073	1.768069073	
05	1331.543557	649185.1587	5311924.781	650045.4804	5312880.068	649647.7668	5312350.107	8.768291386	8.768291386	
05	1664.165269	647550.0909	5311869.518	649185.1587	5311924.781	648381.3428	5311849.736	10.95862460	10.95862460	
06	1019.388816	649466.8904	5310696.863	648454.1278	5310607.976	648960.6679	5310663.966	9.425499985	9.425499985	
06	2947.619489	652093.2292	5309394.567	649466.8904	5310696.863	650730.7867	5309956.461	27.25435772	27.25435772	
07-1	342.7335578	646389.8393	5311785.838	646047.155	5311781.26	646218.4892	5311784.108	2.996556536	2.996556536	
07-1	366.3030836	647550.0909	5311869.518	647184.7626	5311868.129	647367.2286	5311879.785	3.202627448	3.202627448	
07-1	396.4294566	646783.6397	5311825.415	646389.8393	5311785.838	646587.7722	5311795.42	3.466025583	3.466025583	
07-1	403.4246696	647184.7626	5311868.129	646783.6397	5311825.415	646984.1171	5311847.449	3.527185486	3.527185486	
07-2	271.4137808	646047.155	5311781.26	645776.1876	5311770.216	645911.6386	5311774.172	2.373000018	2.373000018	
07-2	419.7468191	645776.1876	5311770.216	645404.4167	5311956.218	645581.9255	5311844.251	3.669891803	3.669891803	
07-2	444.3617308	645404.4167	5311956.218	645021.3234	5312155.891	645217.7159	5312076.649	3.885102636	3.8851 02636	
08	895.6319456	647497.8094	531 0975.858	647550.0909	5311869.518	647522.7040	5311422.552	5.168709276	5.168709276	
09-1	1445.260449	636407.3808	5315190.260	637835.3977	5315157.084	637121.6867	5315083.196	13.60825207	13.60825207	
09-1	3262.236954	637835.3977	5315157.084	640628.2669	5313520.120	639256.7854	5314380.095	30.71650015	30.71650015	
09-2	1577.572629	640628.2669	5313520.120	641366.5725	5312166.238	640947.825	5312813.611	14.85407424	14.85407424	
09-3	984.8372116	641366.5725	5312166.238	642011.8287	5311433.635	641720.5787	5311824.037	9.273008916	9.273008916	
10-1	639.8694567	635734.3443	5313735.225	636278.7996	531 4059.801	636013.5144	5313888.740	5.948666858	5.948666858	
10-1	1623.499705	635771.8187	5312168.865	635734.3443	5313735.225	635609.3957	5312954.534	15.09317063	15.09317063	
10-1	2004.281710	636278.7996	531 4059.801	636552.4073	5316031	636404.6820	5315050.488	18.63318222	18.63318222	
10-2	2157.070241	635976.3479	531 0041 .36	635771.8187	5312168.865	635815.8751	5311100.294	20.05360956	20.05360956	
11	1413.783097	634737.6083	5309953.032	633386.3353	5310065.473	634031.2022	5309930.032	6.320679662	6.320679662	
11	1701.255001	633386.3353	531 0065.473	631778.775	5309647.098	632609.2280	5309793.559	7.605896484	7.605896484	
11	3614.302613	631778.775	5309647.098	629229.6174	5312102.305	630562.0073	531 0932.053	16.15866612	16.15866612	
12	1207.627784	633709.0052	5304182.906	633581 8829	5305343.371	633787.9695	5304779.666	4.480709971	4,480709971	

6.1.3.13 Calculation of Fugitive Dust Amount by Vehicle Travelling in Minor Road (Paved Road)

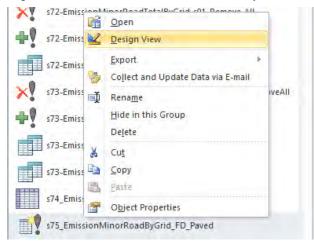
Right-click "s74_EmissionMinorRoadTotalByGrid-s01-TVcross" query and click [Design View].

s71-EmissionMinorP	iii ii	Open	
s72-EmissionMinorF	K	Design View	
s72-EmissionMinorF	-	Export Collect and Update Data via E-mail	*
s72-EmissionMinorF	۰Į	Rena <u>m</u> e	
s73-EmissionMinorF		<u>H</u> ide in this Group De <u>l</u> ete	
s73-EmissionMinorF	×	Cu <u>t</u>	
s73-EmissionMinorF	-	<u>С</u> ору	
s73-EmissionMinorF		Paste Object Properties	
	s72-EmissionMinorF s72-EmissionMinorF s72-EmissionMinorF s73-EmissionMinorF s73-EmissionMinorF s73-EmissionMinorF	s72-EmissionMinorf s72-EmissionMinorf s72-EmissionMinorf s73-EmissionMinorf s73-EmissionMinorf s73-EmissionMinorf	Image: Sign View S72-EmissionMinorF S72-EmissionMinorF S72-EmissionMinorF S73-EmissionMinorF S73-EmissionMinorF

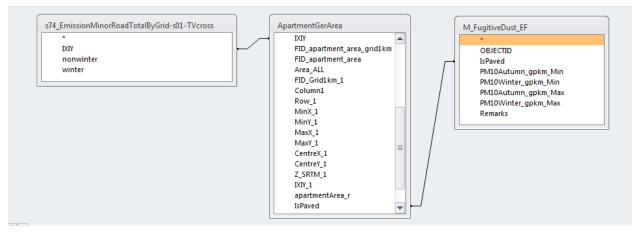
Show "t73_EmissionMinorRoadByGridBySeason" table on this query and set the output item as follows. In this query, cross tabulation of the emission by grid by season is conducted.



Right-click the "s75_EmissionMinorRoadByGrid_FD_Paved" query and click [Design View].



Join "ApartmentGerArea" table, "s74_EmissionMinorRoadByGrid-s01-TVcross" query on [IXIY] column and join "ApartmentGerArea" table, "M_FugitiveDust_EF" query on [IsPaved].



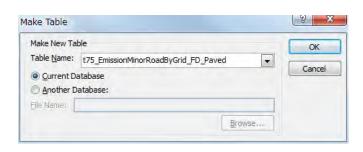
Set the output item as follows. Calculate the emission by multiplying the traffic volume by season by grid by emission factor per traffic volume and by the area ratio of apartment area or ger area by grid.

Eield									
	H: IXIY	 Column 	Row	MinX	MinY	SOx tpy: ""	NOx tpy: ""	PM tpy: Sum(PM10 tpy: S
Table	e: ApartmentG	ei ApartmentGe	ApartmentGe	ApartmentGe	ApartmentGe				
Tota	II: Group By	Group By	Group By	Group By	Group By	Expression	Expression	Expression	Expression
Sort	t: Ascending								
Show	v: 🔽			V	V	v	V	\checkmark	V
Criteria	а:								
01									
					initiality.				
Field P	M_tpy: Sum(IIf([Apa	rtmentGerArea][lsP	aved]=2.([nonwinter	r]*[PMIOAutumn_g	pkm_Min]+[winter]*	PM10Winter_gpkn	Min])*[apartmentA	rea_r].([nonwinter]	PM10Autumn
Table:	xpression								
Sort	xpression								
Show					12				
Criteria:									
or									
1									
L					10000		3		
	ter]*[PM10Winter_s	pkm_Min])*[apartmer	ntArea_r].([nonwinte	er]*[PM10Autumn_i	sokm_Min]+[winter]	k[PM10Winter_gpkr	n_Min])*[gerArea_r]*	⊧0.3))	F
Table		pkm_Min])≉[apartmer	ntAres_r]([nonwinte	er]*[PM10Autumn_1	sokm_Min]+[winter]	k[PM10Winter_sokr	n_Min])*[gerArea_r]*	•0.3))	
Table	ter]≱[PM10Winter_g xpression	skm_Min])*[apartmer	ntArea_r]([nonwinte	er]*[PM10Autumn_i	sckm_Min]+[winter]	*[PM10Winter_gpk;	n_Min])*[gerArea_r]4	•0.3))	
Table Total E Sort Show		skm_Min])*[apartmer	ntArea_r]([nonwinte	r]≉[PM10Autumn_i	gckm_Min]+[winter] 2	⊯[PM10Winter_goki	n_Min])*[gerArea_r]4	0.3))	
Table Total E Sort Show Criteria		pkm,Min])≉[apartmer	ntArea_r]([nonwinte	er]≇[PM10Autumn_i		*[PM10Winter_gpks	n_Min])*[serArea_r]4	•0.3))	
Table Total E Sort Show		skm_Min])≉[apartmer	ntArea_r]([nonwinte	r]≉[PM10Autumn_i		*[PM10Winter_gpkg	n_Min])*[serArea_r]4	×0.3))	
Table Total Sort Show Criteria or	xpression				ġ		3		F
Table Total Sort Show Criteria or Field P	xpression	skm_Min])*[apartmer partmentGerArea][[ġ		3		- IsPaved
Table Total E Sort Show Criteria or Field P Table	xpression M10_toy. Sum(IIf[[A				ġ		3	ntArea CO_toy. **	IsPaved ApartmentGe
Table Total E Sort Show Criteria: or Field PI Table Total E Sort	xpression			nter]*[PM10Autum	ġ		3	ntArea CO_toy: ** Group By	IsPaved ApartmentGe
Table Total E Show Criteria or Field P Table Total E Sort Show	xpression M10_toy. Sum(IIf[[A				ġ		3	ntArea CO_toy. **	IsPaved ApartmentGe Where
Table Total E Sort Show Criteria: or Field PI Table Total E Sort	xpression M10_toy. Sum(IIf[[A			nter]*[PM10Autum	ġ		3	ntArea CO_toy: ** Group By	IsPaved ApartmentGe

Click [Make Table] in [Design]

File	Hor	me	Create	Extern	al Data	Datab	ase Tool	5	Design
View *	Run	Sele	t Make Table	Append	Update	Crosstab	X Delete	0	Union Pass-Through Data Definition
Resu	Its				Qu	ery Type		-	

Set the table name (Here it is "t75_EmissionMinorRoadByGridForSimulation_FD_Paved").



Click [Design]- [Run].

File	Ho	me C	reate	Extern	al Data	Datab	ase Too	ls Design
View	Run	Select	Make Table	Append	Update	Crosstab	X Delete	 Union Pass-Through Data Definition
Resi	ults				Qu	егу Туре		

Click [Yes].

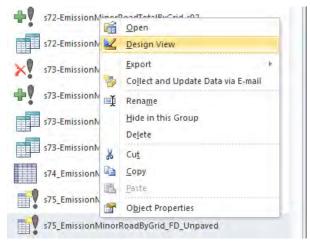
1	You are about to paste 6400 row(s) into a new table.
<u>.</u>	Once you click Yes, you can't use the Undo command to reverse the changes Are you sure you want to create a new table with the selected records?

Create the input data table of fugitive road dust in minor road (paved road) for simulation.

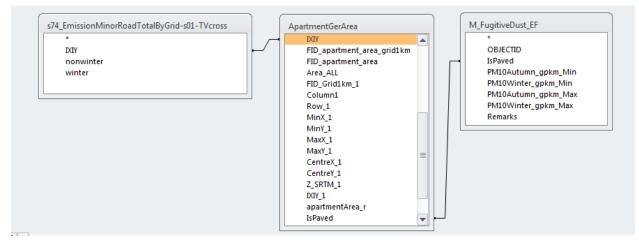
DXIY 🚽 O	olumn_ 🚽	Row 👻	MinX 🚽	MinY 🚽	SOx_tpy 👻	NOx_tpy 👻	PM_tpy 🚽	PM10_tpy 👻	CO_tpy
230018	23	18	633000	5298000			0	0	
230019	23	19	633000	5299000			0	0	
230020	23	20	633000	5300000			6.07252E-05	6.07252E-05	
230021	23	21	633000	5301 000			0.023006337	0.023006337	
230022	23	22	633000	5302000			0.015364939	0.015364939	
230023	23	23	633000	5303000			0.022025292	0.022025292	
230024	23	24	633000	5304000			0.008413580	0.008413580	
230025	23	25	633000	5305000			0.033075443	0.033075443	
230026	23	26	633000	5306000			0	0	
230027	23	27	633000	5307000			0.008777032	0.008777032	
230028	23	28	633000	5308000			0.01 4722454	0.01 4722454	
230029	23	29	633000	5309000			0.016201156	0.016201156	
230030	23	30	633000	531 0000			0.1 001 3281 5	0.1 001 3281 5	
230031	23	31	633000	5311000			0.223428697	0.223428697	
230032	23	32	633000	5312000			0.056197601	0.056197601	
230033	23	33	633000	5313000			0.019578247	0.019578247	
230034	23	34	633000	5314000			0	0	
230035	23	35	633000	5315000			1.18567E-05	1.18567E-05	
230036	23	36	633000	531 6000			2.92555E-05	2.92555E-05	
230037	23	37	633000	5317000			6.50662E-05	6.50662E-05	
230038	23	38	633000	5318000			0.00035344	0.00035344	
230039	23	39	633000	5319000			0.002860292	0.002860292	
230040	23	40	633000	5320000			0.00208683	0.00208683	
230041	23	41	633000	5321000			0.001900787	0.001900787	
230042	23	42	633000	5322000			0.000408433	0.000408433	
230043	23	43	633000	5323000			0	0	
230044	23	44	633000	5324000			0	0	
230045	23	45	633000	5325000			0	0	

6.1.3.14 Calculation of Fugitive Dust Amount by Vehicle Travelling in Minor Road (Unpaved Road)

Right-click the "s75_EmissionMinorRoadByGridForSimulation_FD_Unpaved" query and click [Design View].



Join "ApartmentGerArea" table, "s74_EmissionMinorRoadByGrid-s01-TVcross" query on [IXIY] column and join "ApartmentGerArea" table, "M_FugitiveDust_EF" query on [IsPaved].



Set the output item as follows. Calculate the emission by multiplying the traffic volume by season by grid by emission factor per traffic volume and by the area ratio of apartment area or ger area by grid.

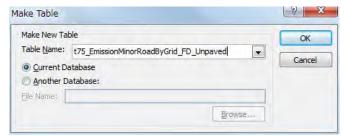
Capacity Development Project for Air Pollution Control in Ulaanbaatar City Phase 2 Mongolia Technical Manual 07: Manual for Development and Updating of Emission Inventory

i ioia.	IXIY	 Column_ 	Row	MinX	MinY	SOx_tpy: ""	NOx_tpy: ""	PM_tpy: Sum	((PM10_tpy: S	ui O(
Table:	ApartmentG	e ApartmentGe	ApartmentGe	ApartmentGe	ApartmentGe					
	Group By	Group By	Group By	Group By	Group By	Expression	Expression	Expression	Expression	G
	Ascending									
Show:	V					V	V	V		
Criteria:										
or:										
Field	l: PM_tpy: S	um(([nonwinte	r] ∗ [PM10Aut	:umn_gpkm_M	in]+[winter]*	[PM10Winte	r_gpkm_Min]):	*[gerArea_r]*	⊧0.7) PM1+	0_t(
Table	c l									
Total	I: Expression Express									
Sort										
Show	r									
Show Criteria					\checkmark					V
Criteria	:									V
	: :						[m]			
Criteria	:									V •
Criteria or			M100					00 hrs.""		
Criteria or Field: F		n(([nonwinter]*[P	M10Autumn_gpl	(m_Min]+[winter		gpkm_Min])*[ge		C0_tpy: ""	IsPaved	
Criteria or Field: F Table:	PM10_tpy: Sum	n(([nonwinter]*[P	M10Autumn_gpl	<m_min]+[winter< td=""><td></td><td>gpkm_Min])*[ge</td><td></td><td></td><td>ApartmentGei</td><td></td></m_min]+[winter<>		gpkm_Min])*[ge			ApartmentGei	
Criteria or Field: F Table:		n(([nonwinter]*[P	M10Autumn_gpł	xm_Min]+[winter		gpkm_Min])*[ge		C0_tpy: "" Group By		
Criteria or Field: F Table: Total: E	PM10_tpy: Sum	n(([nonwinter]*[P	M10Autumn_gpł	km_Min]+[winter		gpkm_Min])*[ge			ApartmentGei	
Criteria or Field: F Table: Total: E Sort:	PM10_tpy: Sum	n(([nonwinter]*[P	M10Autumn_gpł			gpkm_Min])*[ge		Group By	ApartmentGeı Where	
Criteria or Field: F Table: Total: E Sort: Show:	PM10_tpy: Sum	ı(([nonwinter]¥[P	M10Autumn_gpl			gpkm_Min])*[ge		Group By	ApartmentGei Where	

Click [Make Table] in [Design]

File	Ho	me C	ireate	Extern	al Data	Datab	ase Too	ls Design
View	Run	Select	Make Table	Append	Update	Crosstab	X Delete	 Union Pass-Through Data Definition
Resu	Its				Qu	егу Туре		

Set the table name (Here it is "t75_EmissionMinorRoadByGridForSimulation_FD_Unpaved").



Click [Design]- [Run].



Click [Yes].



Create the input data table of fugitive road dust in minor road (unpaved road) for simulation.

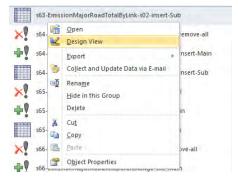
IXIY 🚽	Column_ 🚽	Row 👻	MinX 🚽	MinY 🚽	SOx_tpy 🕞	NOx_tpy	- PM_tpy -	PM10_tpy 👻	CO_tpy 🗸
180013	18	13	628000	5293000			0	0	
180014	18	14	628000	5294000			0.044715804	0.044715804	
180015	18	15	628000	5295000			0.469368715	0.469368715	
180016	18	16	628000	5296000			0.473457043	0.473457043	
180017	18	17	628000	5297000			0.068715288	0.068715288	
180018	18	18	628000	5298000			0	0	
180019	18	19	628000	5299000			0	0	
180020	18	20	628000	5300000			0	0	
180021	18	21	628000	5301 000			0	0	
180022	18	22	628000	5302000			0.222667114	0.222667114	
180023	18	23	628000	5303000			0.569707225	0.569707225	
180024	18	24	628000	5304000			0	0	
180025	18	25	628000	5305000			0	0	
180026	18	26	628000	5306000			0	0	
180027	18	27	628000	5307000			0.063018044	0.063018044	
180028	18	28	628000	5308000			0.604300295	0.604300295	
180029	18	29	628000	5309000			0.138911835	0.138911835	
180030	18	30	628000	531 0000			0.044978917	0.044978917	
180031	18	31	628000	5311000			0.040538871	0.040538871	
180032	18	32	628000	5312000			0.094901141	0.094901141	
180033	18	33	628000	5313000			0.108310317	0.108310317	
180034	18	34	628000	5314000			1.24283E-05	1.24283E-05	
180035	18	35	628000	5315000			0	0	
100026	10	26	629000	5216000			0		

6.2 Conversion Method of Mobile Source Inventory to the Input Data for Dispersion Simulation

Open "EmissionFromTransport Inv01 2015.mdb".

1 <u>Developing the Input Data for Dispersion Simulation of Vehicle Exhaust Gas from Major</u> <u>Road</u>

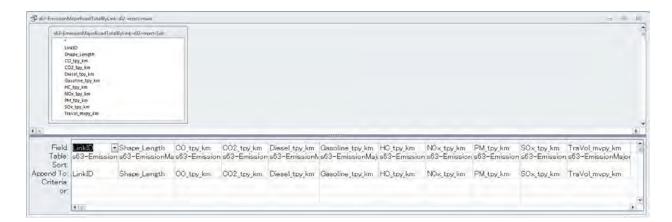
Right-click "s63-EmissionMajorRoadTotalByLink-s02-insert-Sub" query and click [Design View]. Cross tabulation of the emission by link by pollutant is conducted in this query.



563-EmissionMajorRoadTotalByLink-s02-in	nsert-Sub			. 0	53
					4
t61_EmissionMajorRoad Count TimeClass DayCount TraveISpeed Pollutant EF.g.per_km EF.g.per_km,org Emission_g_per_km Emission_g_per_km Emission_g Emmission_g Emmission_g Emmission_g day Emission_g_day.org					
					•
Field: LinkID Sha Table: t61_EmissionN t61	_EmissionMa oup By Group	By n Heading	 >″TraVol″,[Pollutant] & ″_tpy_km″,[Pollutant] & ″_mvpy_km″	E×	niss pre Ilue
					v
Table: t61_EmissionNt61	_EmissionMa oup By Group	By n Heading	Emission: Sum([EF_g_per_km]*[Count]*[DayCount]/100000(Expression Value))	
					•

Right-click "s63-EmissionMajorRoadTotalByLink-s02-insert-Main" query and click [Design View]. Add table to the result of cross tabulation in "s63-EmissionMajorRoadTotalByLink-s02-insert-Sub" query.

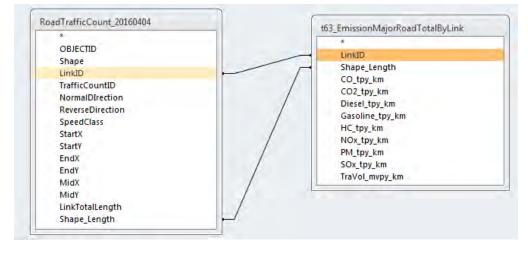
-	s63-En	nission Major Road Total By Link-s02-insert-r	nain
		Open	
	s63	Design View	ib
×	564	Export >	-remove-all
-	s64	Collect and Update Data via E-mail	-insert-Main
	Ĩ	Rename	in sere man
	s64	Hide in this Group	-insert-Sub
×	s6!	Delete	all
	X	Cut	
	s6!	<u>с</u> ору	ain
	s6!	Paste	ıb
		Object Properties	1
¥V.	S66-ER	ISSIANMAIARAAALEMAATAI hande-sul-re	move_all



Right-click "s67-EmissionMajorRoadByLink_LineSource" query and click [Design View].

s65-EmissionMajorRoadTotalByGrid-s02-insert-Main	Copen
s65-EmissionMajorRoadTotalByGrid-s02-insert-Sub	Design View
	<u>Export</u>
s66-EmissionMajorRoadTemporalChange-s01-remove-all	Collect and Update Data via E-mail
s66-EmissionMajorRoadTemporalChange-s02-Main	■Ĵ Rena <u>m</u> e
s66-EmissionMajorRoadTemporalChange-s02-Sub1	<u>H</u> ide in this Group Delete
	X Cut
s66-EmissionMajorRoadTemporalChange-s02-Sub2	
s66-EmissionMajorRoadTemporalChange-s02-Sub3	Paste
s67-EmissionMajorRoadByLink_LineSource	Object Properties

Join "RoadTrafficCount_20160404" table, "t63_EmissionMajorRoadTotalByLink" table on [LinkID] and [Shape_Length] column.



