Project of Capacity Development for the Implementation of Agricultural Insurance

"Enhancing Abilities for Meteorological / Climatological Data Usage"

Japan, July 29 – August 16 2019

BMKG

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Key activities

1. Provide/prepare reliable meteorological data for agricultural insurance.
2. Develop weather information and strengthen abilities for producing products for agriculture.
3. Enhance analysis abilities of risk analysis for climate change data-set.

2

Activity Output 1
Provide/ Prepare Reliable Meteorological Data for Agriculture Insurance

1. Leni Nazarudin
2. Noveta Chandra

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Outline

- Previous Activity
- Japan Training Activity
- Working Plan
- Progress

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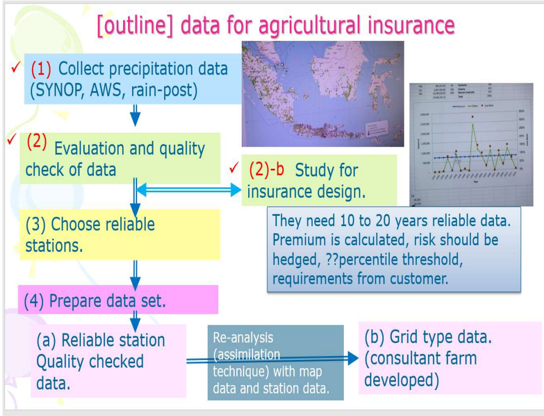
Previous activity

Activity (1) – (2)



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Detail for (1) and (2) activity

Preparation → Working steps → Evaluation

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Preparation

Identify whats kind of data

List up SYNOP and rain post stations

Collect daily precipitation data for SYNOP and rain post station at least for 10 years and hopefully 30 years

Download GSMaP data and develop a software to pickup hourly data from GSMaP data based on station list by JICA Expert

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Working Steps

1st step
- Make 30 years daily precipitation data for agricultural insurance
- Compare rain post with SYNOP data in daily precipitation

2nd step
- Compare SYNOP and rain post data with GSMaP daily / decadal data
- Evaluate, its efffectivity for agricultural insurance or not

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Case study :
East Java and South Sulawesi

Evaluation

- Synop vs Rain Post
- Synop vs GSMaP
- Rain Post vs GSMaP

R^2		Smoothness		Hit rate in contingency sheet	
daily	sum	daily	sum	dasarian	daily
>=0.4	>=0.7	OK (very smoot) <2.0		> 0.6667	
<0.4	<0.7	SM (mostly smooth) 2.0 - 5.0		<0.667	
negatif	negatif	NG (Not smooth) >5.0			

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Advice from maros and malang climatology station

- Attention about the data lag time
- Separated the source of the data, like the rain post station and SMPK (Agro Meteorological Station)
- For the sample, it would be better in normal years, not in elnino or lanina periode
- When weather index insurances will be apply, MoU should be involved BMKG local station
- Please share the result of the quality control data to BMKG local station

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Case study :
East Java and South Sulawesi

3(a). Next step 1.

Hopefully by training in Japan.

- SYNOP-rain-post comparison.
- Extend comparison from only for 2015 or 2018 to 10 years.
- Make summarize table and figures for each year and for 10 years.

Finished for 6 synop and 6 rain post stations

- Trial for scripts and software.
- Extract GSMaP data and pick up data from GSMaP (2006~2013).
- Try scripts and software on Linux and confirm it works.

Finished for 4 years (2009-2013)

- [Challenge] develop software.
- Let's try to develop software (Python or C) referring Excel sheet equations.
- Tonouchi tries to code it in C, hopefully until next visit(probably Jan. 2020).

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East Java

Synop Banyuwangi vs Kaliklatak

R^2	Synop vs Rain post		Synop vs GSMaP		Rain post vs GSMaP	
	daily	sum	daily	sum	daily	sum
2009	0.146	0.748	-0.027	0.977	0.091	0.955
2010	0.014	0.987	-0.189	0.996	-0.054	0.994
2011	0.001	0.955	-0.093	0.995	0.015	0.876
2012	0.103	0.923	-0.117	0.984	0.087	0.845
2013	-0.127	0.973	0.876	0.996	0.096	0.963
2014	-0.830	0.979	0.783	0.968	0.237	0.947
2015	0.015	0.977	0.732	0.992	0.152	0.981
2016	-0.072	0.975	0.746	0.974	0.238	0.989
2017	-0.047	0.948	0.870	0.964	0.088	0.874
2018	0.008	0.956	0.876	0.978	0.046	0.839