Set the output item as follows. Calculate the emission by multiplying the emission per vehicle x 1km by traffic count and length of link.

Capacity Development Project for Air Pollution Control in Ulaanbaatar City Phase 2 Mongolia Technical Manual 07: Manual for Development and Updating of Emission Inventory

				StartY			MidX	MidY
	RoadTrafficCount_2016(RoadTrafficCount_2016(RoadTrafficCount_2016(RoadTrafficCount_2016(RoadTrafficCount_2016(RoadTrafficCount_20160	RoadTrafficCount_2016(RoadTrafficCount_2016
	Ascending							
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Field: Table:	SOx_tpy: [t63_EmissionMajorRoadTotalByLink]![SOx_tpy_km]*[RoadTi	rafficCount_20160404]![Shape_Length]/1	000 N	O×_tpy: [t63_Emission
Sort: Show: iteria:	Is Not Null				
or:					
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Click [Design]-[Create Table]

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View	Run	Select	Make Table	Append	Update	Crosstab	X. Delete		Union Pass-Through Data Definition
Resi	ults				Qu	егу Туре			

Set the table name (Here it is "t67_EmissionMajorRoadByLink_LineSource").

Make New Tal	le	OK
Table <u>N</u> ame:	t67_EmissionMajorRoadByLink_LineSource	
O Current Da	tabase	Cancel
O Another D	atabase:	

Click [Design]-[Run]

File	Ho	me	Create	Extern	al Data	Datab	ase Tool	5	Design
View	Run	Sele	ct Make Table	Append	Update	Crosstab	X Delete		Union Pass-Through Data Definition
Rest	lts				Qu	егу Туре			_

Click [Yes].



Create the input data table of major road for simulation.

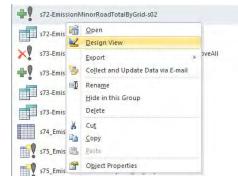
01 01 02	1044.023094		StartY 🚽	EndX 🚽	EndY 🚽	MidX 🚽	MidY 🚽	SOx_tpy 🕞	NOx_tpy 🕞	PM_tpy 🚽
		643072.6911	5313512.434	642957.6074	5314549.164	643017.8677	5314030.741	2.744180338	35.73983124	2.085857078
02	2245.763941	642957.6074	5314549.164	643161.8106	5316777.705	643116.7758	5315660.633	5.9029166	76.87878241	4.486818959
	395.5026814	643072.6911	5313512.434	642709.134	5313389.335	642879.916	5313479.422	0.518994605	6.601414408	0.400377002
02	397.5723472	642349.8118	5312542.938	642317.5325	5312153.035	642348.0633	5312345.429	0.521710504	6.635959613	0.402472175
02	923.1456535	642709.134	5313389.335	642349.8118	5312542.938	642525.5759	5312967.613	1.211389039	15.40840885	0.934522841
03	1209.605961	643264.9285	5312318.442	643072.6911	5313512.434	643175.1124	5312916.517	1.227936269	15.97711996	0.778603424
04-1	525.119773	644003.8064	5312975.935	643580.2832	5313264.833	643816.3518	5313149.902	0.760878922	9.050825698	0.443313752
04-1	548.1167005	644016.2185	5312430.67	644003.8064	5312975.935	644022.1812	5312704.663	0.794200610	9.447194666	0.462728092
04-2	566.0409513	643580.2832	5313264.833	643072.6911	5313512.434	643325.0641	5313387.154	0.476528771	7.000639761	0.330855753
05	268.4971198	650045.4804	5312880.068	649882.5456	5313092.888	649965.4221	5312987.825	0.253319659	3.441 046 041	0.193113722
05	1331.543557	649185.1587	5311924.781	650045.4804	5312880.068	649647.7668	5312350.107	1.256274779	17.06499753	0.957698661
05	1664.165269	647550.0909	5311869.518	649185.1587	5311924.781	648381.3428	5311849.736	1.570094229	21.32786122	1.196933319
06	1019.388816	649466.8904	5310696.863	648454.1278	5310607.976	648960.6679	5310663.966	2.542908028	32.84331552	2.231500449
06	2947.619489	652093.2292	5309394.567	649466.8904	5310696.863	650730.7867	5309956.461	7.352960071	94.96827449	6.452507726
07-1	342.7335578	646389.8393	5311785.838	646047.155	5311781.26	646218.4892	5311784.108	0.330114756	4.959539864	0.261239914
07-1	366.3030836	647550.0909	5311869.518	647184.7626	5311868.129	647367.2286	5311879.785	0.352816497	5.300603644	0.279205184
07-1	396.4294566	646783.6397	5311825.415	646389.8393	5311785.838	646587.7722	5311795.42	0.381833674	5.736548548	0.302168243
07-1	403.4246696	647184.7626	5311868.129	646783.6397	5311825.415	646984.1171	5311847.449	0.388571336	5.837773062	0.307500166
07-2	271.4137808	646047.155	5311781.26	645776.1876	5311770.216	645911.6386	5311774.172	0.356266332	4.830613736	0.254091080
07-2	419.7468191	645776.1876	5311770.216	645404.4167	5311956.218	645581.9255	5311844.251	0.550972980	7.470640379	0.392956917
07-2	444.3617308	645404.4167	5311956.218	645021.3234	5312155.891	645217.7159	5312076.649	0.583283293	7.908735784	0.416000808
08	895.6319456	647497.8094	531 0975.858	647550.0909	5311869.518	647522.7040	5311422.552	1.067058033	13.96575622	0.818649108
09-1	1445.260449	636407.3808	5315190.260	637835.3977	5315157.084	637121.6867	5315083.196	1.784026073	26.05555005	1.393951528
09-1	3262.236954	637835.3977	5315157.084		5313520.120	639256.7854	531 4380.095	4.026897566	58.81249868	3.146422634
09-2	1577.572629	640628.2669	5313520.120	641366.5725	5312166.238	640947.825	5312813.611	2.597907776	34.75975931	1.862510855
09-3	984.8372116	641366.5725	5312166.238	642011.8287	5311433.635	641720.5787		1.647872201	21.83086165	1.159507669
10-1	639.8694567	635734.3443	5313735.225	636278.7996	531 4059 801	636013.5144	5313888.740	1.137867472	15.36702414	1.009858357
10-1	1623.499705	635771.8187	5312168.865	635734.3443	5313735.225	635609.3957	5312954.534	2.887038107	38.98976407	

2 Developing the Input Data for Dispersion Simulation of Fugitive Dust from Major Road

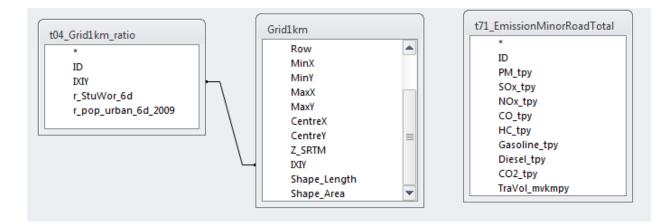
See "6.1.3.12 Calculation of Fugitive Dust Amount by Vehicle Travelling in Major Road".

3 <u>Developing the Input Data for Dispersion Simulation of Vehicle Exhaust Gas from Minor</u> <u>Road</u>

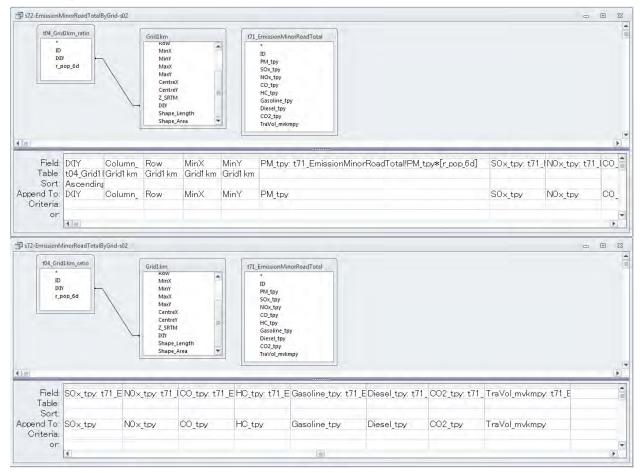
Right-click "s72-EmissionMinorRoadByGrid-s02" query and click [Design View].



Add these tables such as "Grid1km", "t04_Grid1km_ratio", and "t71_EmissionMinorRoadTotal", and join "Grid1km" table, "t04_Grid1km_ratio" table on [IXIY] column.



Set the output item as follows.



Click [Design]-[Append].

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Res	ults				Qu	ery Type			

Set the table name (Here it is "t72_EmissionMinorRoadByGrid").

Append To		OK
Table <u>N</u> ame:	t72_EmissionMinorRoadByGrid	
O Current Da	tabase	Cancel
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File Name:		

Click [Design]-[Run]

	1. 6	4 + 1 -						Query Tools
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Click [Yes].



Create the input data table of minor road for simulation.

142336 190015 19 15 629000 5295000 0.002383428 0.002984759 0.039273244 0.1924 142337 190016 19 16 629000 5296000 0.000644163 0.000343933 0.004525443 0.022 142338 190017 19 17 629000 5297000 0.000274642 0.000343933 0.004525443 0.022 142340 190019 19 19 629000 5299000 0 0 0 0 0 142341 190020 19 20 629000 5301000 0	10 629000 5290000 0 0 0 11 629000 5291000 0 0 0 12 629000 5292000 0 0 0 13 629000 5293000 0 0 0 14 629000 5294000 0.001085182 0.001358969 0.017881221 0.06773091 15 629000 5295000 0.0002383428 0.0020864759 0.039273244 0.19268682 16 629000 5295000 0.000274642 0.000343933 0.00452543 0.0220324 18 629000 5298000 0 0 0 0 20 629000 5301000 0 0 0 0 21 629000 5302000 0 0 0 0 0 22 629000 5304000 0 0 0 0 0 25 629000 5305000 0 0 0 0		DXIY 🚽	Column_ 🚽	Row 🚽	MinX 🚽	MinY 🚽	PM_tpy 🚽	SOx_tpy 🚽	NOx_tpy 🚽	CO_tpy 、
14232 190011 19 11 629000 5291000 0 0 0 142333 190012 19 12 629000 5292000 0 0 0 142334 190013 19 13 629000 5293000 0 0 0 142335 190014 19 14 629000 5295000 0.001358969 0.017881221 0.087 142336 190015 19 15 629000 5295000 0.0002483428 0.002984759 0.039273244 0.1924 142337 190016 19 16 629000 5295000 0.000244163 0.000343933 0.00452543 0.0223 142338 190017 19 17 629000 5297000 0 0 0 0 142340 190019 19 18 629000 5301000 0 0 0 0 142341 190021 19 22 629000 5302000 0.01738197 0.013447466 0.17694013 0.868 142343 190024 19 <td>11 629000 5291000 0 0 0 12 629000 5292000 0 0 0 0 13 629000 5293000 0 0 0 0 14 629000 5294000 0.001085182 0.001358669 0.017881221 0.08773081 15 629000 5295000 0.002383428 0.002984759 0.039273244 0.19268692 16 629000 5296000 0.000274642 0.000343933 0.004425443 0.0220324 18 629000 5298000 0 0 0 0 0 20 629000 530000 0 0 0 0 0 21 629000 530000 0 0 0 0 0 0 22 629000 5303000 0.007746187 0.00970522 0.127638784 0.62623614 24 629000 5306000 0 0 0 0 0</td> <td>142330</td> <td>190009</td> <td>19</td> <td>9</td> <td>629000</td> <td>5289000</td> <td>0</td> <td>0</td> <td>0</td> <td></td>	11 629000 5291000 0 0 0 12 629000 5292000 0 0 0 0 13 629000 5293000 0 0 0 0 14 629000 5294000 0.001085182 0.001358669 0.017881221 0.08773081 15 629000 5295000 0.002383428 0.002984759 0.039273244 0.19268692 16 629000 5296000 0.000274642 0.000343933 0.004425443 0.0220324 18 629000 5298000 0 0 0 0 0 20 629000 530000 0 0 0 0 0 21 629000 530000 0 0 0 0 0 0 22 629000 5303000 0.007746187 0.00970522 0.127638784 0.62623614 24 629000 5306000 0 0 0 0 0	142330	190009	19	9	629000	5289000	0	0	0	
142333 190012 19 12 629000 5292000 0 0 0 142334 190013 19 13 629000 5293000 0 0 0 0 142335 190014 19 14 629000 5294000 0.00185182 0.001358969 0.039273244 0.087 142337 190016 19 16 629000 5295000 0.000238428 0.002984759 0.039273244 0.052 142337 190016 19 16 629000 5297000 0.000274642 0.000343933 0.004525443 0.022 142340 190019 19 19 629000 5299000 0 0 0 0 142341 19002 19 20 629000 5301000 0	12 629000 5292000 0 0 0 13 629000 5293000 0 0 0 0 14 629000 5293000 0.001358969 0.017881221 0.08773091 15 629000 5295000 0.002383428 0.002984759 0.039273244 0.19268692 16 629000 5296000 0.000244163 0.000806683 0.010614277 0.05207699 17 629000 5298000 0 0 0 0 20 629000 5300000 0 0 0 0 21 629000 5302000 0.007746187 0.00370522 0.127638784 0.62623614 24 629000 5305000 0 0 0 0 25 629000 5306000 0 0 0 0 25 629000 5305000 0 0 0 0 26 629000 5306000 0 0 0 <td>142331</td> <td>190010</td> <td>19</td> <td>10</td> <td>629000</td> <td>5290000</td> <td>0</td> <td>0</td> <td>0</td> <td></td>	142331	190010	19	10	629000	5290000	0	0	0	
14234 190013 19 13 629000 5293000 0 0 0 142335 190014 19 14 629000 5294000 0.00185182 0.001358968 0.017881221 0.087 142336 190016 19 16 629000 5295000 0.00283428 0.002984759 0.039273244 0.192 142337 190016 19 16 629000 5296000 0.00024462 0.000343933 0.004525443 0.022 142339 190018 19 18 629000 5298000 0 0 0 0 142340 190020 19 20 629000 530000 0<	13 629000 5293000 0 0 0 14 629000 5294000 0.001085182 0.00135869 0.017881221 0.08773091 15 629000 5295000 0.002383428 0.002984759 0.039273244 0.19268692 16 629000 5295000 0.00041442 0.000843833 0.00452543 0.02220324 18 629000 5298000 0 0 0 0 0 20 629000 5298000 0	142332	190011	19	11	629000	5291000	0	0	0	
142335 190014 19 14 629000 5294000 0.00135182 0.001358969 0.017881221 0.087 142336 190015 19 15 629000 5295000 0.002883428 0.002984759 0.039273244 0.1921 142337 190016 19 16 629000 5295000 0.002847642 0.00284759 0.039273244 0.1921 142338 190017 19 17 629000 5296000 0 <td>14 629000 5294000 0.001085182 0.001388969 0.017881221 0.08773091 15 629000 5295000 0.002383428 0.00284759 0.039273244 0.19268682 16 629000 5295000 0.000248478 0.00086683 0.01014277 0.05207699 17 629000 5298000 0 0 0 0 18 629000 5298000 0 0 0 0 20 629000 5300000 0 0 0 0 21 629000 5302000 0.01738197 0.013447406 0.176940013 0.86812352 23 629000 5304000 0 0 0 0 25 629000 5305000 0 0 0 0 26 629000 5306000 0 0 0 0 26 629000 5306000 0 0 0 0 27 629000 5307000 <t< td=""><td>142333</td><td>190012</td><td>19</td><td>12</td><td>629000</td><td>5292000</td><td>0</td><td>0</td><td>0</td><td></td></t<></td>	14 629000 5294000 0.001085182 0.001388969 0.017881221 0.08773091 15 629000 5295000 0.002383428 0.00284759 0.039273244 0.19268682 16 629000 5295000 0.000248478 0.00086683 0.01014277 0.05207699 17 629000 5298000 0 0 0 0 18 629000 5298000 0 0 0 0 20 629000 5300000 0 0 0 0 21 629000 5302000 0.01738197 0.013447406 0.176940013 0.86812352 23 629000 5304000 0 0 0 0 25 629000 5305000 0 0 0 0 26 629000 5306000 0 0 0 0 26 629000 5306000 0 0 0 0 27 629000 5307000 <t< td=""><td>142333</td><td>190012</td><td>19</td><td>12</td><td>629000</td><td>5292000</td><td>0</td><td>0</td><td>0</td><td></td></t<>	142333	190012	19	12	629000	5292000	0	0	0	
142336 190015 19 15 629000 5295000 0.002383428 0.002984759 0.039273244 0.1924 142337 190016 19 16 629000 5296000 0.000644163 0.00086683 0.010614277 0.0521 142338 190017 19 17 629000 5297000 0.000274642 0.000343933 0.004525443 0.0221 142340 190019 19 19 629000 5298000 0 0 0 0 0 142340 190020 19 20 629000 530000 0	15 629000 5295000 0.002383428 0.002984759 0.039273244 0.19268692 16 629000 5296000 0.000644163 0.00080683 0.010614277 0.05207699 17 629000 5296000 0.000274642 0.000343933 0.00452543 0.0220324 18 629000 5299000 0 0 0 0 20 629000 5300000 0 0 0 0 21 629000 5301000 0 0 0 0 0 22 629000 5302000 0.01738197 0.013447406 0.176940013 0.86812352 23 629000 5305000 0 0 0 0 25 629000 5306000 0 0 0 0 0 25 629000 5306000 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 </td <td>142334</td> <td>190013</td> <td>19</td> <td>13</td> <td>629000</td> <td>5293000</td> <td>0</td> <td>0</td> <td>0</td> <td></td>	142334	190013	19	13	629000	5293000	0	0	0	
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142341 190020 19 20 629000 5300000 0 0 0 142342 190021 19 21 629000 5301000 0 0 0 0 142343 190022 19 22 629000 530200 0.010738197 0.013447406 0.176940013 0.868 142343 190023 19 23 629000 530200 0.007746187 0.009700522 0.127638784 0.626 142345 190024 19 24 629000 5304000 0 <td< td=""><td>20 629000 5300000 0 0 0 21 629000 5301000 0 0 0 0 22 629000 5302000 0.01738197 0.013447406 0.176940013 0.86812352 23 629000 5303000 0.007746187 0.00970522 0.127638784 0.8623614 24 629000 5304000 0 0 0 0 25 629000 5305000 0 0 0 0 26 629000 5306000 0 0 0 0 0 27 629000 5306000 0.015420439 0.0131096 0.254092244 1.24665671 28 629000 5308000 0.00825852 0.010343532 0.36099462 0.66774689 30 629000 5314000 0.00302332 0.0034802 0.0246708 31 629000 5313000 0 0 0 0 32 629000 5313000</td><td>142339</td><td>190018</td><td>19</td><td>18</td><td>629000</td><td>5298000</td><td>0</td><td>0</td><td>0</td><td></td></td<>	20 629000 5300000 0 0 0 21 629000 5301000 0 0 0 0 22 629000 5302000 0.01738197 0.013447406 0.176940013 0.86812352 23 629000 5303000 0.007746187 0.00970522 0.127638784 0.8623614 24 629000 5304000 0 0 0 0 25 629000 5305000 0 0 0 0 26 629000 5306000 0 0 0 0 0 27 629000 5306000 0.015420439 0.0131096 0.254092244 1.24665671 28 629000 5308000 0.00825852 0.010343532 0.36099462 0.66774689 30 629000 5314000 0.00302332 0.0034802 0.0246708 31 629000 5313000 0 0 0 0 32 629000 5313000	142339	190018	19	18	629000	5298000	0	0	0	
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142353 190032 19 32 629000 5312000 0.000277905 0.00034802 0.004579217 0.022 142354 190033 19 33 629000 5313000 0 0 0 142355 190034 19 34 629000 5314000 0 0 0	32 629000 5312000 0.000277905 0.00034802 0.004579217 0.02246708 33 629000 5313000 0 0 0 0 34 629000 5314000 0 0 0 0 35 629000 5315000 0 0 0 0	142351	190030	19	30	629000	531 0000	0.003053392	0.003823752	0.050312662	0.24684979
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142355 190034 19 34 629000 5314000 0 0 0	34 629000 5314000 0 0 0 35 629000 5315000 0 0 0	142353	190032	19	32	629000	5312000	0.000277905	0.00034802	0.004579217	0.02246708
	35 629000 5315000 0 0 0	142354	190033	19	33	629000	5313000	0	0	0	
		142355	190034	19	34	629000	5314000	0	0	0	
142356 190035 19 35 629000 5315000 0 0 0		142356	190035	19	35	629000	5315000	0	0	0	

4 <u>Developing the Input Data for Dispersion Simulation of Fugitive Dust from Minor Road</u> (Paved Road)

See "6.1.3.13 Calculation of Fugitive Dust Amount by Vehicle Travelling in Minor Road (Paved Road)".

5 <u>Developing the Input Data for Dispersion Simulation of Fugitive Dust from Minor Road</u> (Unpaved Road)

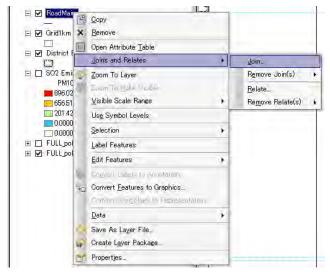
See "6.1.3.14 Calculation of Fugitive Dust Amount by Vehicle Travelling in Minor Road (Unpaved Road)".

6.3 Drawing Emission Distribution Map

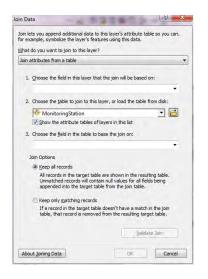
Open template file, click [File]-[Save As], and saved as other name.

File	Edit View	Bookmarks	Insert	Sele
B	New	(Ctrl+N	-
6	Open	C	Ctrl+O	R
	Save	(Ctrl+S	
	Save As			
	Save A Copy			

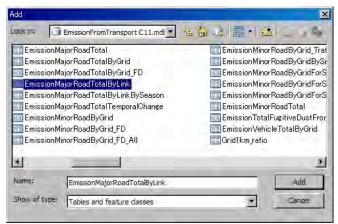
Join the table of emission by grid to "RoadMain" layer. Right-click "RoadMain" layer and select [Joins and Relates]-[Join].



When showing the following dialog, click iii button.



Select the table of emission by grid to join and click [Add] (Here it is "EmissionMajorRoadByLink" table).



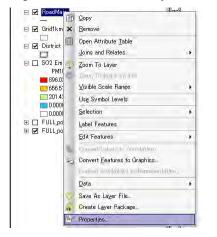
Show the selected table in the dropdown textbox of "2.". When clicking the dropdown button of "1." and selecting "LinkID", show "LinkID" in "3." automatically. After then, click [OK].

Join Data 🔹 💽
Join lets you append additional data to this layer's attribute table so you can, for example, symbolize the layer's features using this data.
What do you want to join to this layer?
Join attributes from a table
1. Choose the field in this layer that the join will be based on:
OBJECTID 2. Shape_Length
Linkto TrafficCountID NormalDirection ReverseDirection SpeedClass Schooserure great on une table to base the joint on:
Join Options
Keep all records
All records in the target table are shown in the resulting table. Unmatched records will contain null values for all fields being appended into the target table from the join table.
C Keep only matching records
If a record in the target table doesn't have a match in the join table, that record is removed from the resulting target table.
<u>Ve</u> lidate Join
About Joining Data

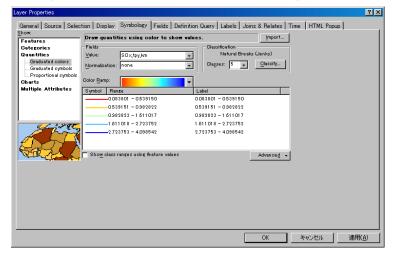
If the following dialog may be shown, click [No].

Create Index	×
The join field in the join table you are joining to the target is not indexed.	
Would you like to automatically create an index for the join field in the join table now? Doing so will significantly improve performance.	
Yes Cancel	
Use my choice and do not show this dialog again	

Right-click "RoadMain" layer and click [Properties].



Click [Symbology] tab and select [Quantities]-[Graduated colors]. Click and select the target column name at the drop down button of [Value] (Here it is [SOx_tpy_km].).



When click [Reverse Sorting] after you right-click on the [Range] column, the display order of rank changes. According to the order of symbol color, decide the display order of rank.

Symbol	Range		Label
	<mark>0.083801 - 0.5</mark> -0.539151 - 0.9 -0.982823 - 1.6 -1.611018 - 2.7 -2.723753 - 4.0	<u>F</u> lip Symbols <u>R</u> amp Colors	lected Symbol(s) Symbols
Sho <u>w</u> d	class ranges usin	Reverse Sorting Remove Class(es <u>C</u> ombine Classes	
		Format <u>L</u> abels <u>E</u> dit Description	

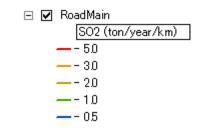
When double-clicking color in [Symbol] column, since the following dialog is shown, select color. Also, set the thickness of line in [Width].

Symb	ol Selector					<u>?×</u>
Тур	pe here to se	arch		•		Current Symbol
Sear	rch: 💿	All Styles	C Referenced	Styles		
	ESRI				_	
	_				_	
	אַליאו	ハイウェイ ランプ	エウスプレスウェ イ	エクスプレスウェ イ ランプ		Color:
						<u>W</u> idth: 1.00
	主要道	重要幹線道路	幹線道路	住宅地道路		Edit Symbol
	+					
	鉄道	河川	境界 国	境界 州		
						Style References
	境界 郡	境界 市	境界 軍事施設	境界街区	•	OK Cancel

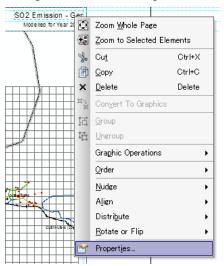
After selecting a rank, click the [Range] of the selected rank and input the maximum of the rank. However, if doing [Reverse Sorting], since the input order of rank is reversed, take care in the input order. When all setting completed, click [OK].

	tion Display Symbology Fields Definition Query Labels Joins & Relates Time HTML Popup
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Click "SO2_tpy_km" of "RoadMain" layer and make it editable and change to "ton/year/km".



Change the title of this map. Move the cursor to the textbox of title, right-click it, and click [Properties].



Input a title in [Text] (Here it is "SO2 Emission - Major Road".).

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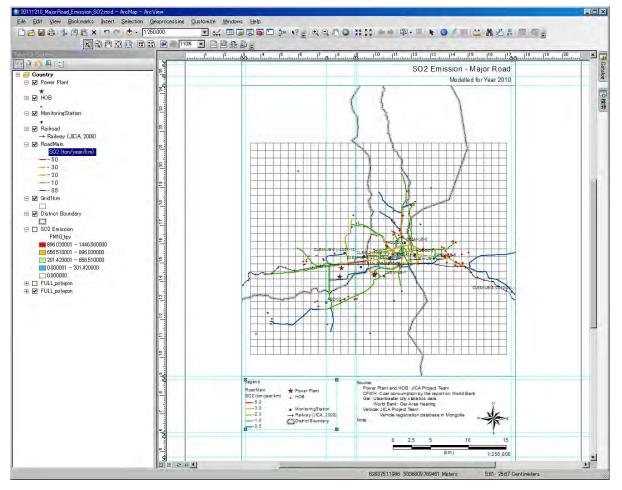
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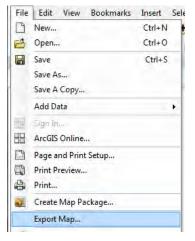
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Complete drawing the map by ArcGIS.



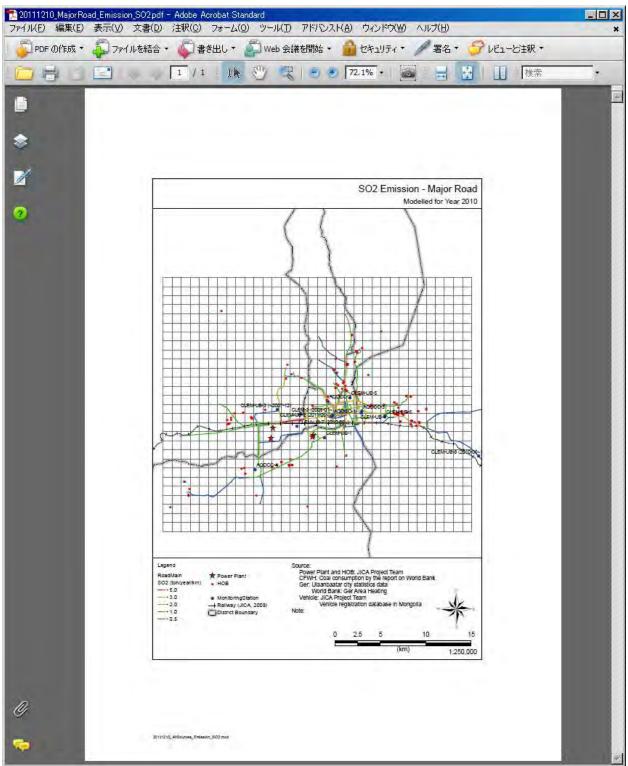
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Setting the destination and file name and click [Save].

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Create the PDF file of distribution map.



7 <u>Others Source Inventory (Fugitive Ash from Ash Pond of Power</u> <u>Plant)</u>

7.1 Developing and Updating Method for Emission inventory

Other source targets fugitive ash from ash pond of power plant in this manual.Calculation flow diagram of the emission from fugitive ash from ash pond of power plant is shown in Figure 7-1. Emission is calculated by using the following formula. Regarding temporal change, monthly fugitive pattern by site is calculated by using monthly erosion depth by monitoring.

$$E_i = AD_i \times EF_i$$

Ei: Emission from site i (ton/year)

ADi: Capable area of fugitve ash from site i (m2)

EFi: Emission factor of site i (g/m2)

ADi and EFi are respectively calculated by the following formula.

$$AD_i = A_i \times P_i$$
$$EF_i = D_i \times d$$

Ai: Area of site i (m2)

Pi: Capable ratio of fugitive ash in site i (%)

Di: Erosion depth of site i (cm)

d: Dry density of ash (=1.041 g/cm3)

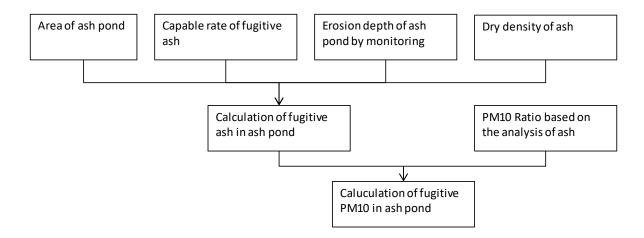


Figure 7-1 Calculation Flow Diagram of the Emission from Fugitive Ash from Ash Pond of Power Plant

7.1.1 Collecting and Organizing Information on Activity Data

Activity data of this source is the area by ash pond by power plant and the monthly scatterable ratio.

Monthly scatterable ratio is the ratio of the area other than the area where it does not scatter due to covering soil and containing moisture in ash pond.

Inquire the person in charge of management of ash pond at each power station or the person in charge of monitoring, and check the usage condition of the ash pond including the above information. At that time, discuss and estimate the monthly scattering rate using satellite images such as Google Earth.

Therefore, activity data is calculated by the following formula.

Scatterable area (m^2) = the area of ash pond x scatterable ratio (%) / 100

7.1.2 Collecting Information on Emission Factor

Data from which the emission factor at this source is based is the dry density of the ash (ρ g/cm³), the average erosion depth of the ash pond (D cm), and the content of PM10 and PM2.5 in ash (R_{PM10} and $R_{PM2.5}$). Emission factors are calculated by the following formula.

 $EF_{Ash} = \rho \ x \ D \ x \ 10^{-2}$ $EF_{PM10} = EF_{Ash} \ x \ R_{PM10}$ $EF_{PM2.5} = EF_{Ash} \ x \ R_{PM2.5}$ $EF_{Ash} \ EF_{PM10} \ EF_{PM2.5}: Emission factor of fugitive ash, and PM10 and PM2.5 in ash (ton/m²)$

In the non-winter season, monitoring of the average erosion depth of ash pond for each site of power plant and month is conducted at least once a month, so collect the file that the monitoring staff has been organized.

It is preferable to measure dry density of ash by taking a sample for each ash pond, but it is difficult to ensure measurement accuracy. For this reason, collect analysis results on the dry density of fly ash and bottom ash both in Mongolia and overseas, and set the dry density for each power plant taking account of the ash condition at ash pond.

Since ash may leak due to rain during the summer, if there is any doubt about the data, inquire to the monitoring staff and decide whether or not to apply it to the emission factor after discussing whether it is used for calculating the emission factor.

Take a sample from the ash pond and asked to analyze the content of PM10 and PM2.5 in the ash. Since the particle size distribution of ash differs depending on power plant, you should collect and analyze a sample for each power plant. The institute name and contacts for conducting the analysis are as follows.

Institute name	Responsible person	Contacts
Soil laboratory, Institute Hea Geography, Mongolian Academy Ocl of Sciences		99712339 batkhishig@gmail.com

7.1.3 <u>Developing and Updating Emission Inventory</u>

Use "FugitiveAsh_AshPond.xls" for developing and updating emission inventory of fugitive ash from ash pond of power plant.

Emission is automatically calculated by using fuel consumption and emission factor.

Capacity Development Project for Air Pollution Control in Ulaanbaatar City Phase 2 Mongolia Technical Manual 07: Manual for Development and Updating of Emission Inventory

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			middle	iddle west east					east			Fugitive as	h amount				
		dry density Area Source Erosion Area Source Erosion		Average Erosion Thickness	Area	Suspension Source Area Ratio	Average Erosion Thickness	Ash pond o	f PP4		Gross of fugitive ash amount						
	lonth	(g/cm3)	(m ²)	(%)	(cm/month)	(m ²)	(%)	(cm/month)	(m ²)	(%)	(cm/month)	Middle	West	East	Total	· · · · · ·	
		Condition	Used	Estimation	Estimation	Covered bush	Estimation	Estimation	capability of dispersion	Estimation	Measurement	Used	Covered bush	capability of dispersion	/		
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	6		250,000								0.125	0			-		
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	8		250,000	0%							0	0			-	-	-
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Calculate the fugitive amount of PM10 and PM2.5 by multiplying the above fugitive ash amount by the ratio of PM10 and PM2.5.

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				11 0	0	-	0						GHP3-Ash Pond	36.2	29.44	19.32	21.61	14.18		
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Estimated the fugitive pattern from ash pond using the hourly fugitive amount by ash pond

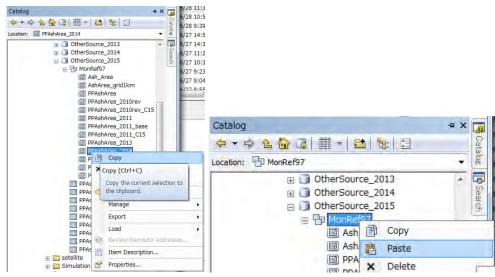
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	- 4		180,000	80%	0.45	0			648	648		8.7273	
	5		180,000	80%	0.04375	0			63	63		0.8485	
	6		180,000	80%	0.125	0			180	180		2.4242	
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5	8		180,000	40%	0	0			0	0		0.0000	
i.	9		180,000	40%	0	0			0	0		0.0000	
5	10		180,000	40%	0	0			0	0		0.0000	
2	11		180,000	0%	0	0			0	0		0.0000	
þ		1.00	180,000	0%	0	0			•	~		0.0000	
1	Total					0	0	891	891	891			

7.2 Import Inventory File into Access

Data on other source inventory is generated in "OtherSources.mdb". This explains the method to import the inventory developing in 7.1.3 to "OtherSources.mdb".

Open ArcGIS, copy [PPAsh_Area_20xx] featureclass in previous year, and create [PPAsh_Area_20yy] featureclass in target year

Here, copy the feature lass of 2014 and create the one of 2015.



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	OK Cance		PPAshArea_2014	
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Open "PPAshArea_2015" table in "OtherSources.mdb" and input [Fugitive ash amount] and [Fugitive PM10 amount], that is fugitive ash amount by ash pond in [FugitiveAsh_forEmis] sheet of "FugitiveAsh_AshPond.xls" to [FugitiveAsh_EJ] and [PM10_EJ] respectively.

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Power Plant	D	Area Name	Area (m²)	Fugitive ash amount (ton/year)	Fugitive PM10 amount (ton/year)	Fugitive PM2.5 amount (ton/year)							
PP2	2	West	50.882	0	0.00	0.00							
	1	East	55,968	0		0.00							
	1	Total		0		0	A						
PP3	4	Southwest	119,000	0		0.00							
	5	Northwest	102,600	0	0.00	0.00							
	6	North middle	60,000	0		0.00							
25.85 L	0	Total	-	0		0							
PP4	3 4	Middle	250,000	0		0.00	A						
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7.3 Spatial Distribution to the Grid of Emission by Site

Since the amount of fugitive ash was calculated for each ash pond, when using the emission for simulation, the amount of fugitive ash was distributed for each grid.

The amount of fugitive ash by grid in ash pond is calculated by the following formula.

Fugitive amount of ash pond by grid

= Fugitive amount of ash pond x the area of ash pond in a grid / total area of ash pond

Right-click the query calculated emission by grid for previous year and click [Design View]. Change this query name to the one of target year and save as new file.

Here, open [Q_PPAsh_emis_grid1km_2014] query and save the query as [Q_PPAsh_emis_grid1km_2015].

PPAshArea grid1km SHAPE Index	Copen
PPASHAIEa_GIIGIKII_SHAPE_HIGEX	k Design View
PPAshArea_SHAPE_Index	Export +
SelectedObjects	婱 Collect and Update Data via E-mail
Selections	■ Rena <u>m</u> e Hide in this Group
Queries	Delete
Q_PPAsh_emis_grid1km	₭ Cu <u>t</u>
Q_PPAsh_emis_grid1km_2013	⊒ ⊆ору
Q_FFASh_emis_grid1km_2015	Paste .
Q_PPAsh_emis_grid1km_2014	Object Properties

Click [Show Table] in [Design] tab.

	17 - 0	i + ↓						(Query Tools		Micros	oft Access	
File	Ho	me C	ireate	External	l Data	Datab	ase Tool	Is	Design				
View	Run	Select	Make Table	Append I	Update	Crosstab	X Delete	Pa	nion ass-Through ata Definition	Show Table	Delete Rows	Harring Insert Columns Harring Delete Columns Harring Return: All	. *
Resu	ults	-			Qu	ery Type	-				Query	Setup	

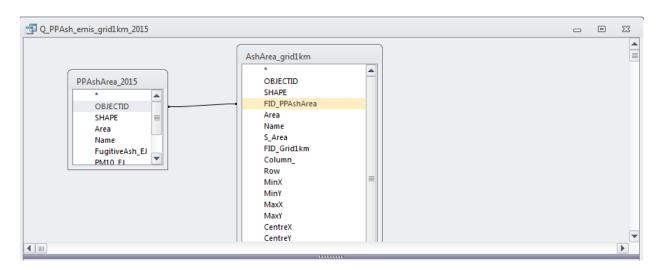
Select "PPAshArea_2015" table and click [Add].

ables Queries Both	
PPAshArea_2011_base_SHAPE_Index PPAshArea_2011_C15 PPAshArea_2011_C15_SHAPE_Index	*
PPAshArea_2011_SHAPE_Index PPAshArea_2013 PPAshArea_2013_SHAPE_Index	
PPAshArea_2013_SHAPE_INDEX PPAshArea_2014 PPAshArea_2014 SHAPE Index	
PPAshArea 2015 PPAshArea 2015 SHAPE Index	
PPAshArea_grid1km PPAshArea_grid1km_SHAPE_Index	
PPAshArea_SHAPE_Index SelectedObjects	=
Selections	T

Join [ObjectID] column in "PPAshArea_2015" table to [FID_PPAshArea] column in [AshArea_grid1km].

Select [ObjectID] column in "PPAshArea_2015" table, drag and drop to [FID_PPAshArea] column in "AshArea_grid1km" table, and then these columns are connected by black line.

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Set [table] of [IXIY], [Column_], [Row], [MinX], and [MinY] column as [AshArea_grid1km].

Field: Table		Column_ Ash Area_grid1km	Row Ash Area_grid1km	Min X Ash Area_grid1km	Min Y Ash Area_grid1 km	SO2_tpy: Sum(Null)	NO×,tpy: Sum(Null)	TSE
		Group By	Group By	Group By	Group By	Expression	Expression	Exp
Sort:								
Show: Oriteria:		V			V	2	V	
or:								
	4							

Regarding [FugitiveAsh_EJ_tpy] and [PM10_EJ_tpy] column, set as follows.

Field:	SO2_tpy: Sum(Null)	NOx_tpy: Sum(Null)	TSP_tpy: Sum([Fugitive Ash_EJ]*[Area_r])	PM10_tpy: Sum([PM10_EJ]*[Area_r])	CO_tpy: Sum(Null)	
Table:						
Total:	Expression	Expression	Expression	Expression	Expression	
Sort:						
Show:	V	W		V		
)riteria:				<>0		
or:						
	•					

Click [Make Table] in [Design]

	-7- (-	-	_	-	-	-		Query Tools	Q
File	Но	me C	reate	Extern	al Data	Datab	ase Tool	5	Design	
View	Run	Select	Make Table	Append	N Update	Crosstab	X. Delete	۲	Union Pass-Through Data Definition	
Res	ults				Qu	егу Туре				

Set the table name (Here it is "PPAsh_emis_grid1km_2015").

Make New Tab	ble	OK
Table Name:	PPAsh_emis_grid1km_2015	
Current Da	atabase	Cancel
Another Da	atabase:	
File Name:		

Right-click the old table and click [Remove Table] (Here it is "PPAshArea_2014" table).

PPAshArea_2014	R <u>e</u> move Table
OBJECTID SHAPE Area Name FugitiveAsh_EJ PM10_FJ	Properties

Click [Run] in [Design] and create the new table.



Click [Yes] and create the table of fugitive amount by grid.



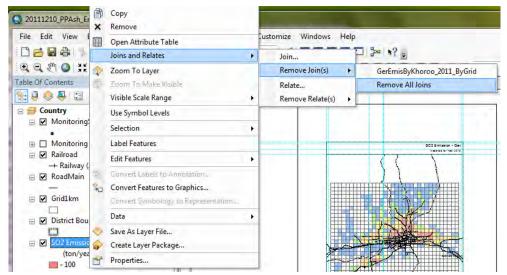
7.4 Drawing Emission Distribution Map

Open template file, click [File]-[Save As], and saved as other name.

File	Edit View	Bookmarks	Insert	Sele
	New	C	trl+N	-
B	Open	C	Ctrl+O	R
	Save	(Ctrl+S	
	Save As			
	Save A Copy		_	

Join the table of emission by grid to "SO2 Emission" layer

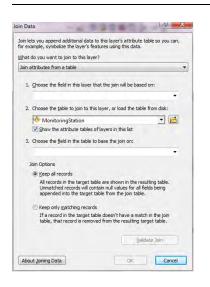
If the table is already a joined table, select [Joins and Relates]-[Remove Join(s)]-[Remove All].



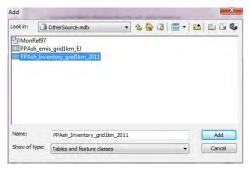
Right-click "SO2 Emission" layer and select [Joins and Relates]-[Join].