Synop Banyuwangi vs Kaliklatak

Smoothness	Synop vs Rain post		Synop vs GSMaP		Rain post vs GSMaP	
	daily	sum	daily	sum	daily	sum
2009	1.91	9.02		3.84		3.21
2010	1.75	51.60		2.50		44.20
2011	2.00	6.68		2.10		8.92
2012	1.98	7.99		2.76		7.27
2013	3.62	3.47		1.47		4.26
2014	2.66	3.38		3.71		5.92
2015	3.22	3.02		2.01		2.40
2016	3.11	4.36		4.88		2.94
2017	2.23	6.47		4.91		7.45
2018	2.39	4.29		3.34		6.95

Synop Banyuwangi vs Kaliklatak

Proportion	Synop vs Rain post		Synop vs GSMaP		Rain post vs GSMaP	
	daily	sum	daily	sum	daily	sum
2009	0.47	0.90	0.29	0.94	0.38	0.96
2010	0.61	0.99	0.17	0.88	0.08	0.99
2011	0.46	1.19	0.30	1.19	0.32	0.85
2012	0.79	1.43	0.22	1.03	0.24	0.70
2013	0.23	1.60	0.69	0.88	0.28	0.58
2014	0.25	1.23	0.80	0.92	0.62	0.83
2015	0.31	1.01	0.87	1.11	0.51	1.11
2016	0.29	1.10	0.85	1.09	0.48	0.98
2017	0.32	0.92	0.81	0.94	0.37	0.94
2018	0.34	1.00	0.83	0.94	0.27	0.85

Synop Banyuwangi vs Kaliklatak

Hit rate in contingency	Synop vs Rain post		Synop vs GSMaP		Rain post vs GSMaP	
	daily	dasarian	daily	dasarian	daily	dasarian
2009	0.92	0.75		0.86		0.83
2010	0.85	0.78		0.89		0.75
2011	0.92	0.72		0.94		0.69
2012	0.90	0.81		0.94		0.78
2013	0.84	0.83		0.97		0.81
2014	0.92	0.81		0.92		0.83
2015	0.91	0.92		0.97		0.89
2016	0.88	0.81		0.86		0.86
2017	0.87	0.75		0.94		0.75
2018	0.90	0.81		0.97		0.78

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South Sulawesi (Synop Maros vs Gentung rain post) 2009 – 2018

Synop Maros vs Gentung

R^2	Synop vs Rain post		Synop vs GSMaP		Rain post vs GSMaP	
	daily	sum	daily	sum	daily	sum
2009	0.311	0.983	0.478	0.980	0.281	0.958
2010	0.001	0.993	-0.008	0.879	-0.124	0.831
2011	0.046	0.996	0.438	0.988	0.027	0.991
2012	0.268	0.926	0.268	0.963	-0.138	0.787
2013	0.355	0.985	0.388	0.960	0.137	0.966
2014	0.526	0.986	0.510	0.937	0.285	0.950
2015	0.699	0.985	0.225	0.966	0.468	0.979
2016	0.340	0.972	0.510	0.978	0.522	0.980
2017	0.300	0.993	0.498	0.985	0.177	0.975
2018	0.410	0.990	0.273	0.985	0.221	0.991

Synop Maros vs Gentung

Smoothness	Synop vs Rain post		Synop vs GSMaP		Rain post vs GSMaP	
	daily	sum	daily	sum	daily	sum
2009	1.23	2.52		3.77		4.17
2010	1.46	2.85		13.89		18.45
2011	1.88	1.75		3.33		2.37
2012	1.12	10.23		6.79		10.30
2013	0.89	3.15		6.01		6.59
2014	0.81	2.35		6.19		5.78
2015	0.69	2.30		2.91		3.02
2016	0.97	5.38		4.67		3.75
2017	1.01	2.18		3.28		4.16
2018	0.88	2.25		2.62		2.05

Synop Maros vs Gentung

Proportion	Synop vs Rain post		Synop vs GSMaP		Rain post vs GSMaP	
	daily	sum	daily	sum	daily	sum
2009	0.480	0.710	0.550	0.590	0.507	0.710
2010	0.470	0.920	0.220	0.510	0.017	0.530
2011	0.480	1.020	0.440	0.590	0.248	0.560
2012	0.670	0.701	0.423	0.662	0.125	0.857
2013	0.645	0.980	0.566	0.848	0.449	0.815
2014	0.834	1.023	0.804	1.040	0.542	0.927
2015	0.925	1.114	0.588	0.820	0.518	0.657
2016	0.691	0.901	0.486	0.636	0.541	0.740
2017	0.620	0.968	0.571	0.741	0.375	0.690
2018	0.858	1.163	0.494	0.847	0.329	0.637