Remove Open Attribute Table Joins and Relates Zoom To Layer Torm To Make Visible	٠	Customize Window Join	s Help
Joins and Relates Zoom To Layer	٠		s Help
Zoom To Layer	•	Join	-
Zoom To Make Visible		Remove Join(s)	• E
A REALTY TRAINING TRAINING		Relate	5
Visible Scale Range	+	Remove Relate(s)	
Use Symbol Levels			
Selection	+		
Label Features			
Edit Features	•		
Convert Labels to Annotation			
Convert Features to Graphics			
Convert Symbology to Representation	_		
Data	+		
Save As Layer File			
Create Layer Package			, <u> </u>
Properties			
	Use Symbol Levels Selection Label Features Edit Features Convert Labels to Annotation, Convert Features to Graphics Convert Symbology to Representation, Data Save As Layer File Create Layer Package	Use Symbol Levels Selection Label Features Edit Features Convert Labels to Annotation Convert Features to Graphics Convert Symbology to Representation Data Save As Layer File Create Layer Package	Use Symbol Levels Selection Label Features Edit Features Convert Labels to Annotation Convert Symbology to Representation Data Save As Layer File Create Layer Package

When showing the following dialog, click is button.



Select the table of emission by grid to join and click [Add] (Here it is "PPAsh_Inventory_grid1km_2011" table).



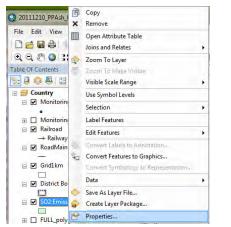
Show the selected table in the dropdown textbox of "2.". When clicking the dropdown button of "1." and selecting "IXIY", show "IXIY" in "3." automatically. After then, click [OK].

	ample, symbolize the layer's features using this data.
hat	do you want to join to this layer?
oin a	ttributes from a table
1.	Choose the field in this layer that the join will be based on:
	OBJECTID 1
2.	Column_
	Row MinX
	MinY
	MaxX
3.	MaxY CentreX
	CentreY
	Z_SRTM
. 1	Shape_Length
	Shape Area
	All records in the target table are shown in the resulting table.
	Unmatched records will contain null values for all fields being appended into the target table from the join table.
	C Keep only matching records
	If a record in the target table doesn't have a match in the join table, that record is removed from the resulting target table.
	Validate Join

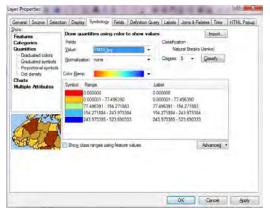
If the following dialog may be shown, click [No].

he join field in	n the join table	you are joining to	the target is not ind	exed.
			for the join field in t	he join table
ow? Doing so	o will significan	tly improve perform	nance.	

Right-click "SO2 Emission" layer and click [Properties].



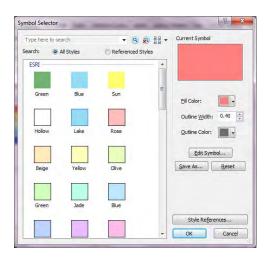
Click [Symbology] tab and select [Quantities]-[Graduated colors]. Click and select the target column name at the drop down button of [Value] (Here it is [PM10_tpy].).



When click [Reverse Sorting] after you right-click on the [Range] column, the display order of rank changes. According to the order of symbol color, decide the display order of rank.

Symbol	Range	Label	
	0.000000	0.00000	
	0.000001 - 77.49 77.496391 - 154. 154.271884 - 243 243.973385 - 523	Flip Symbols Ramp Colors Properties for Selected Symbol(s) Properties for All Symbols	
Sho <u>w</u> o	slass ranges using f	Reverse Sorting Remove Class(es) Combine Classes Format Labels Edit Description	

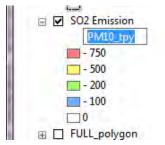
When double-clicking color in [Symbol] column, since the following dialog is shown, select color.



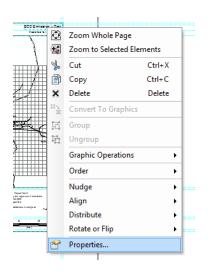
After selecting a rank, click the [Range] of the selected rank and input the maximum of the rank. However, if doing [Reverse Sorting], since the input order of rank is reversed, take care in the input order. When all setting completed, click [OK].

Categories Fri Guantities Ya Graduated colors Dopotional symbols Dopotional symbols Dopotional symbols Dot density Colarts Multiple Attributes	elds alue: ormalization: lor <u>R</u> amp: ymbol Rai 500 200	PM10_tp none	y 750.0000		Lab	Classifica Cla <u>s</u> ses: el	Manual		nport	
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	Show class	ranges usin	ng feature	values			L	Adva	nce <u>d</u>	•
						_	ок	1.027	ncel	Apply

Click "SO2_tpy" of "PM10_tpy" layer and make it editable and change to "ton/year".



Change the title of this map. Move the cursor to the textbox of title, right-click it, and click [Properties].



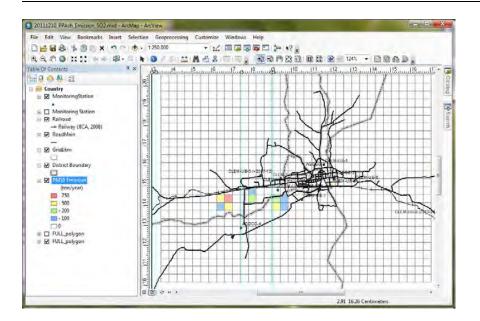
Input a title in [Text] (Here it is "SO2 Emission – Ash Pond in Power Plant".).

Text:	Size and Position	
-	0 Emission - Ash Pond ii	n Power Plant
	1	
Font:	Arial 12.00	Character Spacing: 0.00
	×.	Leading: 0.00

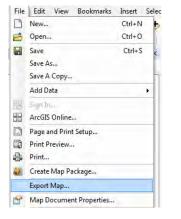
Update [Layer Name] of [Properties]-[General] tab to "PM10 Emission".

General Source	Selection	Display	Symbology	Fields	Definition Query	Labels	Joins & Relates	Time	HTML Popup
Layer Name:	PM10 Er	mission					Visible		
Description:								*	
								-	
Credits:									
Scale Range									
You can specify Show layer			at which this	alayer wi	l be shown:				
 Don't show 									
Qut beyon		20.00		ninimum :	acala)		AH TH		
Ourpeyon				in an an	scurcy		Attenning.		
In beyon	d: <none< td=""><td>></td><td>- (1</td><td>maximum</td><td>scale)</td><td></td><td>A W</td><td>(·</td><td></td></none<>	>	- (1	maximum	scale)		A W	(·	
							212319 1		

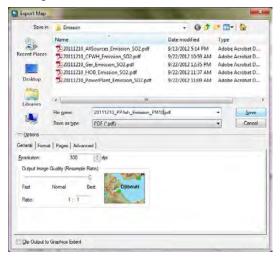
Complete drawing the map by ArcGIS.



To export the distribution map to PDF file, click [File]-[Export Map].

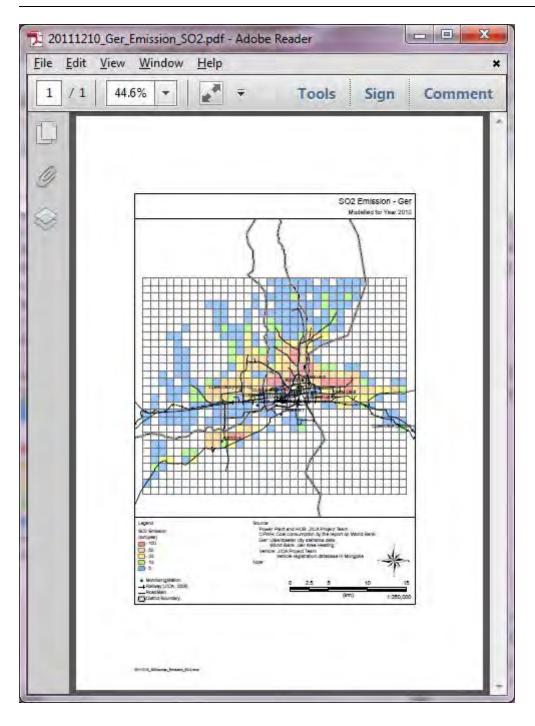


Setting the destination and file name and click [Save].



Create the PDF file of distribution map.

Capacity Development Project for Air Pollution Control in Ulaanbaatar City Phase 2 Mongolia Technical Manual 07: Manual for Development and Updating of Emission Inventory



Mongolia Air Pollution Reducing Department of Capital City (APRD)

Capacity Development Project for Air Pollution Control in Ulaanbaatar City Phase 2 Mongolia

Technical Manual 08 Manual for Conducting and Updating of Dispersion Simulation

March 2017

Japan International Cooperation Agency (JICA)

SUURI-KEIKAKU CO., LTD.

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1 Developing Dispersion Simulation Model

1.1 Dispersion Simulation Model Used in This Manual

When grasping the air pollution structure in UB city and the effect of concentration reduction measures, the selection conditions of dispersion simulation model are as follows.

1. This model is recommended in the world

AERMOD and CALPUFF are specified as recommended models in USEPA. Therefore, one of these atmospheric dispersion simulation models is preferred to use. In addition, information such as user manual of these atmospheric dispersion simulation models etc. is available from websites.

2. This model is available at low price

The budget for conducting the atmospheric dispersion simulation model is limited. Therefore, input data, such as meteorological data, terrain data, and the main tool of dispersion simulation model, is preferred to be available for free or at low cost.

3. This model has the linear relation between emission and concentration

In order to calculate concentration by source, it is preferable to calculate and sum up for each source and to calculate only the target source when recalculating. In addition, the calculation time and the number of calculations are preferred to be small in order to verify various air pollution control measures.

As a result of selecting the atmospheric diffusion simulation model that meets these conditions, CALPUFF Ver 5.8.4 (USEPA recommended model) is used in this manual. Under the condition 2, CALPUFF's program and code is available for free from the website and related aerological data, elevation data, land use data also are available for free from the website. Under the condition 3, the pseudo-first-order chemical reaction model (MESOPUFF II) is used in CALPUFF, and the calculation time and the calculation frequency for verifying the control measures are reduced because of the assumption of the linear relation between emission and concentration.

1.2 Flow Diagram of Developing and Conducting Dispersion Simulation Model, CALPUFF

1.2.1 Outline of CALPUFF

Until now, JICA Experts have been utilizing ISC-ST3 model which is not able to consider generation process of secondary particles such as chemical transformation. In order to solve this matter, CALPUFF was decided for the utilization. CALPUFF was reconstructed as an air dispersion simulation model because CALPUFF is able to consider chemical transformation.

CALPUFF is a model developed by Scire, et al. in 1995 to correspond to advection and dispersion of the pollutant by non-steady-state change in an air current in a maritime area and complex geometry. In an air current field generated by three dimension air flow model, the advective dispersion calculation of pollutant is conducted by using the advective puff.

The model consists of 3 components: (1) CALMET which generates three dimension air flow model, (2) CALPUFF which conducts air quality dispersion model using puff model, and (3) CALPOST which outputs or analyzes the calculation result. In addition, this model consists of some sub-module, such as MAKEGEO.

The basic equation for CALPUFF is as follows.

$$g = \frac{2}{(2\pi)(2\pi)^{1/2}\sigma_z} \cdot \sum_{n=-\infty}^{\infty} exp[-(H_e + 2nh)^2/(2\sigma_z^2)] \dots (2-2)$$

Where,
C: ground-level concentration (g/m3)
Q: pollutant mass contained in the puff (g)
 σ_x : standard deviation of Gaussian distribution in the along-wind direction (m)
 σ_y : standard deviation of Gaussian distribution in the cross-wind direction (m)
 σ_z : standard deviation of Gaussian distribution in the vertical direction (m)
da: distance from the puff center to the receptor in the along-wind direction (m)
dc: distance from the puff center to the receptor in the cross-wind direction (m)
g: vertical term of the Gaussian equation (m)
He: effective height above the ground of the puff center
h: height of the mixed-layer (m)

The summation of the vertical term g expresses multiple reflections of the mixing layer and the ground surface. The term g converges to the uniformly mixed limit of 1/h for $\sigma z > 1.6$ h. In general, puffs within the convective boundary layer meet this criterion after few hours from release.

For a horizontal symmetric puff with $\sigma x = \sigma y$, the equation (2-1) reduces to:

Where, R is the distance from the center of the puff to the receptor (m), and, s is the distance traveled by the puff (m). The distance dependent variables in Equation (2-3) are terms such as C(s) and $\sigma y(s)$.

1.2.2 Flow Diagram of Developing and Conducting Dispersion Simulation Model

Flow diagram of dispersion simulation with CALPUFF is shown in Figure 1.2-1.

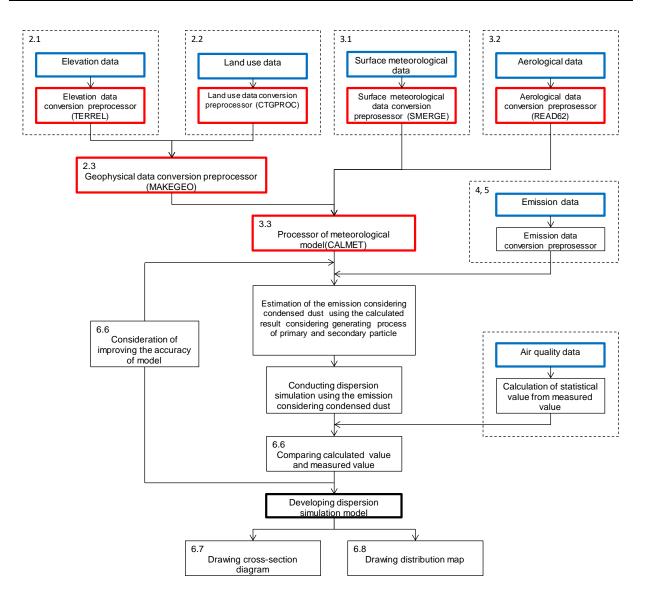


Figure 1.2-1 Flow Diagram of Dispersion Simulation with CALPUFF

2 Developing Geology Data

2.1 Collecting and Organizing Elevation Data

2.1.1 <u>Outline</u>

Download SRTM30/GTOPO30 Global Data (~900 m, 30 arc-sec) from USGS website¹ as elevation data.

Decompress the downloaded file and use DEM file as input file.

CALPUFF includes TERREL as elevation data conversion processor.

Set input file, output file, projection, datum, calculation range, and calculation resolution in TERREL. Output elevation data file is used in MAKEGEO processor.

2.1.2 Developing Method

Download SRTM30/GTOPO30 Global Data (~900 m, 30 arc-sec) from USGS website. In the case of UB city, open "e100n90" folder and save "e100n90.dem.zip" to "TERREL" folder.

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 srtm30_version_history.pdf 	-	• e100n90.stx.zip

Decompress "e100n40.dem.zip" saved in "TERREL" folder. The file after decompressing is "E100N40.DEM". Open INP file in the folder.

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¹ e100n40 and e100n90 in folder of http://dds.cr.usgs.gov/srtm/version2_1/SRTM30/

Set the number of input file as elevation data (NTDF) and output file name (OUTFIL, LSTFIL, PLTFIL).

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Set input file name of elevation data. [GTOPO30] means the setting format of elevation data. When using the data except [GTOPO30], see the list in the figure. Set the input file name at the back of "=". Don't forget to input "!END!" because of mandatory word.

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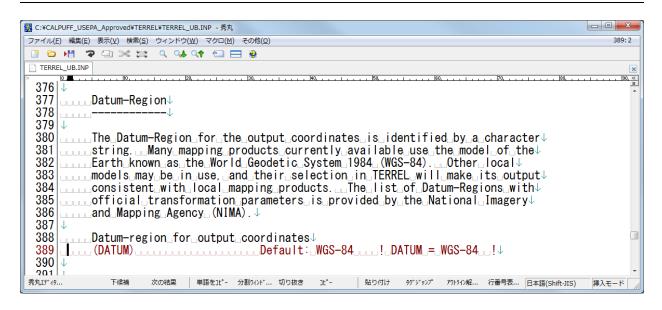
Set the datum of elevation data. When input data is [GTOPO30], set "WGS-84". When using the other data, see the list in the following figure.

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107	Mapping Agency (NIMA)
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Set the projection of output data (PMAP). "UTM" is set in this case. UTM is the projection that earth is divided into 60 zones every longitude 6 degrees. Therefore, set the zone that target city located (IUTMZN). UTM zone in UB city is "48".

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23 LCC : Lambert Conformal Conici	
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25 EM : Equatorial Mercator	
26 LAZA: Lambert Azimuthal Equal Area	
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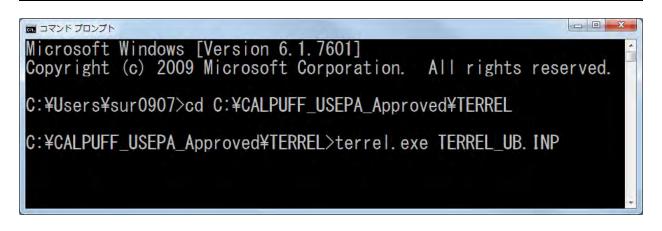
Set the datum of output data (DATUM). "WGS-84" is set in this case.



Set the grid type of output (IGRID), reference point coordinates for grid of output at lower left corner (XREFKM, YREFKM), the number of grid (NX, NY), and grid spacing (DGRIDKM).

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Move the "TERREL" folder in command prompt, input "terrel.exe <input file name>.INP", and press [Enter] (Here it is "TERREL_UB.INP").



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2.2 Collecting and Organizing Land Use Data

2.2.1 Outline

Download USGS Land Use/Land Cover Scheme of "Lambert Azimuthal Equal Area Projection (Optimized for Asia)" from USGS website² as land use data.

Decompress the downloaded file and use IMG file as input file.

CALPUFF includes CTGPROC as land use data conversion processor.

Set input file, output file, projection, datum, calculation range, and calculation resolution in CTGPROC. Output land use data file is used in MAKEGEO processor.

2.2.2 <u>Developing Method</u>

Download "eausgs2_0la.img.gz" from USGS website.

² Eurasia Land Cover Characteristics Data Base Version 2.0 http://edcftp.cr.usgs.gov/project/glcc/ea/lamberta/

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Decompress compressed file saved in "CTGPROC" folder. Open INP file in the folder.

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Set the number of input file as land use data (NDBF) and output file name (LUDAT, RUNLST).

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39 Shoreline Database (GSHHS)	
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Set input file name of land use data. [GLAZAS] means the setting format of land use data. When using the data except [GLAZAS], see the list in the figure.

A	FF_USEPA_ApprovedvCTGPROC4CTGPROC4CTGPROC4UB.INP - 종원
	補業(約) 表示(公) 検索(公) ウィンドウ(公) マクロ(凶) その和(公) 61:
CTGPRO	C_UB.TNP
	10
	Subgroup (Ob)
61	
62	▲
63	The following NDBF Land Use Data Files are processed.
64	Enter NDBF lines identifying the file name for each.
65	followed by a group terminator. The type of data base↓
	for each file is designated by the assignment name:
67	
68	(CTG) designates USGS CTG (compressed)
69	
	(NZGEN) designates New Zealand Generic↓
70	(GLAZNA) designates USGS Global (Lambert Azimuthal) for North America
71	(GLAZSA) designates USGS Global (Lambert Azimuthal) for South America↓
72	(GLAZEU) designates USGS Global (Lambert Azimuthal) for Eurasia - Europe↓
73	(GLAZAS) designates USGS Global (Lambert Azimuthal) for Eurasia - Asia
74	(GLAZAF) designates USGS Global (Lambert Azimuthal) for Africa
75	(GLAZAP) designates USGS Global (Lambert Azimuthal) for Australia-Pacific
76	
77	! GLAZAS = eausgs2_01a.img ! !END!↓
	CALAGO - Causgoz_VIa. Ing : :LND! +
78	¥

Set the datum of input data. Since input data is "USGS Global (Lambert Azimuthal) for Eurasia – Asia" in this case, check whether [DUSGSLA] is "ESR-S".

C:VCALP	UFF_USEPA	PA_Approved#CTGPROC#CTGPROC_UB.INP - 第月	
) 表示(Y) 検索(S) ウィンドウ(W) マクロ(M) その物(Q)	166:2
CTGPRC	OC_UBINP	P N N N N N	P0
149		Input Datum-Region	100
150			
151	Lin	The Datum-Region for coordinates in the input LULC Data File may	
152		identified in the header records of the file. Check the file doc	
153	I-LAAS	and change these defaults as needed. The list of Datum-Regions w	
154	ALC: NO	official transformation parameters is provided by the National Im	lagery and
155		and Mapping Agency (NIMA).	
156 157	*	Datum wasian faw innut LULC Data File anaudinates	
158	1000	Datum-region for input LULC Data File coordinates	
159		(DCTG) Default: NAS-C ! DCTG = NAS-C	1.4
160		for LULC = 1: USGS CTG (compressed)	1.1.14
161			
162	1000	(DUSGSLA) Default: ESR-S ! DUSGSLA = ESR-S	14
163		for LULC = 2: USGS Global (Lambert Azimuthal)	
164	4		
165	ini	(DNZGEN) Default: WGS-84 ! DNZGEN = WGS-84	11
166	- 1.	for LULC = 3: New Zealand Generic+	
167			
责和17-48		下線線 次の延期 単語を立て 分割ののド 切り掛き ユー 起り付け ヨアジャンプ わらの風 行動号表 日本語	(Shift-JIS) 挿入モード

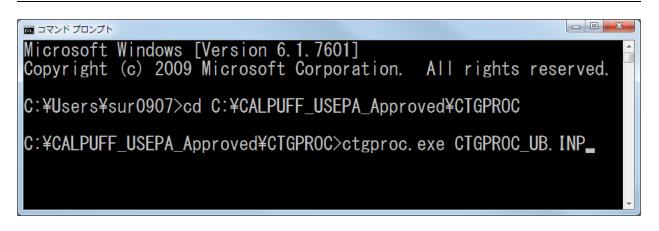
Set the same projection of output data as "TERREL" (PMAP etc.).

	F_USEPA_Approved¥CTGPROCVCTGPROC_UBJNP - 有丸	103.3
P-712(F) N	単無(E) 表示(V) 確素(S) ウインドウ(W) マクロ(M) その物(O)	193:2
CTGPROC		
CTOPROC_		2
178 -	NPUT GROUP: 2 Map Projection and Grid Information for Output	ut↓
179 180	Projection↓	
181 182	·····	
	Map projection for all X,Y (km)↓ (PMAP) Default: UTM ! PMAP = UTM !	
185		
186	UTM : Universal Transverse Mercator	
187	TTM : Tangential Transverse Mercator	
188	LCC : Lambert_Conformal_Conic↓	
189	PS : Polar Stereographic↓	
190	EM : Equatorial Mercator↓	
191 192	LAZA: Lambert Azimuthal Equal Area	
	False Easting and Northing (km) at the projection origin↓	
194	(Used only if PMAP= TTM, LCC, or LAZA) ↓	
195	(FEAST) Default=0.0 ! FEAST = 0.0	14
196	(FNORTH) Default=0.0 ! FNORTH = 0.0	11
197 4		
	UTM zone (1 to 60)	
199	(Used_only_if_PMAP=UTM)↓	
200	(IUTMZN) No Default ! IUTMZN = 48	14
201		
202	Hemisphere for UTM projection?	
203	(Used only if PMAP=UTM) +	
204	(UTMHEM) Default: N ! UTMHEM = N !	4-
205	N : Northern hemisphere projection↓ S : Southern hemisphere projection↓	
200		
Q17"	下候補 次の程果 単語を1分割20 切り抜き ユー 「粘り付け 975'のプ わけひ 行着号 日本語(Shith-315)	挿入モード

Set the datum of output (DATUM), the grid type of output (IGRID), reference point coordinates for grid of output at lower left corner (XREFKM, YREFKM), the number of grid (NX, NY), and grid spacing (DGRIDKM). These items have to be the same setting as "TERREL"

	iEPA_ApprovedWCTGPROCVCTGPROC_UB_INP + 务丸	00
	E) 表示(V) 時期(S) ウィンドウ(W) マクロ(M) その相(Q) マクロアメンド (L) 「ふ」(L) (L) (L) (L) (L) (L) (L) (L) (L) (L)	270
TGPROC UR T		
	nee 	
41	Output Datum-Region)	
42		
43		
44	The Datum-Region for the output coordinates is identified by a cha	aracter
45	string. Many mapping products currently available use the model of	
46	Earth known as the World Geodetic System 1984 (WGS-84). Other loc	
47		
	models may be in use, and their selection in TERREL will make its	
18	consistent with local mapping products. The list of Datum-Regions	
19	official transformation parameters is provided by the National Ima	agery
50	and Mapping Agency (NIMA).	
51 4	a new board a statistic discussion and	
52	Datum-region for output coordinates	
53	(DATUM) Default: WGS-84 ! DATUM = WGS-84 !	
4		
5		
6		
57	Grid	
58		
9 1	Auto a	
0	Reference coordinates X.Y (km) assigned to the southwest corner	
51	of grid cell (1,1) (lower left corner of grid)	
52	(XREFKM) No Default ! XREFKM = 623.0 !	
53	(YREFKM) No Default ! YREFKM = 5298.0 !	
54	(TREFRM) NO Default ! TREFRM - 3230.0 !!	
	And a state of the second seco	
55	Cartesian_grid_definition↓	
6	No. X grid cells (NX) No default ! NX = 34 !	
37	No. Y grid cells (NY) No default ! NY = 28 !	
68	Grid Spacing (DGRIDKM) No default ! DGRIDKM = 1. !!	
69	in kilometers	
70		
71 1	where where the second states of the second second second second second	
19	下機構 次の構成 単語を比*- 分割から* 切り抜き ユ*- 私り付け 約5%かび 755044 行番号表 日本語(Shift J	IS) 挿入モート

Move the "CTGPROC" folder in command prompt, input "CTGPROC.exe <input file name>.INP", and press [Enter] (Here it is "CTGPROC_UB.INP").



When showing "TERMINATION PHASE" message and completing calculation, you check to make output files. Output file is "LULC1KM_UB.DAT" in this case.

							- Titles !
	0 Windows7_05	(C:) + CALPUFF_USEPA_Approv	ed + CTGPROC +	+ 4 0	TERFOCOR		
	11H Hc - #8	いの 新しいフォルター	_			÷.	13
אלעסל אעדב 🗠 🕹 🐱	なる気に入り	6.0	#REA	12m	サイズ	1012	
icrosoft Windows [Version 6.1.7601] opyright (c) 2009 Microsoft Corporation. All rights reserved.	タウンロード ログスクトップ 記録が表示した場所	code code	2015/0+01 11113 2015/0400 11110 2005/07/21 18:53 2007/06/27 12:48	フラ(10-1.45) ガネラトイル			
:¥Users¥sur0907>cd C:¥CALPUFF_USEPA_Approved¥CTGPROC	394750 3 K41X>N	CTGRROC_UB_INP	2087/05/03 10.04 2015/04/02 11/05 2915/04/01 11/10	アプリシーション DF ファイル		A 	
:¥CALPUFF_USEPA_Approved¥CTGPROC>ctgproc.exe_CTGPROC_UB.INP ETUP_PHASE DMPUTATIONAL_PHASE	 ■ ビジチヤ ■ ビデオ ▲ ミュージック 	esusgs2_0a.img esusgs2_0a.img.gz LUWISTON.CMP	2007/04/24 22:39 2013/07/06/25/22 2007/06/27 22:35 2007/06/27 22:36	WHITAN LADING	- 157,314,83 31,015,93 639,83 2,439,83	A .	
and Use Processing Complete — Check LIST file for Run Summary ad QA Warnin Messages. FMINATION PHASE	● コンピューター ▲ Windows7_05 (C:) 量 DNFOX (##metury) [I 量 NGCDS5 (Wpikto) (I:) Ge NGCDS5 (Wpikto) (I:)	UULCIKM_UBLDAT	0015/14/06 32-10 2014/02/09 30:50 2007/04/27 12:40 2005/09/12 6:35 2005/09/12 6:35 2005/09/17 15-82	015 224 A 016 274 A DAT 274 A 041 274 A	243 KM 3 KB 800 K5 5,697 KB 3,067 KB 3,067 KB 2 KB	****	
止 - プログラムは終了しました。 ¥CALPUFF_USEPA_Approved¥CTGPR0C>	ULCIKM_UB.DAT	■新日時: 2015/04/01 11:10 サイス: 242 KB	WEER 2016/07/06 11:37		A 2222-1	P	

2.3 Developing Geological Data

2.3.1 <u>Outline</u>

Geological data is made by using elevation data made in "TERREL" and land use data made in "CTGPROC".

CALPUFF includes MAKEGEO as processor to combine elevation data and land use data.

Set input file, output file, projection, datum, calculation range, and calculation resolution in TERREL. Output geological data file is used in CALMET processor.

2.3.2 Developing Method

Open INP file in "MAKEGEO" folder.

理 - 自開く - 書き込む	い 新しいフォルダー					6
お気に入り	名前	更新日時	種類	サイズ	属性	
ダウンロード	CODE	2015/04/01 11:22	ファイルフォル		D	
■ デスクトップ	GEO1KM.DAT	2007/06/27 22:49	DAT ファイル	617 KB	A	
1 最近表示した場所	geo1km_ub.dat	2015/04/01 11:25	DATファイル	61 KB	A	
	LULC1KM.DAT	2007/06/27 22:46	DAT ファイル	2,489 KB	A	
1.	LULC1KM_UB.DAT	2015/04/01 11:10	DAT ファイル	243 KB	A	
ライブラリ	🗋 luse.clr	2015/04/01 11:25	CLR ファイル	1 KB	A	
ドキュメント	i makegeo.exe	2015/04/01 11:21	アプリケーション	1,063 KB	A	
■ ピクチャ	makegeo.inp	2005/02/21 17:02	INP ファイル	15 KB	A	
ビデオ	MAKEGEO.LST	2007/06/27 22:49	MASM Listing	422 KB	A	
→ ミュージック	makegeo_070327.exe	2007/03/27 14:57	アプリケーション	1,014 KB	A	
	makegeo_UB.inp	2015/04/01 11:25	INP ファイル	15 KB	A	
コンピューター	makegeo_ub.lst	2015/04/01 11:25	MASM Listing	51 KB	A	
	QALUSE.GRD	2015/04/01 11:25	GRD ファイル	5 KB	A	
Kindows7_OS (C:)	QATERR.GRD	2015/04/01 11:25	GRD ファイル	12 KB	A	
🚽 INF00X (¥¥mercury) (I	README.TXT	2003/04/14 12:55	テキスト文書	3 KB	А	
🚽 KKJ305 (¥¥pluto) (J:)	TERR1KM.DAT	2007/06/27 22:28	DAT ファイル	79 KB	A	
🚽 KKJ204 (¥¥pluto) (L:)	TERR1KM_UB.DAT	2015/04/01 11:20	DAT ファイル	9 KB	A	
😽 Lenovo_Recovery (Q:) 👻						
G KKJ204 (¥¥pluto) (L:) とEnovo_Recovery (Q:) → makegeo_UB.inp 更新	TERR1KM_UB.DAT		DAT ファイル		A	

Set input file (LUDAT, TERRDAT) and output file name (GEODAT, RUNLST).

C:VCALP	UFF_USEPA_Approved¥MAKEGEO¥makegeo_UB.inp(更新)- 务内
	編集(E) 表示(Y) 検察(S) ウィンドウ(W) マクロ(M) その他(D) 23:
	H1 P U X H2 V 4 H 0 E 9
makege	eo_UB.inp *
14	
15	
16	INPUT GROUP: 0 Input and Output Files
17	
18	
19	Default Name Type File Name
20	
21	LU.DAT input ! LUDAT =. /CTGPROC/lulc1km_UB.dat !!
22	LU2.DAT input * LU2DAT = luglobe.dat *
23	TERR. DAT input ! TERRDAT =/TERREL/terr1km_UB. dat !
24	GEO. DAT output ! GEODAT =geo1km UB. dat !
25	MAKEGEO LST output ! RUNLST =makegeo UB. Ist !
26	QALUSE.GRD output * LUGRD =qaluse_UB.grd *
27	QATERR.GRD output * TEGRD =qaterr_UB.grd *
28	4
29	All file names will be converted to lower case if LCFILES = T
30	Otherwise, if LCFILES = F, file names will be converted to UPPER CASE↓
31	(LCFILES) Default: T ! LCFILES = T !
32	T = lower case.
33	F = UPPER CASE
34	
35	NOTE: File/path names can be up to 70 characters in length
36	
5月1573	下破壊 次の結果 単語を北*・分割り05 切り抜き 北*- 私り付け 約75707 7050編… 行番号表… 日本語(Shirh-JIS) 挿入モード

Set the same projection as "TERREL" etc. (PMAP etc.).

	UFF_USEPA_Approved¥MAKEGEO¥makegeo_UB.inp (更新) - 秀丸 編集(E) 表示(V) 検索(S) ウィンドウ(W) マクロ(M) その他(Q)	100:24
	編集(E) 表示(X) 現示(S) ウインドウ(X) マクロ(M) その約(Q)) ***********************************	100.24
	eo UB.inp*	
	v	
81	1	
82	Projection	
83	······	
84	4	
85	Map projection for all X,Y (km)	
86	(PMAP) Default: UTM ! PMAP = UTM !	1
87	↓	
88	UTM : Universal Transverse Mercator	(
89	TTM : Tangential Transverse Mercator	
90	LCC : Lambert Conformal Conic↓	
91	PS : Polar Stereographic↓	
92	EM : Equatorial Mercator	
93	LAZA: Lambert Azimuthal Equal Area	
94		
95	False Easting and Northing (km) at the projection origin	
96	(Used only if PMAP= TTM, LCC, or LAZA)↓	
97	(FEAST) Default=0.0 ! FEAST = 0.0	11
98	(FNORTH) Default=0.0 ! FNORTH = 0.0	
99		ux.
100	UTM zone (1 to 60)	
101	(Used only if PMAP=UTM)↓	
102	(IUTMZN) No Default ! IUTMZN = 48	14
103		
104	Hemisphere for UTM projection?	
105	(Used only if PMAP=UTM)↓	
106	(UTMHEM) Default: N ! UTMHEM = N !	4
107	N : Northern hemisphere projection↓	
108	S : Southern hemisphere projection	
109		
\$R17"	下俳編 次の結果 単語を2 分割りひ 切り抜き 北ー 粘り付け がっ かけの 行参号 日本語(Shift-JIS)	挿入モード

Set the datum of output (DATUM), the grid type of output (IGRID), reference point coordinates for grid of output at lower left corner (XREFKM, YREFKM), the number of grid (NX, NY), and grid spacing (DGRIDKM). These items have to be the same setting as "TERREL".

	JSEPA_Approved#MAKEGEO#makegeo_UB.inp (更新) - 気丸	100-00
and the second second	WE) 表示(Y) 検索(5) ウィンドウ(W) マクロ(M) その句(Q)	151:5
	▼ (1) × (2) ∧ (4) ← (1) 目 ●	
makegeo_UE	Unp*	
143	Output Datum-Region	
144		
145		
146	The Datum-Region for the output coordinates is identified by a	character
147	string. Many mapping products currently available use the mode	
148		
	Earth known as the World Geodetic System 1984 (WGS-84). Other	
149	models may be in use, and their selection in TERREL will make i	
150	consistent with local mapping products. The list of Datum-Regi	ons with
151	official transformation parameters is provided by the National	Imagery and
152	and Mapping Agency (NIMA).	
153 4		
154	Datum-region for output coordinates	2.1
155	(DATUM) Default: WGS-84 ! DATUM = WGS-84	1.1.1
156		
157 1		
158		
159	Grid↓	
160		
161		
162	Reference coordinates X.Y (km) assigned to the southwest corner	4
163	of grid cell (1,1) (lower left corner of grid)	
164	(XREFKM) No Default ! XREFKM = 623.0 !	
165	(YREFKM) No Default ! YREFKM = 5298.0 !!	
166		
167	Cartesian grid definition	
168	No. X grid cells (NX) No default ! NX = 34 !	
169	No. Y grid cells (NY) No default ! NY = 28 !	
170	Grid Spacing (DGRIDKM) No default ! DGRIDKM = 1. !	
171	in kilometers	
172		
R15'et	下線編 次の編集 単語を次一 分割500ドー 切り物き 次*- 私り付け がり**27 75504編 行動号表 日本	創(Shift-315) 論入モード

Move the "MAKEGEO" folder in command prompt, input "makegeo.exe <input file name>.INP", and press [Enter] (Here it is "makegeo_UB.INP").

Im コマンド ブロンプト
Microsoft Windows [Version 6.1.7601] Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:¥Users¥sur0907>cd C:¥CALPUFF_USEPA_Approved¥MAKEGE0
C:¥CALPUFF_USEPA_Approved¥MAKEGEO>makegeo.exe makegeo_UB.inp_
-

When showing "TERMINATION PHASE" message and completing calculation, you check to make output files. Output file is "geo1km_ub.dat" in this case.

and the second s						0.0
G w windows7_05	(C:) • CALPUFF_USEPA_Approved	MAKEGEC .	·+ + + = ===	KFIS なら様常		
11月・ 日く・ 用き	きふた 新しん マオルター				10.4	11
		2007/04/27 23:44 2003/04/27 23:44 2003/04/27 23:44 2003/04/27 23:44 2003/04/2011 21:02 2003/04/2011 21:02 2003/04/27 24:45 2003/04/21 21:25 2003/04/21 21:25 20	DAT ファイル GAT ファイル DAT ファイル DAT ファイル PT 10年~50 DAT ファイル PT 10年~50 PT 10年~50 PT 10年~50 PT 20年~50 PT	017 K8 43 K0 2,459 K0 243 K2 1,065 K0 15 K6 422 K8 3,014 K6 5 K0 11 K6 2,5 K0 12 K8 2,5 K0 2,5 K0 2,	A 4 4 4 4 4 4 5 4 4 4 4 4 4	
		Bit Bit<	ERUCAY ERUIN # KRUCAY ERUIN # CODE 2016/14/21 14/2 # CODINALIA 2007/21 24/9 # REBR DEGINALIAN 2007/21 24/9 # SCHERLY Tessingen, 072 24/9 2007/21 24/9 # SCHERLY DEGINALIAN DEGINALIAN # SCHERLY Tessingen, 072 24/9 2007/21 24/9 # SCHERLY DEGINALIAN DEGINALIAN # SCHERLY DEGINALIAN DEGINALIAN # SCHERLY DEGINALI	Bit Bit <td>Bit Bit Bit<td>Bit Bit Bit Bit Bit Bit State Bit State State</td></td>	Bit Bit <td>Bit Bit Bit Bit Bit Bit State Bit State State</td>	Bit Bit Bit Bit Bit Bit State Bit State State

3 <u>Converting Meteorological Data</u>

3.1 Converting Surface Meteorological Data

3.1.1 <u>Outline</u>

CALPUFF includes SMERGE as surface meteorological data conversion processor.

Preparing surface meteorological data is converted into the format of input data in SMERGE

SMERGE format is limited to 6 types such as CD144, NCDC SAMSON, NCDC HUSWO, ISHWO, TD3505, and TD9956 and these are the format of NCDC³. Among them, surface meteorological data created in the format of TD 3505 is available from NOAA's website. However, if there is missing in the data, it is necessary to make assumptions based on the data before and after.

Set input file, output file, calculation period, and input file format (TD3505) in SMERGE. The output surface meteorological data file is used by the CALMET processor.

3.1.2 Obtaining Surface Meteorology Data

Obtain surface meteorological data formatted by TD3505 after accessing NOAA's website⁴ and selecting the target year's folder. The detailed format of the data is described in "isd-lite-format.pdf".

2010	
2012 Jan 26 12:53 2013 Jan 13 2016 2014 Dec 10 2015 2015 Mar 21 11:37 2016 Jul 11 21:22 additional Feb 20 2008 country-list.txt Mar 14 2012 27k dsi3260.pdf Nov 7 2012 69k	
2013	
2014	
2015 Mar 21 11:37 2016 Jul 11 21:22 additional Feb 20 2008 country-list.txt Mar 14 2012 27k dsi3260.pdf. Nov 7 2012 69k	
2016	
additional	
country-list.txt Mar 14 2012 27k dsi3260.pdf. Nov 7 2012 69k	
<u>dsi3260.pdf</u>	
THI 11 01.02 00161 1	
<u>isd-history.txt</u>	
isd-inventory.csv Jul 11 21:45 53045% 🖺 🗹	

Obtain the surface meteorological data of target city. Code is specified by city⁵ and code of UB city is "442920".

³ the U.S. National Climatic Data Center

⁴ ftp://ftp.ncdc.noaa.gov/pub/data/noaa/isd-lite

⁵ http://rda.ucar.edu/datasets/ds353.4/inventories/station-list.html

) () ftp://ftp.ncdc.noaa.gov/pub/data/noaa/2015/	C	Q. 検索		4	俞	☆	Ê	2	-	9	=
442840-99999-2015.gz Mar	21	10:54	127k 🖤								
	21	10:54	131k 💆								
442860-99999-2015.gz Mar	21	10:54	127k 💇								
442870-99999-2015.gz Mar	21	10:54	129k 🖤								
442880-99999-2015.gz Mar	21	10:54	129k 🖤								
442900-99999-2015.gz Mar	21	10:54	1k 💇								
	21	10:54	134k 🖤								
442920-99999-2015.gz Mar	21	10:54	585k 💇								
442940-99999-2015.gz Mar	21	10:54	127k 🖤								
442970-99999-2015.gz Mar	21	10:54	1k 🗹								
442980-99999-2015.gz Mar	21	10:54	126k 🖤								
	21	10:54	139k 🖤								
<u>443040-99999-2015.gz</u> Mar	21	10:54	138k 🔮								

Copy all data after opening "442920-99999-2015.gz".

ftp://ftp.ncdc99999-2015.gz × +									ķ	- 9	
() ftp://ftp.ncdc.noaa.gov/pub/data/noaa/2015/442920	C	Q 依奈		٠	A	\$	0	0	1	0	Ξ
2944429209999992015010100004+47917+1066											
2+130699999V0209999099999999999999999										10214	Χ.
01021CA1999+999999001CE19MSL +999994 2271MA1999999087251MD1310091+9999MW104		990F102991001999								-	
1254 38725 40425 53009 70410 00004 333									1164	2	
03sccgal	-						10.16.1	Nor	_		
1454429209999992015010100004+47843+1067	67F	M									
5/13309999990201701N002012200019N00500	0019	9-02801-03201999	999AD	DGF	1009	919	9995	9999	99999	99999	245
1102001999999MW1041REMMET086METAR 2MUE								2 0			
MR 0FE657.6 70 NT-											
1484429209999992015010100304+47843+106							_	_			_
5/13309999990202001N002012200019N00400											251
1102001999999MW1041REMMET089METAR ZMUE	8 01	00302 20002MPS 4	000NW	EO	NSC	MZ	0/M.	2 0	1020	N0310	
MK QFE657.7 67 NW MO=		-									
148442920999992015010101004+47843+1067 54133099999902099990000012200019N00300			0.0.01	DC P	0.00	010	0000	0.0.0		00000	100
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1484429209999992015010101304+47843+1067	672	Me.									
5+133099999902099990001012200019N00300		9-02701-03101959	999AD	DGF	1009	919	9999	0999	09999	99999	M
11022019999999MW1041REMMET009METAR ZMUE	8 01	01302 VRB01MPS 3		FU			7/M3	1 0		NOS10	
MK OFN658.5 71 NW MO											

Paste to editor and save as the new name. Interpolate the mission data using the before and after data.