Synop Maros vs Gentung

Hit rate in contingency	Synop vs Rain post		Synop vs GSMaP		Rain post vs GSMaP	
	daily	dasarian	daily	dasarian	daily	dasarian
2009	0.88	0.81		0.89		0.83
2010	0.75	0.72		0.64		0.61
2011	0.79	0.89		0.92		0.83
2012	0.83	0.80		0.71		0.69
2013	0.86	0.78		0.89		0.83
2014	0.87	0.86		0.83		0.83
2015	0.91	0.89		0.89		0.86
2016	0.86	0.80		0.80		0.77
2017	0.88	0.81		0.86		0.75
2018	0.86	0.86		0.83		0.92

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Japan Training Related Activities

Study visit to Sompo Holding, Inc
- Tokyo, Aug 1 2019
- Lecturer : Kiyosi Fukuwatari

Study visit to Japan Aerospace Exploration Agency (JAXA)
- Tsukuba, Aug 9 2019
- Lecturer : Moeka Yamaji

Study visit to NARO Institute for Agro-Environmental Sciences (NIAES)
- Tsukuba, Aug 8 2019
- Lecturer : Dr. Motoki Nishimori

Study visit to National Agriculture and Food Research Organization (NARO)
- Morioka, Aug 12 2019
- Lecturer : Toshihiro Hasegawa

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Study visit : Sompo Holding Inc in Tokyo

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Sompo's Agricultural Insurance Activities

Main points:

1. Weather Index is calculated by Insurance company, but case in Myanmar and Thailand when using GSMaP data, weather index calculated by private company (RESTEC/ The Remote Sensing Technology Center of Japan)
2. **Meteorological agency prepare reliable meteorological data and the data should be accessable by public**
3. The length of climate data affects premium price
4. GSMaP data used to filling missed observation data

(case study : Myanmar and Thailand)

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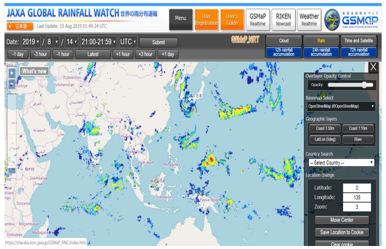
Study visit : Japan Aerospace Exploration Agency (JAXA) in Tsukuba

GSMaP website :
http://sharaku.eorc.jaxa.jp/GSMaP



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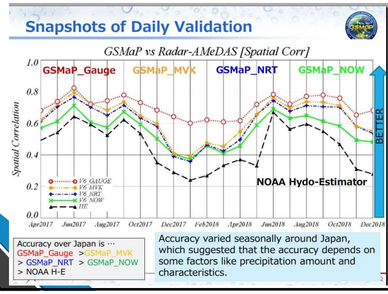
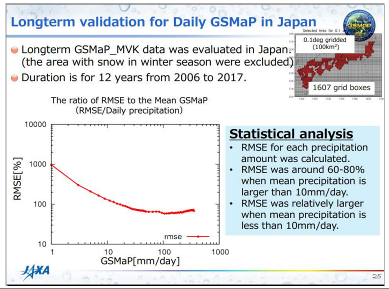
Japan Aerospace Exploration Agency (JAXA)

GSMaP products :

- NOW >> Real time, a few minutes latency
- NRT >> Near real time, 4 hours latency
- MVK >> Standart, 3 days latency





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Japan Aerospace Exploration Agency (JAXA)

GSMaP Recommendation Products for agricultural insurance:

Standard/v6/	GSMaP_gauge (standard with gauge-calibration Ver.6, 3-day data latency, since March 2014
	GSMaP_Gauge_RNL (reanalysis with gauge-calibration Ver.6, a period from March 2000 to February 2014)
The GSMaP_Gauge_RNL is almost same as Gauge	GSMaP_Gauge is the product after the launch of the GPM Core Observatory in Feb 28 2014
	GSMaP_Gauge_RNL is the reprocessed product for the past duration before GPM launch

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Japan Aerospace Exploration Agency (JAXA)

GSMap Application for Agriculture

GSMaP Application for Agriculture

- GSMaP-based Weather Index Insurance was developed by Sompo Japan Holdings and RESTEC.
  - GSMaP is used to estimate the rainfall amount over the target region where ground-based dataset is insufficient.
  - In February 2019, AgriSompo started to offer "Longan parametric weather insurance program" in Thailand.
  - Longan, the major agricultural export crop for the country, has been exposed to drought risk.
  - The Thai government has been investigating way to launch an efficient financial support program including utilization of insurance to enable stable growth for farmers.