](筆篇)(更新)- 尚凡		
ファイル(E) 編集(E) 表示(M) 検索	用(5) ウィンドウ(W) マクロ(M) その他(3)	19406:1
1 CO (M 1 CO 100)	22 4 44 47 51 E 4	
e] (mm) ·		
19390 017244292 19391 023044292 19392 018144292 19392 018144292 19393 017244292 19395 021144292 19396 019144292 19396 019144292 19399 021144292 19399 021144292 19400 018144292 19400 018144292 19402 018144292	$\begin{array}{c} 20999992015123114304+47843+106767FM-15+\\ 20999992015123115004+47917+106867FM-12+\\ 20999992015123115004+47843+106767FM-15+\\ 2099992015123116004+47843+106767FM-15+\\ 20999992015123118004+47843+106767FM-15+\\ 20999992015123118004+47843+106767FM-15+\\ 20999992015123118004+47843+106767FM-15+\\ 20999992015123112004+47843+106767FM-15+\\ 20999992015123121004+47843+106767FM-15+\\ 20999992015123121004+47843+106767FM-15+\\ 20999992015123121004+47843+106767FM-15+\\ 20999992015123121004+47843+106767FM-15+\\ 20999992015123121004+47843+106767FM-15+\\ 20999992015123122304+47843+106767FM-15+\\ 2099992015123122304+47843+106767FM-15+\\ 2099992015123123004+47843+106767FM-15+\\ 20099992015123123004+47843+106767FM-15+\\ 20099992015123123004+47843+106767FM-15+\\ 20099992015123123004+47843+106767FM-15+\\ 20099992015123123004+47$	130699999V020999059999999999 13069999V02099900001999999 13309999V020999000101999999 13309999V02099900001024381 13069999V02099900001024381 13099999V02099900001024381 133099999V02099900001024381 133099999V02099900001024381 133099999V020999000001024381 133099999V020999000001024381 133099999V02099900001024381 13309999V020999000101999999 13309999V0209990001019999999 13309999V0209990001019999999 13309999V0209999V001019999999 13309999V0209999V001019999999 13309999V020999V00101999999 13309999V020999V00101999999 13309999V020999V001019999999 13309999V020999V001019999999 13309999V020999V001019999999 13309999V020999V001019999999

3.1.3 Developing Method

Open INP file in "SMERGE" folder.

ふむ 新しいフォルター						10
			8			
名前	更新日時	種類	サイズ	属性		
CODE	2016/04/26 15:43	ファイル フォル		D		
🔒 metdata	2016/07/06 13:43	ファイルフォル		D		
old	2016/07/06 13:46	ファイル フォル		D		
442920_201003to201102_rep2.isd	2015/04/06 15:16	ISD ファイル	2,475 KB	A		
🔁 ish-format-document.pdf	2016/04/21 10:25	Adobe Acrobat	580 KB	AI		
ish-format-document_2011sep.pdf	2015/04/01 18:39	Adobe Acrobat	244 KB	A		
README.TXT	2003/04/14 13:08	テキスト文書	3 KB	A		
smerge.exe	2015/04/01 11:31	アプリケーション	1,125 KB	A		
smerge_070627.exe	2007/06/27 19:03	アプリケーション	786 KB	A		
smerge_160426.exe	2016/04/26 15:42	アプリケーション	1,146 KB	A		
SMERGE_UB.INP	2015/04/03 17:16	INP ファイル	7 KB	Α		
SMERGE_UB_2014.INP	2016/04/26 15:03	INP ファイル	7 KB	A	_	
Dubmet_2014.lst	2016/04/26 15:43	MASM Listing	24 KB	A		
ubmet_201003to201102.dat	2015/04/06 15:16	DAT ファイル	617 KB	A		
ubmet_201403to201502.dat	2016/04/26 15:43	DAT ファイル	617 KB	A		
新日時: 2015/04/03 17:16 作成日時: 2015	5/04/01 14:59					
	<pre>metdata dd /pre>	metdata 2016/07/06 13:43 old 2016/07/06 13:43 442920_201003to201102_rep2.isd 2015/04/06 15:16 215.behromat-document.pdf 2015/04/01 18:39 215.behromat-document_2011sep.pdf 2015/04/01 18:39 215.behromat-document_2011sep.pdf 2015/04/01 18:39 215.behromat-document_2011sep.pdf 2015/04/01 11:31 215.behromat-document_2015/04/01 11:31 2015/04/04/26 15:03 215.behromat-document_2015/04/01 12:12 2015/04/06 15:16 215.behromat-document_201102.dat 2015/04/06 15:16 215.behromat-201403to201502.dat 2015/04/01 14:59	metdata 2016/07/06 13:43 ファイル フォル old 2016/07/06 13:43 ファイル フォル 4/42920_201003to201102_rep2.isd 2016/04/06 15:16 ISD ファイル 216/hormat-document.pdf 2016/04/21 10:25 Adobe Acrobat 2016/04/21 10:25 Adobe Acrobat 2015/04/06 15:16 ISD ファイル 2016/04/21 10:25 Adobe Acrobat 2016/04/21 10:25 Adobe Acrobat 2015/04/01 11:31 アグリケーション 2015/04/01 11:31 アグリケーション 2015/04/01 11:31 アグリケーション 2016/04/26 15:03 INP ファイル 2016/04/26 15:03 INP ファイル 2016/04/26 15:43 AGAT ファイル 2016/04/26 15:143 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ファイル 617 KB A 1 ubmet_201403to201502.dat 2016/04/26 15:43 DAT ファイル 617 KB A 1 ubmet_201403to201502.04zt 2016/04/26 15:43 DAT ファイル 617 KB A<!--</td--></td></td>	metdata 2016/07/06 13:43 ファイル フォル old 2016/07/06 13:43 ファイル フォル 442920_201003to201102_rep2.tsd 2015/04/06 15:16 ISD ファイル 2,475 kB 2 16t-format-document.pdf 2015/04/06 15:16 ISD ファイル 2,475 kB 2 16t-format-document.pdf 2015/04/01 10:25 Adobe Acrobat 244 kB IB README.TXT 2003/04/14 13:08 デキストを書 3 kB IS merge_exee 2015/04/01 11:31 アブリケーション 1,125 kB IS merge_160426.exe 2015/04/01 11:31 アブリケーション 1,146 kB IS MERGE_UB_1041 2016/04/26 15:42 アブリケーション 1,146 kB IS MERGE_UB_2014.INP 2016/04/26 15:43 INP ファイル 7 kB ID ubmet_2014.051 2015/04/01 15:16 DAT ファイル 617 KB ID ubmet_201403to201502.dat 2016/04/26 15:43 DAT ファイル 617 KB	metdata 2016/07/06 13:43 ファイル フォル D old 2016/07/06 13:43 ファイル フォル D 442920_201003to201102_rep2.isd 2016/07/06 13:43 ファイル フォ/ル D 216/67/06 13:43 ファイル フォ/ル D D 216/07/06 13:43 ファイル フォ/ル D D 216/07/06 13:43 ファイル フォ/ル D D 216/07/06 13:43 クライル フォ/ル D D 216/07/06 13:43 DOT/06/12 10:25 Adobe Acrobat 244 KB A 316.67mat-document_2011sep.pdf 2015/04/01 11:31 アグリケーション 1,125 KB A 316.87mge_exek 2015/04/01 11:31 アグリケーション 786 KB A 316.87mge_070627.exe 2016/04/26 15:42 アグリケーション 1,125 KB A 316.97mge_exek 2016/04/26 15:43 Tアグリケーション 1,145 KB A 316.97mge_070627.exe 2016/04/26 15:43 Tアグリケーション 1,145 KB A 316.97mge_0716.011.77mg DT アイル 7 KB A 316.97mge_0716.011.710 DT アイル 7 KB A 316.016/04/26 15:43 DAT アイル <td>metdata 2016/07/06 13:43 ファイル フォル D old 2016/07/06 13:43 ファイル フォル D 442920_201003to201102_rep2.isd 2015/04/06 13:16 ISD ファイル フォル D 3 ish-format-document.pdf 2015/04/06 13:16 ISD ファイル フォル D 3 ish-format-document.pdf 2015/04/01 18:39 Adobe Acrobat 244 KB A 3 ish-format-document_2011sep.pdf 2015/04/01 11:31 アブリケーション 3 KB A 5 smerge_exex 2005/04/01 11:31 アブリケーション 1,125 KB A 5 smerge_exex 2005/04/01 11:31 アブリケーション 1,126 KB A 5 Smerge_L06126.exe 2015/04/02 15:42 アブリケーション 1,146 KB A 5 SMERGE_UB_2014.INP 2016/04/26 15:03 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ubmet_201403to201502.04zt 2016/04/26 15:43 DAT ファイル 617 KB A </td

Set the number of input file as surface meteorological data (NFF) and output file name (SURFDAT, RUNLST).

C:YCALP	UFF_USEPA_ApprovedVSMERGEVSMERGE_UB_INP 务九	000
77-114(F)	編集(E) 表示(V) 株束(S) ウィンドウ(W) マクロ(M) その他(O)	171
SMERG	E_UB.INP	
17 18 19 20 21	Subgroup (0a) 4 	Please t
24 25 26 27 28		
29 30 31 32 33		11
34 35 36 37 38 39	All file names will be converted to lower case if LCFILES = T	CASE
	NOTE: File/path names can be up to 70 characters in length	捕入王一片

Set input file name of surface meteorological data (SFCMET), monitoring station number (IFSTN), and time zone (XSTZ). When using the surface meteorological data in the format of TD3505 or TD9956, since the time of them use UTC, time zone is set as "0".

111(E)	編集(E) 表示(Y) 総差(S) ウィンドウ(W) マクロ(M) その信(Q)	
0		
SMERG	LUBLINP	
401	10 · · · · · · · · · · · · · · · · · · ·	
43		
44		
45	Subgroup (Ob)	
46		
47	4	
48		
49	Enter NFF 4-line groups identifying the file name (SFCMET), the↓	
50	station number (IFSTN), the station elevation (optional) in meters	
51	(XELEV), and the time zone of the data (XSTZ) for each file,	
52	followed by a group terminator. J	
53	1	
54	NOTE: XSTZ identifies the time zone used in the dataset. The↓	
55	TD3505 and TD9956 data are prepared in UTC time rather than	
56	local time, so XSTZ=0. is expected for these.	
57	4	
58	The optional station elevation is a default value used to calculate	1
59	a station pressure from altimeter or sea-level pressure if the	
60	station presure is missing and the station elevation is missing in	
61	the file. If XELEV is not assigned a value (i.e., XELEV does not	
62	appear in this control file), no default elevation is available and	i.
63	station pressure remains missing.	
64		
65	<pre>! SFCMET = 442920_201003to201102_rep2.isd!</pre>	
66	! IFSTN = 442920 !↓	
67	! XSTZ = 0 ! !END!	
68	4	
69	A second s	

Set the start date and time and the end date and time (IBYR, IBMO, IBDY, IBHR, IEYR, IEMO, IEDY, and IEHR) and time zone (XBTZ). When setting time zone, when going to the west, this value is positive and when going to the east, this value is negative. Therefore, set "-8" in Mongolia.

器 C:VCALPUFF_USEPA_ApprovedVSMERGEVSMERGE_UB.INP - 我和	O D X
ファイル(E) 編集(E) 表示(Y) 検索(G) ウィンドウ(W) マクロ(M) その他(Q)	72:1
<u>3 ¤ H </u>	
SMERCE_UB_INP	M
70	
72 INPUT_GROUP: 1 Run_control parameters	
73	
74 December Decied	
75 Processing Period↓ 76 ↓	
77 Starting date: Year (IBYR) No default ! IBYR = :	2010 1
78 Month (IBMO) No default ! IBMO = 3	2010
79 Day (IBDY) No default ! IBDY =	1 1
80 Hour (IBHR) No default ! IBHR =	i 11
81 4	
82 Ending date: Year (IEYR) No default ! IEYR = 1	2011
83 Month (IEMO) No default ! IEMO = 3	3 !↓ =
84 Day (IEDY) No default ! IEDY =	1
85 Hour (IEHR) No default ! IEHR = (0 ! i
86 1	
87 Base time zone: (XBTZ) No default ! XBTZ = -	-8
88 PST = 8., MST = 7.↓ 89 CST = 6., EST = 5.↓	
89	
91	
92 NOTE: The hour is defined by the time at the end of the l	hour
93 in time zone XBTZ.↓	ing all t
94 4	
95 File Options	
Q6 秀丸27-6 下横柄 次の福岡 単語を21- 分割の小 切り抜き 31- 140月は やゲジャンプ 7050尾 行乗号表	-
25242 Too FIRM AND A REPORT - TREATING WIGHT IT - 10/11/17 17 7 10/ 7/12/10/100	日本語(Shift-JIS) 挿入モード

Set the file format of surface meteorological data.

C:#CALPUFF_U	SEPA_ApprovedVSMERGEVSMERGE_UBLINP ~ #7.	2 B 🛛 🕺
アイル(日) 編集((1) 表示(1) 検索(5) フィンドウ(10) マクロ(10) その相(10)	117:1
1 🔾 H1.	🗢 (a) (c) (c) (a) (a) (a) (c) 🖂 😣	
SMERGE_UB.D	NP	
115	Format of output SURF DAT FILE	No
116	(IOFORM) Default: 2 ! IOFORM = 2 !	
117 1	1 = Unformatted	
118	2 = Formatted	
119	(IOPACK) Default: 0 ! IOPACK = 0 !	
121	0 = NOT packed	
	1 = Packed (used only if IOFORM = 1)+	
122	Time of All Confere Chatles files in this sum!	
123	Type of ALL Surface Station files in this run	
	(JDAT) No Default ! JDAT = 6 !	
125	1 = CD144 2 = NCDC SAMSON	
126		
127	3 = NCDC HUSWO	
128	4 = CD144 (extended record format with precip rate)	27
130	5 = TD3505(CD) - NCDC Integrated Surface Hourly CD-ROM Se	
	6 = TD3505 - NCDC Integrated Surface Hourly Database 7 = TD9956 - NCDC DATSAV3 Database (not abbreviated)	
132	7 = TD9956 - NCDC DATSAV3 Database (not abbreviated)	
133	Format of input HUSWO file	
134	(Used only if JDAT=3)	
135	(IHUSWO) Default: 1 ! IHUSWO = 1 !	
136	1 = All data are in English units	
137	2 = All data are in Metric units	
138	Z - ATT UALA ATC TH MCL(TC UNILS)	
139	Calculation of station pressure from altimeter or sea level	
140	pressure	
141	(IPCALP) Default: E for IDAT = 1-4 forced T	
PLIT'S		ゆえモード

Move the "SMERGE" folder in command prompt, input "smerge.exe <input file name>.INP", and press [Enter] (Here it is "SMERGE_UB.INP").



When showing "TERMINATION PHASE" message and completing calculation, you check to make output files. Output file is "ubmet_201003to201102.dat" in this case.

	C + Windows7_OS (C:) + CALPUFF_USEPA_Approved + SMERGE +	- 4, SM2PG2036
אלעמל אלדכו	「「「「「」」「「」」「「「」」」」「「」」」」」「「」」」」」」「「」」」」」	lite di i
icrosoft Windows [Version 6.1.7601] opyright (c) 2009 Microsoft Corporation. All rights reserved. EVUsers¥sur0907>cd C:¥CALPUFF_USEPA_Approved¥SMERGE E:¥CALPUFF_USEPA_Approved¥SMERGE>smerge.exe SMERGE_UB.INP ETUP_PHASE OMPUTATIONAL PHASE INSSING Values for WS WD ICE1L ICC TEMPK IRH PRES 1894 1894 0 0 0 0 0 ERMINATION PHASE デュー プログラムは終了しました。	デスクトップ metádás 2010/01/96:1045 酸 ad 2015/01/96:1046 酸 2015/01/02:1020 2015/01/02:1020 ダイプタリ 101-06/00:000000000000000000000000000000000	$\begin{array}{c} 2750.4, 276.5, \\ 1250.777.6, \\ 4250.4, 276.6, \\ 3501.6, \\ 3$
:¥CALPUFF_USEPA_Approved¥SMERGE>	ubmet_2010031e201102.det 現所日時: 2015/04/06 15:16 作用日時: 2016/07/06 13 DKTファイル サイズ: 616 KB	1:57
	1.供雇択	A コンピューター

3.2 Converting Aerological Data

3.2.1 <u>Outline</u>

Aerological data is available from "NOAA/ESRL Radiosonde Database"⁶.

When setting target term, the unit of wind speed, monitoring station, and output format, show the data according to this setting. Set target term in UTC (Coordinated Universal Time). UTC is the value by subtracting eight hour from Mongolian time. After copying all displayed data, paste them to the text editor such as Notepad, and save as new file. This extension sets ".fsl".

CALPUFF includes READ62 as aerological data conversion processor.

Set input file, output file, calculation term, and input file format in READ62. Output aerological data file is used in CALMET processor.

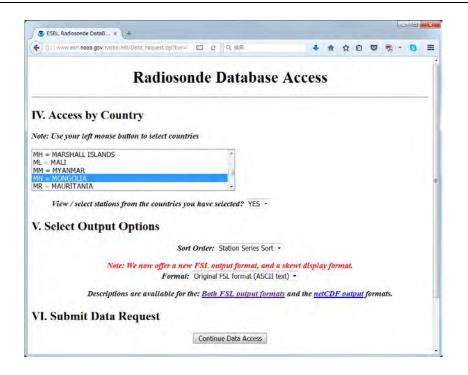
3.2.2 Obtaining Aerological Data

Visit "NOAA/ESRL Radiosonde Database" website and set target term. Date and time of aerological data is UTC, so considering the time-zone difference, set target term so that it covers the target term specified by SMERGE. Set the unit of wind speed to "Tenth of Meters/Second"

S NOAA/ESRL/GSD - RAOB * +			
(j) !www.est.noaa.gov/racbs/	-C Q (1)#	****	
NOAA/E	SRL Radiosond	le Database	
Beneral information about this database, acc roducts, and other details is available on th		ss software for our CDrom and	DVD archive
Recent Activities:			
January 2016 - Updated the archive with GTS data colle March 24th. - Updated the <u>inventory</u> to include all obse		ind ESRL/GSD data for 2015 at	ad 2016 thru
I.	Input Dates: (UTC u	inits)	
From	: yr 2010 - mo 2 - dy 28 -	- hr 0 -	
Thru	yr 2011 • mo 3 • dy 1 •	• hr 0 •	
II. Se	ounding Specific Info	ormation	
Hours of ac	cess: All Times • Data level	s: All Levels 🔹	
	Wind Units: Tenths of Meters/Sec	ond -	
1	III. Select Stations / I	Data	
Select R	adiosonde Sites by: Country		
	Continue Data Request		
Natio	nal Oceanic and Atmospheric Administrati Earth System Research Laboratory (ES		
	Continue Data Request		

Set country (MN=Mongolia) and file format (Original FSL Format).

⁶ <u>http://www.esrl.noaa.gov/raobs/</u>



Select target monitoring station and click [Get Radiosonde Data]

◆ ① www.esrl.noaa.gov/raobs/intl/GetRaobs.cgi?shour=All+T 2 (2) Q 検索	+	A	슈	1	*	0	-
Radiosonde Database Ad	ccess						
V. Select Stations							Ĩ
Note: Use your left mouse button to select stations							
9999 99999 44212 49.97 092.08 00936 ULAN-GOM 99 MN ⇒999 9999 44231 49.63 100.17 01288 MJREN 99 MN 9999 9999 4427 46.07 10.50 00755 CHOBALSAN 99 MN 9999 9999 44277 46.40 096.25 02147 ALTA199 MN 9999 9999 4427 46.40 1096.25 02147 ALTA199 MN 9999 9999 4427 43 4.27 10.07 80 10132 AR8AHER 99 MN 9999 9999 4437 43.58 104.40 10132 AR8AHER 99 MN							
-							
nit wban wmo lat lon elev station name Station Sort by WMO Station Identifier							
V. Select Output Options							
Sort Order: Station Series Sort 👻							
Format: Original FSL format (ASCII text) +							
Descriptions are available for: <u>Both FSL output formats</u> and the <u>netCDF output</u> format.							
VI. Submit Data Request							

Aerological data in target term is displayed. Select all data by pressing Ctrl+A and press Ctrl+C or select "copy" after right-clicking.

) @ www.ie	irl.noaa.gov/rap	ba/temp/radb_r	iountings3231	C C C	1. 保田		+	Ĥ	1	0	1	0	=
254	0	28	PB	в 20	10								
		442.92			1313	2330							
						3							
						ms							
						.30							
						32767							
				32767		32767							
						70							
						70							
		1749				40							
						32767							
						100							
						32767							
						100							
						130							
						32767							
						32767							
						32767							
					270	170							
			-257			32767							
						200							
						32767							
						2.00							
						210							
						210							
						32767							
						32767							
4	300	eenn	- 5.61	32747	280	210	_		 				_

Paste the copied data to Notepad or text editor and save as this file as new file in "READ62" folder.

	- 0 X
i C:¥CALPUFF_USEPA_Approved¥READ62¥aerologyData¥44292.fsl - 秀丸	
ファイル(E) 編集(E) 表示(Y) 検索(S) ウィンドウ(W) マクロ(M) その他(Q)	1:1
44292.fsl	×
$ = 254 = 0 = 28 = 10 = 520 = 2010 \downarrow$	
2 1 99999 44292 47.93N106.98E 1313 2330↓	Â
4	
5 231 22 291 20 29 20 20 20 20 20 20 20 20 20 20 20 20 20	
6	
7	
8	
9	
10 5 818 1749 −189 −249 170 40↓	
11 5 757 2323 -205 -275 32767 32767↓	
12 5 733 2561 −189 −231 250 100↓	
13 5 707 2829 -193 -220 32767 32767↓	
14 4 700 2907 -195 -231 265 100↓	
15 6 671 3215 32767 32767 280 130	
16 5 666 3276 -207 -287 32767 32767	
17 5 652 3432 -207 -287 32767 32767	
18 5 614 3873 −231 −274 32767 32767	
10 6 608 3044 32767 32767 270 170	
$\begin{bmatrix} 20 \\ 01 \end{bmatrix} = \begin{bmatrix} 500 \\ 02 \end{bmatrix} = \begin{bmatrix} 4042 \\ 027 \end{bmatrix} = \begin{bmatrix} 207 \\ 027 \end{bmatrix} = \begin{bmatrix} 32707 \\ 0277 \end{bmatrix} = \begin{bmatrix} 32707 \\ 0277 \end{bmatrix} = \begin{bmatrix} 32707 \\ 0277 \end{bmatrix} = \begin{bmatrix} 32707 \\ 02777 \end{bmatrix}$	-
秀丸I 下候補 次の 単語 分割? 切り コピー 貼り タグジ アクトライ 行番 日本語(Shift-JIS)	挿入モード

3.2.3 Developing Method

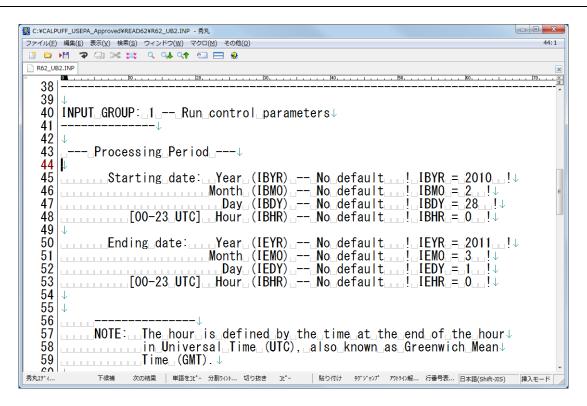
Open INP file in "READ62".