Source: https://sustainabledevelopment.un.org/partnership/?p=30651

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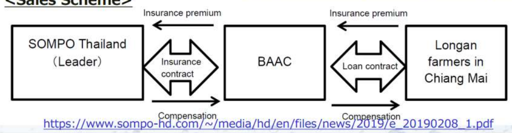

https://www.sompo-hd.com/~/media/hd/en/files/news/2019/e_20190208_1.pdf

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Study visit : NARO Institute for Agro-Environmental Sciences (NIAES)

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NARO Institute for Agro-Environmental Sciences (NIAES)

- Collaboration Research on Cimate Index Insurances for farmers in Indonesia with SOMPO, RESTEC and BMKG funded by JICA-BOP (Bojonegoro, East java) **>> claim threshold for insurance was 79 mm from oct-nov in Bojonegoro**
- Hydrological and Extreme Effects on Serial Production Variabilities in Indonesia *referred to Dr. Lizumi's collaboratted with T.Sakai (NIAES) and JICA-BMKG Training Program 2014 **>> index extreme per comodity**

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Study visit : National Agriculture and Food Research Organization (NARO)

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National Agriculture and Food Research Organization (NARO) in Morioka

Main points:

1. Agricultural under Changing Climate
   - Projected Climate Change
   - International efforts to project the impact on rice future
   - Early Warning System for current climatic variability
2. Visit Gradiotron (an open laboratory)
   - Temperature gradient chamber
   - CO_2 supply and control

→ **The combine effects of T and CO_2 can be tested**

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Work Plan
August – December 2019

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August – December 2019

1. Not reliable stations >> Look for reasons (different big value, missing data, etc)

2. Reliable stations :
- Store as reliable data with quality check information (missing data period)
- Compare reliable stations (SYNOP/rain-post) and GSMaP data
- Check proportion of GSMaP data to observation data

→ Make reliable station data package 10 to 20 years (daily/decadal)

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Time line

Week	August	September	October	November	December
I	Japan training	Data processing	Evaluation 1	Evaluation 2	Evaluation 3
II	Japan training	Data processing	Data processing	Data processing	Data processing
III	Making report about japan training	Data processing	Data processing	Data processing	Data processing
IV	sharing with the team about the results of the training and make evaluation	Data processing	Data processing	Data processing	Final resume (relliable stations) and report

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Data Processing

Evaluate all of the rain post in East Java and South Sulawesi, if there are reliable or not

(each around 200 rain post in East java and South Sulawesi)

→ Make reliable station data package 10 to 20 years (daily/decadal)

↓

East Java (PIC Veta)

South Sulawesi (PIC Leni)

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Progress December 2019

Trial for scripts and software.

- Continue to extract GSMaP data and pick up data from GSMaP (2005~2008) >> done

SYNOP-rain-post comparison.

- Continue to extend comparison from 2009 – 2018 to 2005 – 2018 for the other SYNOP – rain post in East Java and South Sulawesi
- East Java : 3 SYNOP and 7 rain post, has finished for 2005 – 2018.
- South Sulawesi : 3 SYNOP and 3 rain post, has finished for 2008 – 2018.

[Challenge] develop software.

- Let's try to develop software (Python or C) referring Excel sheet equations.
- Tonouchi tries to code it in C, hopefully until next visit(probably Jan. 2020)

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Terima kasih


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Rain Post	Lat	Lon	Year	Distance (km)	R^2 daily	R^2 sum	Smoothness daily	Smoothness sum	Proportion daily	Proportion sum	Hit rate in contingency sheet dasarian	Hit rate in contingency sheet daily	Reliable
Stamet Banyuwangi	-8.21667	114.3833											
Kaliklatak	-8.18533	114.3402	2005	6	0.008	0.943	2.236	5.110	0.483	1.581	0.778	0.877	
Kaliklatak	-8.18533	114.3402	2006		0.167	0.976	1.725	4.397	0.749	1.396	0.833	0.918	
Kaliklatak	-8.18533	114.3402	2007		0.063	0.998	1.826	149.724	0.977	0.998	0.694	0.855	
Kaliklatak	-8.18533	114.3402	2008		0.106	0.976	1.758	3.714	0.734	1.725	0.857	0.885	
Kaliklatak	-8.18533	114.3402	2009		0.146	0.748	1.909	9.017	0.471	0.900	0.750	0.918	
Kaliklatak	-8.18533	114.3402	2010		0.014	0.987	1.752	51.598	0.609	0.987	0.778	0.855	
Kaliklatak	-8.18533	114.3402	2011		0.001	0.955	1.998	6.682	0.461	1.191	0.722	0.923	
Kaliklatak	-8.18533	114.3402	2012		0.103	0.923	1.978	7.989	0.792	1.426	0.806	0.902	
Kaliklatak	-8.18533	114.3402	2013		-0.127	0.973	3.617	3.469	0.235	1.598	0.833	0.841	
Kaliklatak	-8.18533	114.3402	2014		-0.083	0.979	2.660	3.377	0.251	1.230	0.806	0.923	
Kaliklatak	-8.18533	114.3402	2015		0.015	0.977	3.220	3.039	0.306	1.011	0.917	0.910	
Kaliklatak	-8.18533	114.3402	2016		-0.072	0.975	3.107	4.364	0.287	1.099	0.806	0.877	
Kaliklatak	-8.18533	114.3402	2017		-0.047	0.948	2.227	6.472	0.315	0.924	0.750	0.874	
Kaliklatak	-8.18533	114.3402	2018		0.008	0.956	2.388	4.294	0.335	0.998	0.806	0.901	

R^2 daily	R^2 sum	Smoothness daily	Smoothness sum	Hit rate in contingency sheet dasarian	Hit rate in contingency sheet daily
>=0.4	>=0.7	OK (very smoot) <2.0		> 0.6667	
<0.4	<0.7	SM (mostly smooth) 2.0 - 5.0		<0.667	
negatif	negatif	NG (Not smooth) >5.0			

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GSMAP	Lon	Lat	Year	R^2 daily	R^2 sum	Smoothness daily	Smoothness sum	Proportion daily	Proportion sum	Hit rate in contingency sheet dasarian	Hit rate in contingency sheet daily	Reliable
Stamet Banyuwangi	-8.21667	114.3833	2005	0.167	0.994		2.017	0.477	0.905	0.889		
Stamet Banyuwangi	-8.21667	114.3833	2006	-0.029	0.956		5.671	0.274	0.927	0.889		
Stamet Banyuwangi	-8.21667	114.3833	2007	0.002	0.988		2.949	0.229	0.759	0.917		
Stamet Banyuwangi	-8.21667	114.3833	2008	-0.064	0.994		1.860	0.240	0.884	0.971		
Stamet Banyuwangi	-8.21667	114.3833	2009	-0.027	0.977		3.840	0.293	0.942	0.861		
Stamet Banyuwangi	-8.21667	114.3833	2010	-0.189	0.996		2.498	0.175	0.884	0.889		
Stamet Banyuwangi	-8.21667	114.3833	2011	-0.093	0.995		2.102	0.300	1.186	0.944		
Stamet Banyuwangi	-8.21667	114.3833	2012	-0.117	0.984		2.762	0.217	1.028	0.944		
Stamet Banyuwangi	-8.21667	114.3833	2013	0.876	0.996		1.474	0.687	0.877	0.972		
Stamet Banyuwangi	-8.21667	114.3833	2014	0.783	0.968		3.708	0.803	0.923	0.917		
Stamet Banyuwangi	-8.21667	114.3833	2015	0.732	0.992		2.011	0.871	1.109	0.972		
Stamet Banyuwangi	-8.21667	114.3833	2016	0.746	0.974		4.884	0.854	1.094	0.861		
Stamet Banyuwangi	-8.21667	114.3833	2017	0.870	0.964		4.914	0.808	0.942	0.944		
Stamet Banyuwangi	-8.21667	114.3833	2018	0.876	0.978		3.338	0.828	0.939	0.972		

R^2 daily	R^2 sum	Smoothness daily	Smoothness sum	Hit rate in contingency sheet dasarian	Hit rate in contingency sheet daily
>=0.4	>=0.7	OK (very smoot) <2.0		> 0.6667	
<0.4	<0.7	SM (mostly smooth) 2.0 - 5.0		<0.667	
negatif	negatif	NG (Not smooth) >5.0			