査理 ▼ □ 開く ▼ 書き込	む 新しいフォルダー				800 ·		
🚖 お気に入り	名前	更新日時	種類	サイズ	属性		
ダウンロード	퉬 aerologyData	2016/07/06 14:09	ファイル フォル		D		
■ デスクトップ	CODE	2015/04/01 11:33	ファイル フォル		D		
🧾 最近表示した場所	📕 old	2016/07/06 14:09	ファイル フォル		D		
	144292_2014_repair_1.txt	2016/04/20 17:00	テキスト文書	1,377 KB	A		
	44292_2014_repair_1_history.txt	2016/04/20 18:26	テキスト文書	2 KB	A		
ライブラリ	44292_repair2.fsl	2015/04/08 14:42	FSL ファイル	1,413 KB	A		
ドキュメント	R62_UB_2014.INP	2016/04/20 16:36	INP ファイル	6 KB	A		
▶ ピクチャ	r62_ub_2014.lst	2016/04/20 17:00	MASM Listing	51 KB	A		
ビデオ	R62_UB2.INP	2015/04/08 13:45	INP ファイル	6 KB	A		
→ ミュージック	r62_ub2.lst	2015/04/08 14:42	MASM Listing	51 KB	.A.	-	
	read62.exe	2015/04/01 11:32	アプリケーション	885 KB	A		
■ コンピューター	READ62_070627.EXE	2007/06/27 21:52	アプリケーション	659 KB	A		
	README.TXT	2003/04/14 13:06	テキスト文書	4 KB	A		
Windows7_OS (C:)	up_ub_2014_repair_1.dat	2016/04/20 17:00	DAT ファイル	444 KB	Α.		
🖵 INF00X (¥¥mercury) (I	up_ub2.dat	2015/04/08 14:43	DAT ファイル	479 KB	A		
👳 KKJ305 (¥¥pluto) (J:)							
🚽 KKJ204 (¥¥pluto) (L:)							
B Lenovo_Recovery (Q:) +							
	時: 2015/04/08 13:45 作成日時: 2015/0	14/08 11:37					

Set input file (INDAT) and output file name (UPDAT, RUNLST).

この C:¥CALPUFF_USEPA_Approved¥READ62¥R62_UB2.INP - 秀丸	
ファイル(E) 編集(E) 表示(Y) 株茶(S) ウィンドウ(W) マクロ(M) その炮(Q)	19:25
○ H	
R62_UB2.INP	
13 4	89
14 INPUT_GROUP:_OInput_and_Output_Files↓	
15	
16 ↓	
17 4	
18 Input and Output files:4	
19	
20 ↓	
21 Default Name Type File Name↓	
22	
23 SOUNDING DAT input ! INDAT = 44292_repa	air2.fsl
24 SUBSOUND. DAT input * SUBDAT =	*
25 UP. DAT output ! UPDAT = UP UB2. DAT	
26 READ62.LST output ! RUNLST = R62_UB2.L	
27	
28 All file names will be converted to lower case	if LCFILES = T
29 Otherwise, if LCFILES = F, file names will be o	
30 (LCFILES) Default: T ! LCFILES = T	
31 T = lower case↓	
32 F = UPPER CASE	
秀丸3714 下候補 次の結果 単語を211-分割9(74 切り抜き 311- 話り付け 9575/**27* 75)5	50/新 行番号表 日本語(Shift-JIS) 挿入モード

Set the start date and time and the end date and time (IBYR, IBMO, IBDY, IBHR, IEYR, IEMO, IEDY, and IEHR). Date and time of aerological data is UTC, so considering the time-zone difference, set target term so that it covers the target term specified by SMERGE.



Set the format of aerological data (JDAT).

C:VCALP	UFF_USEPA_ApprovedWREAD52WR62_UB2.INP - 黄文	X-
ファイル(ド)	編集(E) 表示(V) 検索(S) ウィンドウ(W) マクロ(M) その物(O)	58:1
	H P G X H A H A G E S	
R62_UE		8
62 63	File Options	<u>, , po, , «</u> <u>1</u>
64 65 66	Type of NCDC input sounding data file↓ (JDAT) No Default ! JDAT = 2 !↓ 1 = TD-6201 format↓	
68		
70	0 = NO substitute sounding file is used	
74	1 = Delimiter between data in a sounding level is a slash (/) and wind speed and direction are written as integers 2 = Delimiter between data in a sounding level is a comma (,)	L.
76		3)↓
78	Format used in UP.DAT output data records (IFMT) Default: 2! IFMT = 2!	12
79 80	1 = Delimiter between data in a sounding level is a slash and wind speed and direction are written as integers↓	(∕)↓
81 82 83		gits)4
劳丸15'4	下候補 次の結果 単語をは*- 分割2(2) 切り抜き は*- 貼り付け タデジャン? アウト9(0編 行輩号表 日本語(Shith-JIS)	抑入モード

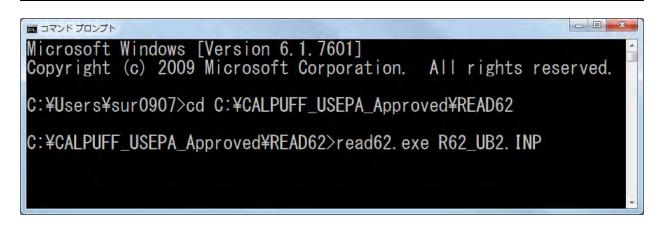
Set the top pressure of output aerological data (PSTOP).

	F_USEPA_ApprovedrREAD62vR62_U82.1NP - 秀丸 編集(ロ) 表示(V) 検索(S) ウィンドウ(W) マクロ(M) その約(0) 89:1
	編集(日) 表示(1) 検索(1) (27-2 FO(1)) マクロ(1) その物(1) (27-2 FO(1)) (27-2 FO(1
R62 UB2	
1000000000	1.1117 1 1 100 1 1 100 1 1 100 1 1 100 1 1 100 1 1 100 1 1 100 1 1 100 1 1 100 1
83	4
84	Processing Options
85	
86	Top pressure (mb) level for which data are extracted (e.g., 850 mb, 4
	700 mb, 500 mb, etc.). Pressure level must correspond to a height
	that equals or exceeds the top of the CALMET modeling domain, or U
89	else CALMET will stop with an error message.
	(PSTOP) Default: 700. ! PSTOP = 400 !
91	
92	Missing data control options to determine when a sounding level
	is rejected, and when an incomplete sounding level is written to
94	the UP DAT file with missing value indicators. The missing value↓
95	indicators are:
96	Height = 9999 (9999.0)↓
	Temperature = 999.94
	Wind Direction = 999 (999.0)
99	Wind Speed = 999 (999.0)
	Eliminate level if at least one of the following is missing?
101	(LHT) Height Default: F ! LHT = F !↓
102	(LTEMP) Temperature Default: F ! LTEMP = F !4
103	(LWD) Wind Direction Default: F ! LWD = F !↓
	(LWS) Wind Speed Default: F !LWS = F !!
105	
117 6	下候補 次の福留 単語を文*- 分割の0 切り抜き ス*- 私の付け 955/577 79.50発 行番号表日本語(Shit-JIS) 挿入モード

When extrapolating missing data with preceding and succeeding data, set the flag of extrapolation (LXTOP) to "T" and set the top value for extrapolation.

	iEPA_ApprovedVREAD62VR62_UB2.INP - 秀丸	
	E) 表示(X) 検索(S) ウィンドウ(W) マクロ(M) その也(Q)	113;
	3 (1) × 1 × 1 + 3 + 1 = 8	
R62_U82.INP		19
107 108 109 110 111 112 113		ed_will↓ by_the↓ pair↓ nt_is↓
116 117 118 119 120	 (1) Extrapolation to extend missing profile data to PSTOP press Wind speed and direction are constant with height↓ Temperature gradient is constant with height↓ Valid data must exist at heights as great as PVTOP (mb) press (LXTOP) Default: F ! LXTOP = T !↓ (PVTOP) Default: 850. ! PVTOP = 400 !↓ 	
123 124 125 126 127 128	 (2) Extrapolation to extend missing profile data to surface? Wind direction is constant with height. Wind speed is set with first valid speed, extrapolated to 10 using the neutral power law. Valid data must exist within first ZVSFC (m) of the surface. Temperature is NOT extrapolated. (LXSFC) Default: F LXSFC = F 	Om↓
129 130 4 131 !EN	(ZVSFC) Default: 200. ! ZVSFC = 200 !	质(Shift-JIS) 挿入モート

Move the "READ62" folder in command prompt, input "READ62.EXE <input file name>.INP", and press [Enter] (Here it is "R62_UB2.INP").



When showing "TERMINATION PHASE" message and completing calculation, you check to make output files. Output file is "up_ub2.dat" in this case.

arok footh	 目く 書き込 お気に入り ダウンロード デスクトップ 	の 新しいフォルター 名称 serologyOsta coole	更新日時 1016/02/06 14:00	65		间.+. 第19	61
archidoxyth crosoft Windows [Version 6.1.7601]	ダウンロード アスクトップ	👃 serologyOata		65	対応	32	
¥Users¥sur0907>cd C:¥CALPUFF_USEPA_Approved¥READ62 ¥CALPUFF_USEPA_Approved¥READ62>read62.exe R62_UB2.INP TUP PHASE MPUTATIONAL PHASE ERMINATION PHASE	 ■社区表示した場所 ヨイブラリ ドキュントト ビクチャ ピクチャ ピクチャ ピクチャ ピクチャ ピクチック シビューター (Modewar2_OS (C)) E MODOS (Venemory) () E MODOS (Venemory) () E MODOS (Venemory) () E MODOS (Venemory) () 	Code Code Code <th>2015/04/03 11:12 2015/04/03 11:12 2015/04/03 12:00 2015/04/03 12:00 2015/04/03 12:00 2015/04/03 11:00 2015/04/03 11:00 2015/04/04 2015/04 2015/04 2015/04 2015/04 2015/04 2015/04 2015/04 2015/04 200</th> <th>ファイルフェルー デキストな音 デキストな音 FSG ファイル 100 ファイル MASM Little PT Vクーション アプリケーション アプリケーション アプリケーション</th> <th>1.377 HB 7 KB 1.413 KB 1.918 1.918 1.918 1.918 1.918 1.918 1.918 1.918 1.918 1.918 1.918 1.918 1.918 1.918 1.918 1.917 HB 1.917 HB 1.917 HB 1.917 HB 1.917 HB 1.918 KB 1.918 K</th> <th>6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6</th> <th></th>	2015/04/03 11:12 2015/04/03 11:12 2015/04/03 12:00 2015/04/03 12:00 2015/04/03 12:00 2015/04/03 11:00 2015/04/03 11:00 2015/04/04 2015/04 2015/04 2015/04 2015/04 2015/04 2015/04 2015/04 2015/04 200	ファイルフェルー デキストな音 デキストな音 FSG ファイル 100 ファイル MASM Little PT Vクーション アプリケーション アプリケーション アプリケーション	1.377 HB 7 KB 1.413 KB 1.918 1.918 1.918 1.918 1.918 1.918 1.918 1.918 1.918 1.918 1.918 1.918 1.918 1.918 1.918 1.917 HB 1.917 HB 1.917 HB 1.917 HB 1.917 HB 1.918 KB 1.918 K	6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	

3.3 Developing Meteorological Model

3.3.1 <u>Outline</u>

Meteorological model file is made by using geological data made in "MAKEGEO", surface meteorological data made in "SMERGE", and aerological data made in "READ62".

CALPUFF includes CALMET as processor to make meteorological model file.

Set input file, output file, calculation term, projection, datum, calculation range, and calculation resolution in CALMET. These settings have to be the same setting as "MAKEGEO", "SMERGE", and "READ62". Output meteorological model file is used in CALPUFF processor.

3.3.2 Developing Method

Open INP file in "CALMET" folder.

整理 ▼ 🗋 開く ▼ 書	き込む 新しいフォルター			8	. •		6
☆ お気に入り	~ 名前	更新日時	種類	サイズ	属性		
ダウンロード	CODE	2015/04/01 11:29	ファイルフォル		D		
■ デスクトップ	DEMO		ファイル フォル		D		
1 最近表示した場所	old	2016/07/06 14:36			D		
	Calmet.exe	2015/04/01 11:29	アプリケーション	23,840 KB	A		
and the second	calmet_131116.exe	2013/11/16 8:53	アプリケーション	23,673 KB	A		
👼 ライブラリ	= CMET_UB2.INP	2015/04/08 13:46	INP ファイル	41 KB	A		
▶ ドキュメント	Cmet_ub2.lst	2015/11/06 14:33	MASM Listing	217 KB	A	_	
■ ピクチャ	geo1km_ub.dat	2015/04/02 10:30	DAT ファイル	61 KB	A		
🔡 ビデオ	QAMETG.bna	2016/04/22 14:16	BNA ファイル	1 KB	A		
↓ ミュージック	README.TXT	2013/11/27 2:49	テキスト文書	3 KB	A		
	ubmet_201003to201102.dat	2015/04/06 15:16	DAT ファイル	617 KB	A		
■ コンピューター	up_ub2.dat	2015/04/08 14:43	DAT ファイル	479 KB	A		
A Windows7_OS (C:)							
P INFOOX (¥¥mercury) (I							
🖵 KKJ305 (¥¥pluto) (J:)							
🖙 KKJ204 (¥¥pluto) (L:)							
Lenovo_Recovery (Q:)	-						

Set input file other than aerological data (GEODAT, SRFDAT), output file name (METLST, METDAT), and the number of aerological data file (NUSTA).

器 C:¥CALPUFF_USEPA_Approved¥CALMET¥CMET_UB2.INP (更新) - 秀丸	- @ ×
ファイル(E) 編集(E) 表示(Y) 検索(G) ウィンドウ(W) マクロ(M) その他(Q)	10:1
CMET_UB2.1NP *	10 10
10	1
11 INPUT GROUP: 0 Input and Output File Names	E
12 4	
13 👃	
14 Subgroup (a)↓	
15	
16 Default Name Type File Name	
17	
18 GEO. DAT input ! GEODAT=. /MAKEGEO/geo1km_ub. da	at II
19 SURF. DAT input ! SRFDAT=. /SMERGE/ubmet_201003	to201102.dat_!
20 CLOUD.DAT input * CLDDAT= *	
21 PRECIP. DAT input * PRCDAT=PRECIP. DAT *	
22 WT.DAT input * WTDAT= *4	
24 CALMET.LST output ! METLST=CMET_UB2.LST ! 4	
25 CALMET. DAT output ! METDAT=CMET_UB2. DAT !+	
26 PACOUT. DAT output PACDAT=*	
	150 - T
28 All file names will be converted to lower case if LCFII	
29 Otherwise, if LCFILES = F, file names will be converted	a to UPPER CASE
30 T = lower case ! LCFILES = T !↓	
31 F = UPPER CASE 4	
秀丸1571 下被補 次の紙業 単語を北*- 分割の01 切り抜き 11*- 熱り付け 955763プ 201504編 行	番号表… 日本語(Shift-JIS) 挿入モード

Set input file name of aerological data (UPDAT).

ALPUFF_USEPA_Approved¥CALMET¥CMET_U82.INP (更新) - 秀丸	
E) 編集(E) 表示(Y) 検索(S) ウィンドウ(W) マクロ(M) その他(Q)	
_UB2.1NP *	80
2 4	
NUMBER OF UPPER AIR & OVERWATER STATIONS:	
Number of upper air stations (NUSTA) No default	NUSTA = 1
Number of overwater met stations	
(NOWSTA) No default	NOWSTA = 0
NUMBER OF PROGNOSTIC and IGF-CALMET FILES:4	
UNUMBER OF PROGNOSTIC and IGF-CALMET FILEs:↓	
Number of MM4/MM5/3D.DAT files	
(NM3D) No default	NM3D = 0.11
Number of IGF-CALMET.DAT files	
(NIGF) No default	$NIGF = 0 ! \downarrow$
! END!↓	
Subgroup_(b)↓	
Upper air files (one per station)	
Upper_air_files_(one_per_station) ↓	
Default Name Type File Name	
UP1.DAT input 1 ! UPDAT=/READ62/up_ub2.dat!	!END!
4	
	表 日本語(Shift-JIS) 挿入モー

Set the start date and time a (IBYR, IBMO, IBDY, and IBHR), time zone (IBTZ), and length of run (IRLG).

語 C. KCALPUFF_USERA_Approved KCALMET KCMET_UB2.INP (更新) - 香丸	O B X
ブァイル(E) 編集(E) 表示(V) 検索(5) ウィンドウ(V) マクロ(8) その格(Q)	131:1
CMET_UB2.INP *	12
1101 Martines Manatana Manatana Manatana Manatana Manatana Mar	and an a march of a
110	
112 INPUT GROUP: 1 General run control parameters	
113	
114 4	
115 4	and a
116 Starting date: Year (IBYR) No default ! IBYR=	2010
117 Month (IBMO) No default ! IBMO= :	3 14
118 Day (IBDY) No default ! IBDY=	1 1
119 Hour (IBHR) No default ! IBHR=	1 11
120	
121 Note: IBHR is the time at the END of the first hour of the	simulation
122 (IBHR=1, the first hour of a day, runs from 00:00 to	
	01-00/0
124 Base time zone (IBTZ) No default ! IBTZ=	0 1
125 $PST = 08$, $MST = 07$	-0 :+
$126 \\ 127 $	
	0700 1
128 Length of run (hours) (IRLG) No default ! IRLG= 1	8760 14
129	4.12
130 Run type (IRTYPE) Default: 1 ! IRTYPE=	indiana Maria
131	
132 0 = Computes wind fields only	
133 1 = Computes wind fields and micrometeorological variab	est
134 (u*, w*, L, zi, etc.)↓	
135 (IRTYPE must be 1 to run CALPUFF or CALGRID)	
136 1	· · · · · · · · · · · · · · · · · · ·
現れ5°45	(本語(祭)(化-335) 挿入モード

Set the projection of output data (PMAP etc.).

		183:
	展集(E) 表示(Y) 核末(S) クインドウ(Y) マクロ(B) その相(Q)	18.13
CWE1_L	1962. I Nov * 1916. – I I I I I I I I I I I I I I I I I I	
169	INPUT GROUP: 2 Map Projection and Grid control parameters	
170		
171	4	
172	Projection for all (X,Y):4	
173		
174	4	
175	Map projection↓	
176	(PMAP) Default: UTM ! PMAP = UTM !	
177		
178	UTM : Universal Transverse Mercator	
179	ITM : Tangential Transverse Mercator	
180	LCC : Lambert Conformal Conic	
181	PS : Polar Stereographic	
182	EM : Equatorial Mercator	
183	LAZA Lambert Azimuthal Equal Area	
184		
185	False Easting and Northing (km) at the projection origin	
186	(Used only if PMAP= TTM, LCC, or LAZA)	
187	(FEAST) Default=0.0 ! FEAST = 0.000 !	
188	(FNORTH) Default=0.0 ! FNORTH = 0.000 !4	
189		
190	UTM zone (1 to 60)↓	
191	(Used only if PMAP=UTM)	
192	(IUTMZN) No Default ! IUTMZN = 48 !	
193		
193	Hemisphere for UTM projection?	
195	(Used only if PMAP=UTM)	
196	(UTMHEM) Default: N ! UTMHEM = N !	
197	N : Northern hemisphere projection4	
198	S Southern hemisphere projection	
120	o outlieff neinsphere projection	

Set the datum of output data (DATUM).

C:WCALPUFF_U	USEPA_Approved#CALMETVCMET_UB2.DVP (世界) - 角丸	312 X
ファイル(E) 編集	(1) 表示(1) 毎年(5) ウインドウ(2) マクロ(3) その他(0)	246:1
CNET_UB2.IN		5
000		Cr Call
232 +		
233	Datum-region	
234		
235		
236	The Datum-Region for the coordinates is identified by a character	
237	string. Many mapping products currently available use the model of the	e l
238	Earth known as the World Geodetic System 1984 (WGS-84). Other local	
239	models may be in use, and their selection in CALMET will make its output	+ -
240	consistent with local mapping products. The list of Datum-Regions with	
241	official transformation parameters is provided by the National Imagery	and
242	Mapping Agency (NIMA).	
243		
244	NIMA Datum - Regions (Examples)	
245		
246	WGS-84 WGS-84 Reference Ellipsoid and Geoid, Global coverage (WGS84)	E
247	NAS-C NORTH AMERICAN 1927 Clarke 1866 Spheroid, MEAN FOR CONUS (NAL	
248	NAR-C NORTH AMERICAN 1983 GRS 80 Spheroid, MEAN FOR CONUS (NAD83)	
249	NWS-84 NWS 6370KM Radius, Sphere:	
250	ESR-S ESRI REFERENCE 6371KM Radius, Sphere	
251		
252	Datum-region for output coordinates	
253	(DATUM) Default: WGS-84 ! DATUM = WGS-84 !	
254		
REALT OF	下線線 次の結果 単語をます。 分割つひと… 切び放き ます。 私り付け ダビディボ 内外の痛 行動考察… 日本語(Selet-35) 3	# A E-K

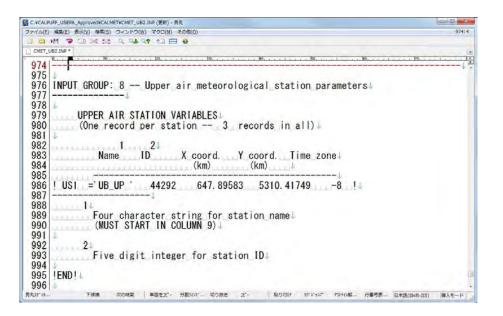
Set reference point coordinates at lower left corner of grid (XREFKM, YREFKM), the number of grid (NX, NY), and grid spacing (DGRIDKM). In addition, set the number of vertical grid and the height to divide the grid (ZFACE).