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GSMAP	Lon	Lat	Year	R^2		Smoothness		Proportion		Hit rate in contingency sheet		Reliable
				daily	sum	daily	sum	daily	sum	dasarian	daily	
Kaliklatak	-8.18533	114.3402	2005	-0.029	0.9548		4.873	0.186	0.516	0.75		
Kaliklatak	-8.18533	114.3402	2006	0.220	0.868		9.954	0.335	0.642	0.778		
Kaliklatak	-8.18533	114.3402	2007	0.101	0.963		7.286	0.130	0.231	0.556		
Kaliklatak	-8.18533	114.3402	2008	0.198	0.983		3.407	0.315	0.507	0.829		
Kaliklatak	-8.18533	114.3402	2009	0.091	0.955		3.206	0.375	0.956	0.833		
Kaliklatak	-8.18533	114.3402	2010	-0.054	0.994		44.202	0.078	0.994	0.750		
Kaliklatak	-8.18533	114.3402	2011	0.015	0.876		8.914	0.317	0.854	0.694		
Kaliklatak	-8.18533	114.3402	2012	0.087	0.845		7.268	0.244	0.704	0.778		
Kaliklatak	-8.18533	114.3402	2013	0.096	0.963		4.283	0.280	0.577	0.806		
Kaliklatak	-8.18533	114.3402	2014	0.237	0.947		5.916	0.622	0.834	0.833		
Kaliklatak	-8.18533	114.3402	2015	0.152	0.981		2.404	0.507	1.114	0.889		
Kaliklatak	-8.18533	114.3402	2016	0.238	0.989		2.936	0.481	0.977	0.861		
Kaliklatak	-8.18533	114.3402	2017	0.088	0.874		7.454	0.369	0.935	0.750		
Kaliklatak	-8.18533	114.3402	2018	0.046	0.839		6.950	0.273	0.846	0.778		

R^2		Smoothness		Hit rate in contingency sheet	
daily	sum	daily	sum	dasarian	daily
>=0.4	>=0.7	OK (very smoot) <2.0		> 0.6667	
<0.4	<0.7	SM (mostly smooth) 2.0 - 5.0		<0.667	
negatif	negatif	NG (Not smooth) >5.0			

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Rain Post	Lat	Lon	Year	Distance	R^2		Smoothness		Proportion		Hit rate in contingency sheet		Reliable
				(km)	daily	sum	daily	sum	daily	sum	dasarian	daily	
Stamet Banyuwangi	-8.21667	114.3833											
Alas Malang	-8.316	114.252	2005	18	-0.061	0.971	3.018	4.242	0.340	1.267	0.667	0.874	
Alas Malang	-8.316	114.252	2006		0.011	0.987	2.180	3.194	0.580	1.680	0.806	0.888	
Alas Malang	-8.316	114.252	2007		-0.008	0.968	2.158	11.201	0.372	1.575	0.806	0.901	
Alas Malang	-8.316	114.252	2008		-0.108	0.981	2.845	3.141	0.288	1.509	0.771	0.879	
Alas Malang	-8.316	114.252	2009		0.028	0.950	2.553	5.311	0.508	1.308	0.833	0.890	
Alas Malang	-8.316	114.252	2010		-0.139	0.985	2.914	4.546	0.344	1.660	0.667	0.808	
Alas Malang	-8.316	114.252	2011		-0.060	0.867	3.772	9.867	0.215	1.276	0.750	0.921	
Alas Malang	-8.316	114.252	2012		-0.077	0.945	4.183	4.640	0.337	1.630	0.861	0.885	
Alas Malang	-8.316	114.252	2013		0.085	0.963	1.537	5.712	0.589	1.367	0.750	0.879	
Alas Malang	-8.316	114.252	2014		0.148	0.948	1.761	4.766	0.713	1.478	0.750	0.901	
Alas Malang	-8.316	114.252	2015		0.003	0.933	2.924	4.297	0.589	1.959	0.861	0.888	
Alas Malang	-8.316	114.252	2016		0.182	0.985	1.422	4.045	1.147	2.139	0.750	0.866	
Alas Malang	-8.316	114.252	2017		0.028	0.981	1.702	4.026	0.718	1.959	0.667	0.838	
Alas Malang	-8.316	114.252	2018		0.399	0.968	1.070	4.021	1.066	1.575	0.833	0.915	

R^2		Smoothness		Hit rate in contingency sheet	
daily	sum	daily	sum	dasarian	daily
>=0.4	>=0.7	OK (very smoot) <2.0		> 0.6667	
<0.4	<0.7	SM (mostly smooth) 2.0 - 5.0		<0.667	
negatif	negatif	NG (Not smooth) >5.0			

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GSMAP	Lon	Lat	Year	R^2		Smoothness		Proportion		Hit rate in contingency sheet		Reliable
				daily	sum	daily	sum	daily	sum	dasarian	daily	
Alas Malang	-8.316	114.252	2005	-0.080	0.945		6.460	0.179	0.665	0.611		
Alas Malang	-8.316	114.252	2006	0.031	0.993		1.903	0.205	0.580	0.833		
Alas Malang	-8.316	114.252	2007	-0.031	0.9892		35.057	0.172	0.989	0.861		
Alas Malang	-8.316	114.252	2008	-0.100	0.959		4.418	0.150	0.628	0.771		
Alas Malang	-8.316	114.252	2009	-0.047	0.952		4.511	0.183	0.709	0.778		
Alas Malang	-8.316	114.252	2010	-0.054	0.982		5.410	0.078	0.571	0.667		
Alas Malang	-8.316	114.252	2011	-0.158	0.892		471.246	0.115	0.115	0.722		
Alas Malang	-8.316	114.252	2012	-0.114	0.942		3.952	0.115	0.637	0.889		
Alas Malang	-8.316	114.252	2013	-0.147	0.969		4.699	0.100	0.650	0.806		
Alas Malang	-8.316	114.252	2014	-0.070	0.867		7.742	0.124	0.621	0.750		
Alas Malang	-8.316	114.252	2015	-0.065	0.975		3.296	0.129	0.531	0.778		
Alas Malang	-8.316	114.252	2016	-0.160	0.981		4.288	0.113	0.499	0.722		
Alas Malang	-8.316	114.252	2017	-0.125	0.968		5.944	0.120	0.495	0.722		
Alas Malang	-8.316	114.252	2018	-0.045	0.970		2.914	0.158	0.585	0.889		

R^2		Smoothness		Hit rate in contingency sheet	
daily	sum	daily	sum	dasarian	daily
>=0.4	>=0.7	OK (very smoot) <2.0		> 0.6667	
<0.4	<0.7	SM (mostly smooth) 2.0 - 5.0		<0.667	
negatif	negatif	NG (Not smooth) >5.0			

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Rain Post	Lat	Lon	Year	Distance	R^2		Smoothness		Proportion		Hit rate in contingency sheet		Reliable
				(km)	daily	sum	daily	sum	daily	sum	dasarian	daily	
Stamet Paotere	-5.11	119.42											
Barombong	-5.20	119.50	2008	13	0.075	0.974	1.780	3.123	0.226	0.495	0.850	0.833	
Barombong	-5.20	119.50	2009		0.355	0.936	1.330	3.964	0.306	0.385	0.906	0.903	
Barombong	-5.20	119.50	2010		0.113	0.972	1.636	4.781	0.173	0.509	0.792	0.639	
Barombong	-5.20	119.50	2011		0.287	0.988	1.300	2.571	0.398	0.583	0.858	0.889	
Barombong	-5.20	119.50	2012		0.207	0.970	1.360	3.675	0.362	0.692	0.899	0.806	
Barombong	-5.20	119.50	2013		0.366	0.850	1.008	8.383	0.484	0.657	0.893	0.800	
Barombong	-5.20	119.50	2014		0.176	0.966	1.437	3.448	0.252	0.488	0.885	0.861	
Barombong	-5.20	119.50	2015		0.499	0.990	0.891	1.928	0.396	0.542	0.915	0.778	
Barombong	-5.20	119.50	2016		0.378	0.849	0.868	11.536	0.307	0.273	0.928	0.844	
Barombong	-5.20	119.50	2017		0.313	0.948	1.019	5.276	0.314	0.557	0.871	0.778	
Barombong	-5.20	119.50	2018		0.500	0.986	0.752	2.388	0.397	0.534	0.879	0.861	

R^2		Smoothness		Hit rate in contingency sheet	
daily	sum	daily	sum	dasarian	daily
>=0.4	>=0.7	OK (very smoot) <2.0		> 0.6667	
<0.4	<0.7	SM (mostly smooth) 2.0 - 5.0		<0.667	
negatif	negatif	NG (Not smooth) >5.0			