C; FCAL	Land Additional And a Top and (200) 202	a x
TTIME	MR(E) 数元(D) 9472(E) 9472(E) 200(E) 200	270:1
OWET		
-		
256	Horizontal grid definition:	
257		
258		
259		
	with X the Easting and Y the Northing coordinate	
261	4	
262	No. X grid cells (NX) No default ! NX = 34 !	
263	No. Y grid cells (NY) No default ! NY = 28 !	
264		
265	Grid spacing (DGRIDKM) No default ! DGRIDKM = 1. !	
266	Units: km:	
267		
268	Reference grid coordinate of 4	
269	SOUTHWEST corner of grid cell (1,1)	
270		
271	X coordinate (XORIGKM) No default ! XORIGKM = 623.000 !	
272	Y coordinate (YORIGKM) No default ! YORIGKM = 5298.000 !	
273	Units: km/	
274	4	
275		
276		
277		
278	In the second se Second second sec	
279	No. of vertical layers (NZ) No default ! NZ = 10 !	
280	4	
281	Cell face heights in arbitrary	
282	vertical grid (ZFACE(NZ+1)) No defaults	
283	Units: m4	
284	ZFACE = 0., 20., 40., 80., 160., 300., 600., 1000., 1500., 2200., 4000.	
285		
286	1END 1 +	
287	4	
AAA	干燥機 次の検薬 単語を文*・ 対動らけ、一切り抜き ス*・ 私り付け がアドルプ POHCAL。 行動作表日本語(Self-JIS) 種り	E+K

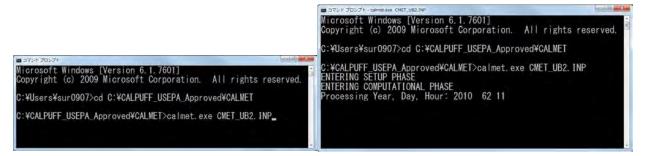
Set the name of surface meteorological data (NAME), monitoring station ID (ID), the location of monitoring station (X coord., Y coord.), time zone (Time zone), and elevation (Anem. Ht.).

III CI¥CALPUFF_USE9A_Approved¥CALMET¥CMET_UB2.INP (更新) - 秀丸	C-10 - 2
	962:6
Private RECONSTRUCT STOLE RECONSTRUCT RECONSTRUCT 949 950 INPUT GROUP: 7 Surface meteorological station parameters: 951 INPUT GROUP: 7 Surface meteorological station parameters: 952 953 954 SURFACE STATION VARIABLES: 955 .00er record per station 5 records in all): 956 .1 957 .1 958 .1 959 Name ID X coord. Y coord. 960 .1 961 .1 962 .1 959 Name ID X coord. Y coord. 961 .1 962 .1 963 .1 964 .1 965 .1 966 .1 967 .1 968 .21 969 .3 960 .3 961 .3 962 .3 963 .21 964 .3 965 .3	
Beneric Manager	Second second [2]
950 951 INPUT GROUP: 7 Surface meteorological station parameters 952 953 954 SURFACE STATION VARIABLES 955 (One record per station 5 records in all) 956 1 957 2 958 1 959 Name 1D X coord. Y coord. Time 960 (km)	
962 ! SSI = UB ' 442920 638.96760 5308.74964 -8 1306	14
964 11 965 Four character string for station name↓ 966 (MUST START IN COLUMN 9)↓ 967 968 2↓ 969 Six digit integer for station ID↓	
売れば、作… 下療機 次の構成 単語を及う 分配のひた… 切り抜き まう 私立のは サアン・カア わから相… 行動発表… 日本酸(Shi	作-JIS) 挿入モード

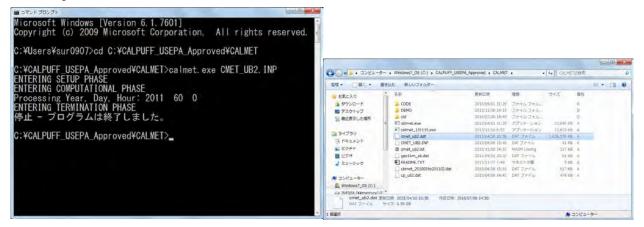
Set the name of aerological data (NAME), monitoring station ID (ID), the location of monitoring station (X coord., Y coord.), and time zone (Time zone).



Move the "CALMET" folder in command prompt, input "CALMET.exe <input file name>.INP", and press [Enter] (Here it is "CMET_UB2.INP"). After starting the calculation, "Processing Year, Day, Hour: <Year> <Month> <Hour>" is displayed and you can check the progress.



When showing "TERMINATION PHASE" message and completing calculation, you check to make output files. Output file is "cmet_ub2.dat" in this case.

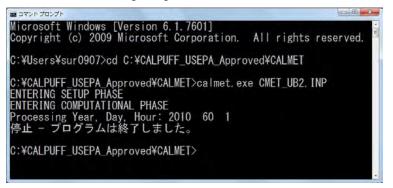


3.3.3 <u>Treatment in Error Message</u>

When CALMET is executed, the following situation may occur. In that case, the data created so far may have error, so it is necessary to go back to the former processor and modify the data.

In the case that execution ends without "TERMINATION PHASE" message.

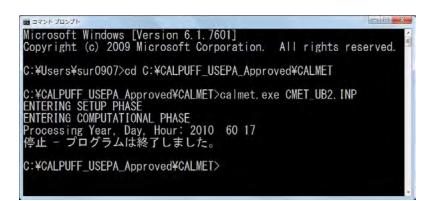
Error information may be written in the LST file that is created when it is executed. Therefore, open LST file and look for the description part of error.



In the following cases, there is a grid of water in the land use grid file and it is a message that at least sea surface meteorological data is necessary. However, since Mongolia does not have sea and sea surface meteorological data, interpolate grid of water with the surrounding land use data to eliminate the error.

C KCALIPUFF_LISEPA_Approved#CALIMETKomet_Lib2.ht - 長年	
ファイルビ 編集(1) 表示(1) 後示(2) ウィンドウ(2) マクロ(2) その数(2)	2165:1
DIET URZINE III OTTIC USZIN	1
2157 Data level eliminated if wind direction missing ? FJ 2158 Data level eliminated if wind speed missing ? FJ 2160 Data level eliminated if wind speed missing ? FJ 2161 B 6 has no valid sites for 2162 interpolation. If it is a water body and 2163 you are using land/water interpolation. 2164 you must have at least 1 sea#. dat file! 2165 [EOF]	or J
gentim_ub.det - 第九 シテイル(作) 編集(5) フィンドウ(W) マタロ(M) 王が型(0) 36:1	び C. Y CALPUIF_USEPA_ApprovedWCALMETWgeo1km_ub.dot - 長丸 ファイル(ヤ) 編集(F) 表示(V) 検索(S) ウィンドウ(W) マクロ(M) その他(D) 43:40
1 🖸 → 🕅 😨 🖓 🖂 📰 🔍 🖓 🖓 🔄 🚍 🔮	
36 30,	36 30,
41 30, 40, 30, 44, 30,	41 30, 40, 30, 30, 30, 30, 42 30, 30, 30, 30, 30, 30, 30, 43 30, 30, 30, 30, 30, 30, 30, 44 30,
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	45 40, 30, 30, 30, 30, 30, 30, 46 30, 30, 30, 30, 30, 30, 30, 30, 30, 30,

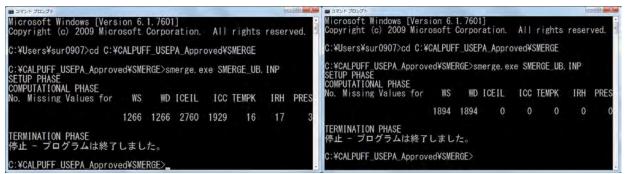
Although the above-mentioned correction was conducted, since the situation did not change, open and check LST file.



This error message is the message on the surface meteorological data. In this case, this message means that ceiling height data is missing at all observation stations and this data at least one station has to exist. It is preferable to have surface meteorological data that can be interpolated, but if there is no data, it is necessary to interpolating with the data measured at the nearest time to eliminate the missing data. The meteorological items whose data need to exist in at least one station are the ceiling height, cloud cover, the surface temperature, relative humidity and sea level pressure.

	G C YCALPUFF_USEPA_ApprovedYSMERGENubmet_201003to201162.dst - 元丸
	[ファインルラ] 補属(E) 参次(V) 検用(S) ライントラ(W) マクロ(M) その物(O) 53311
	SHEREE UNINE UNINE UNINE SOLODITOLAST
	532 2 000 300 000 9999 0 256 950 53 865 500 0 533 2010 71 0
KARM JERN ANNAKOMETING JALE 14	534 3,000 160,000 9999 9999 250 150 77 865 512 0
사실 #411 #701 #431 302/2001 15000 15000 1000 1000 1000 1000 100	536 4.000 150.000 9999 9999 251.150 70 866.367 04 537 2010 71 2
148 Surface to 400. mb	538 2.000 340.000 9999 0 255.650 55 866.300 0 539 2010 71 3
50 Data type (JDAT): 2 (1=TD6201, 2=NCDC CD, 3=other/unknown) 51 Data format (IFMT): 2 (1=slash-delimited, 2=comma-delimited) 52 I	540 9999.000 9999.000 9999 9999 251.150 64 865.512 0 541 2010 71 4
51 Data format (IFMT): 2 (I=slash-delimited, 2=comma-delimited) 52 53 54 54 55 55 55 56 56 57 57 57 57 57 57 57 57 57 57	542 9999.000 9999.000 9999 9999 248.150 76 865.512 04 543 2010 71 5
56 Data level eliminated if temperature missing ? F1 57 1	544 2.000 100.000 999 3 254.050 54 865.600 01 545 2010 71 6
58 Data level eliminated if wind direction missing ? F 59 I Data level eliminated if wind speed missing ? F	546 9999.000 9999.000 999 5 251.150 64 865.512 01 547 2010 71 7
61 62 ERROR in SUBR. MISSEC IYR = 2010 IJUL = 60 IHR = 17	548 9999.000 9999.000 98 9 251.150 70 865.512 0 549 2010 71 8
63 CEILING HEIGHT data at all stations missing for this hour — At least one stat: 64 ion must have non-missing data — NSSIA = 1 JCEIL = 9999 65 [EDF]	550 4 000 100 000 98 9 253 950 56 865 800 0 551 2010 71 9
trong team of the store allow the state that when where the state allowed allowed	秀先35 下線機 次の相関 解語を 分割34 切り抜き 出*- 私り付け #*3*4 79542 行番号 日本語(SA(5.35)) 挿入モード

When executing SMERGE, interpolate the data so that the number of missing data becomes 0 as shown on the right. The left figure is the calculation result before interpolating data, and the missing number is counted for each item.



Although executing again after the above correction, the following error message and information on where the error occurred in the program code is displayed. In this case, this message means that error has occurred in line 20184 of "calmet.for" and the subroutine in which the error occurred is "rdup".

	A_Approved¥CALMET>cal	met.exe CMET_U	B2. INP	
ITERING SETUP	ATIONAL PHASE			
rrtl: 致命的な 2/up_ub2.dat	ミエラー (59): リスト	皆定 1/0 構文エ	ラーです。ユニット	- 30、ファイル
age	PC	Routine	Line	Source
met.exe	00000013FCB503A	Unknown	Unknown	Unknown
lmet.exe lmet.exe	000000013FC33922 000000013FBBF05E	rdup	20184 3304	calmet.for calmet.for
Imet.exe	000000013FB810D5	GOMP	1220	calmet, for
Imet. exe	000000013FD2EEC6	Unknown	Unknown	Unknown
lmet.exe	000000013FD157AB	Unknown	Unknown	Unknown
rnel32.dll	000000076AF5A4D	Unknown	Unknown	Unknown
d l.d l	00000007708B831	Unknown	Unknown	Unknown

In this case, open "calmet.for" in "CODE" folder with editor and check cause of error.

道理 * 00 開く * 習色)	ふむ 新しいフォルダー					· 1	
* お気に入り	· 名明	更新目時	推調	リイズ	魔住		
# ダウンロード	🎍 params-examples	2013/11/27 2:39	27+16 2×16		D.		
 デスクトップ 最近表示した場所 	1 blockdat.ord	2013/11/16 9:25	マネージ情報力	85 KB	A.		
	_ breez.met	2013/11/16 9:16	MET 27-116	1 KB	A.		
	🖹 calmet.for	2014/06/20 22 29	Fortran Source	1.210 KB	A		
- interio	in calmet.obj	2015/04/01 11:29	Source Browset	22,440 KB	A		
うイブラリ キ	Calutils.for	2015/03/19 11:02	Fürtran Source	-87 KB	Λ.		
→ ドキュメント	calutils_20131116.for	2013/11/16 9:16	Fortran Source	89 KB	A		
■ ピクチャ	i comline.for	2015/03/19 11:07	Fortran Source	a Ka	A		
EFオ	in comline.obj	2015/04/01 11:30	Source Browser	2 KB	A		
▲ ミュージック	compile-calmet-gfortran.bat	2013/11/16 8:54	Windows /1µ≠	1 KB	A		
	compile-calmet-ifort.bat	2013/10/02 0:10	Windows / Style=	1 KB.	A		
B 3>82-9-	Compile-calmet-lf95.bat	2013/11/16 9:26	Windows バッチ	1.KB	A		
the second s	compile-calmet-lf95.log	2013/11/16 9:16	テキスト ドキュー	12 KB	A.		
Windows7_0S (C:)	Coordlib.for	2014/06/20 22:30	Fortran Source	289 KB	A		
Se INFOOX (Wimercury) (I	d1.met	2013/11/10/9:16	MET ファイル	J KB	A		
👽 KK3305 (Wepluto) (1:)	d3.met	2013/11/16-9:26	MET 27-116	2 KB	A		
🖙 KKJ204 (Wipluto) (L:) 🖕	d4.met	2013/11/16 9:16	MET JZ-110	1 KB	A		
	禮: 2014/06/20 22:29 洋成日ē: 201 ズ: 1.18 MB	5/03/19 10:37			סטצב-	-	

"rdup" is the subroutine that reads aerological data and it can be seen that an error has occurred in the part where input data is read.

C KOLJUM USEM ANYWAYOLINETY CODMULTUR IV - AR	2 D	C KAUNT JOSA ANTWAKAUNT CORNANCIA TACODALIA A TAK	0.7
3 G NT ゆうえた (手合き U 目 ゆ	3992111	19 20 支援 20 人 25 人 24 人 27 日 8 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	20184-1
8 anato 19919 c	1 B. 2	20174 endifi	
19920 subroutine rdup(iup,iunit,iflag,iconvrt.jhrz,jjul,jyr)		20175 c: 20176 c read data records!	
19922 c. 19923 c CALMET Version: 5.8 Level: 070128 RDUPL		20177 nlbb(iup)=nlevbb. 20178 if(ifmtu(iup).eg.1)then	
19924 c J. Scire, SRCI 19925 c Modified by M. Fernau, Earth Techi		20179 c Original slash-delimited formati 20180 read(iunit,4)(pbb(iup,ii),zlbb(iup,ii),tzbb(iup,ii),4	
9926 c Modified (2/98) by J. Scire to allow comma-delimited 9927 c formati		20181 1 ubb(iup,ii),vbb(iup,ii),ii=1,nlevbb) 20182 else if(ifmtu(iup),eq.2)then	
9928 c		20183 c — Comma-delimited data formati 20184 read(lunit.*) (pbb(iup, ii), zlbb(iup, ii), tzbb(iup, ii), i	
9930 c include pressure (mb), height (m above MSL), i 9931 b temp (deg. C), wind direction (deg.), and i		20185 1 ubb(iup,ii),vbb(iup,ii),ii=1,nlevbb) 20186 else	
9932 c wind speed (m/s) i		20187 write(io6, *) ERROR in SUBR_RDUP - Invalid format type - , 20188 1 IFMIU = , ifmtu(iup), IUP = , iup.	
9934 c Wind direction & wind speed converted to: 9935 c u, v components (m/s) Height (m above MSL) converted:		20139 stopi 20190 endif/	
19936 c to height (m above LGL) (however, no conversions are		20191 c	
Surm_ THE BORE ABER- PEDOR'S DORE Z' ADRES WYOF FOREEL READED)	神法王一步	Region The same start officer of an at another movie maker address and an	挿入モージ

The aerological data created in "READ62" is interrupted by the line beginning with "-> -> ->", so this line may cause the error. Therefore, after searching for the line starting with "-> -> ->", interpolate and correct the original data before executing "READ62" in order to fix the error message so that "-> -> ->" disappears.

10.000.0000	勇凡							C:YCALPUFF_L	SEPA_Approve	dVREAD62¥44	292_repair2.fs	- 秀丸			(En)E	
refailth i	編集(F) 重新(V) I	帰(5) 9イ	-Fウ(W) マク	ロ(M) その他(D).		1724:1	ファイル(E) 編集	(E) 表示(X)	検索(5) ウイ:	>FO(W) 75	70(M) その他((0)		1	1724
0.11	1 7 CI 24	22 9.	P4 R4 6					17 D M	PLAD	C 22 Q	04 04 K					
44292.fsl							8	44292_repair	2.64							
· 前の6	結果、次の結果							1145: 1-0562.0	1600 -			-		to an ille a	-	
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719	4	1000	118	32767	32767	32767	32767	1719	4	1000	118	32767	32767	32767	32767	4
720	4	925	740	32767	32767	32767	32767	1720	4	925	740	32767	32767	32767	32767	1
721	4 .	850	1395	-75	-135	355	1401	1721	4	850	1395	-75	-135	355	140	1
722	4	700	2867	-183	-273	30	130	1722	4	700	2867	-183	-273	30	130	1
723	4	500	5300	-337	-397	355	801	1723	4	500	5300	-337	-397	355	80	1
724	4	400	6820	-475	32767	32767	32767	1724	4	400	6820	-475	32767	315	110	i
725	7	358	7544	-521	32767	275	140	1725	7	358	7544	-521	32767	275	140	į.
726	4	300	8690	-533	32767	275	310	1726	4	300	8690	-533	32767	275	310	Î.
727	6	285	9021	32767	32767	275	350	1727	6	285	9021	32767	32767	275	350	
728	4	250	9870	-521	32767	280	320	1728	4	250	9870	-521	32767	280	320	í
729	4	200	11320	-501	32767	270	330	1729	4	200	11320	-501	32767	270	330	i
730	4	150	13200	-523	32767	260	290	1730	4	150	13200	-523	32767	260	290	i
731	4	100	15810	-545	32767	260	260 -	1731	4	100	15810	-545	32767	260	260	
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	201 44292	2010 3					20	250 6201	44292		1 0 36		ACA 7 100		20	5
	854.0,1313.,20 758.0,2221.20			44. 0. 2364			811.0,1702.,263 700.0.2832.,255		0, 1313 , 2			44. 0, 2364.	, 262. 7, 120, 999. 9, 305.		811.0,1702 700.0,2832	
1 1	672.0.3135.99	9. 9, 300.	20.0. 6	49. 0. 3405.	259. 9, 999.	999.9.	624.0.3702.257	253 672	0, 3135. 9	99. 9, 300.	20.0. 6	649. 0. 3405.	, 259. 9, 999.	999.9.	624.0, 3702	2.
10.000	522.0,5011.,24 450.0,6061.,99			42.0.5149.			506.0.5233.999			45. 1, 999, 9 99. 9, 290,			244.3,999.		506. 0, 5233 410. 0, 6712	
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62	201 44292 ->->Data at to 860.0,1313.20 400.0,6820.21 201 44292 870.0,1313.25 742.0,2499.95	p of sour 6 5, 0, 5 7,999,1 2010 3 9 5, 0, 9 9,310,	10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ssing 150.0.1395 150.0.1482 150.0.1482	259 7, 10, 999 9, 290	2.0.	700. 0, 2867 , 254 16. 810. 0, 1841 , 999 700. 0, 2929 , 250	257 860 258 400 259 6201 260 870 261 742 262 659	0, 1313, 2 0, 6820, 2 44292 0, 1313, 2 0, 2499, 9 0, 3365, 9	266.5.0. 25.7.315. 2010.32 59.5.0. 99.9.310. 99.9.310.	11.0 2.0 22 2.0 8 3.0 1 9.0 0	50. 0. 1482. 28. 0. 2639. 19. 0. 3817.	259.7, 10. 999 9.290 244.1,285	2. 0, 4. 0, 13. 0,	16 810. 0, 1841 700. 0, 2929 596. 0, 4085	}.
6	201 44292 ->->Data at to 860. 0, 1313. 20 400. 0, 6820. 21 201 44292 870. 0, 1313. 25 870. 0, 1313. 25 870. 0, 1313. 25 659. 0, 3365. 95 659. 0, 95	op of sour 16 5. 0, 15 7,999.1 2010 3: 19 5. 0, 19 9,310, 19 9,310,	ding is mi 7.0, 8 99.9 2.0, 22 2.0, 8 3.0, 1 9.0, 0	ssing 50.0.1395 50.0.1482 28.0.2639 519.0.3817	259 7, 10, 999 9, 290, 244, 1, 285,	2 0. 4 0. 13. 0.	700.0,2867.254 16.810.0.1841.995 700.0.2929.250 596.0.4085.995	257 860 258 400 259 6201 260 870 261 742 262 659 263 572	0, 1313, 2 0, 6820, 2 44292 0, 1313, 2 0, 2499, 9 0, 3365, 9 0, 4379, 2	66.5.0. 25.7.315. 2010.32 59.5.0. 99.9.310. 99.9.310. 99.9.310. 99.9.310.	11.0 2.0 22 2.0 8 3.0 7 9.0 6 99.9 5	50. 0, 1482. 28 0, 2639 19. 0, 3817. 00. 0, 5330.	259.7, 10.	2. 0, 4 0, 13. 0, 18. 0,	16 810. 0, 1841 700. 0, 2929 596. 0, 4085 415. 0, 6593	3
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