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GSMAP	Lon	Lat	Year	R^2		Smoothness		Proportion		Hit rate in contingency sheet		Reliable
				daily	sum	daily	sum	daily	sum	dasarian	daily	
Stamet Paotere	-5.1137	119.4198	2008	0.282	0.981		3.831	0.496	0.801	0.830		
Stamet Paotere	-5.1137	119.4198	2009	0.069	0.968		4.426	0.390	0.824	0.972		
Stamet Paotere	-5.1137	119.4198	2010	-0.065	0.985		4.133	0.353	0.924	0.833		
Stamet Paotere	-5.1137	119.4198	2011	0.017	0.977		3.930	0.369	0.777	0.833		
Stamet Paotere	-5.1137	119.4198	2012	0.006	0.986		2.503	0.253	0.908	0.944		
Stamet Paotere	-5.1137	119.4198	2013	0.005	0.969		5.710	0.386	0.942	0.944		
Stamet Paotere	-5.1137	119.4198	2014	0.034	0.989		2.541	0.390	0.995	0.833		
Stamet Paotere	-5.1137	119.4198	2015	0.046	0.966		3.188	0.492	1.106	0.861		
Stamet Paotere	-5.1137	119.4198	2016	-0.153	0.987		2.471	0.168	0.926	0.944		
Stamet Paotere	-5.1137	119.4198	2017	-0.016	0.987		3.205	0.303	0.705	0.806		
Stamet Paotere	-5.1137	119.4198	2018	0.014	0.970		4.178	0.357	0.818	0.917		

R^2		Smoothness		Hit rate in contingency sheet	
daily	sum	daily	sum	dasarian	daily
>=0.4	>=0.7	OK (very smoot) <2.0		> 0.6667	
<0.4	<0.7	SM (mostly smooth) 2.0 - 5.0		<0.667	
negatif	negatif	NG (Not smooth) >5.0			

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GSMAP	Lon	Lat	Year	R^2		Smoothness		Proportion		Hit rate in contingency sheet		Reliable
				daily	sum	daily	sum	daily	sum	dasarian	daily	
Barombong	-5.2	119.5	2008	0.181	0.970		3.620	0.757	1.391	0.890		
Barombong	-5.2	119.5	2009	0.202	0.859		5.811	0.796	1.794	0.871		
Barombong	-5.2	119.5	2010	-0.142	0.948		9.420	0.636	1.651	0.611		
Barombong	-5.2	119.5	2011	0.365	0.959		5.176	0.793	1.208	0.806		
Barombong	-5.2	119.5	2012	0.137	0.949		6.188	0.626	1.190	0.833		
Barombong	-5.2	119.5	2013	0.396	0.865		9.666	0.794	1.357	0.794		
Barombong	-5.2	119.5	2014	0.167	0.940		6.556	0.955	1.885	0.722		
Barombong	-5.2	119.5	2015	0.187	0.965		3.921	1.635	1.803	0.778		
Barombong	-5.2	119.5	2016	-0.152	0.777		395.740	0.363	3.635	0.688		
Barombong	-5.2	119.5	2017	0.066	0.952		6.231	0.624	1.175	0.800		
Barombong	-5.2	119.5	2018	0.239	0.937		7.135	0.833	1.444	0.778		

R^2		Smoothness		Hit rate in contingency sheet	
daily	sum	daily	sum	dasarian	daily
>=0.4	>=0.7	OK (very smoot) <2.0		> 0.6667	
<0.4	<0.7	SM (mostly smooth) 2.0 - 5.0		<0.667	
negatif	negatif	NG (Not smooth) >5.0			

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Rain Post	Lat	Lon	Year	Distance (km)	R^2		Smoothness		Proportion		Hit rate in contingency sheet		Reliable
					daily	sum	daily	sum	daily	sum	dasarian	daily	
Stamet Masamba	-2.50	120.40											
Seppong	-3.30	120.40	2008	13	0.029	0.991	1.562	4.811	0.262	0.499	0.749	0.667	
Seppong	-3.30	120.40	2009		-0.035	0.977	2.837	6.849	0.152	0.371	0.830	0.548	
Seppong	-3.30	120.40	2010		-0.167	0.985	2.082	7.222	0.186	0.565	0.668	0.778	
Seppong	-3.30	120.40	2011		-0.061	0.968	1.192	41.495	0.216	0.511	0.808	0.611	
Seppong	-3.30	120.40	2012		-0.022	0.974	2.267	9.269	0.149	0.333	0.790	0.500	
Seppong	-3.30	120.40	2013		-0.063	0.895	2.622	22.319	0.154	0.400	0.780	0.486	
Seppong	-3.30	120.40	2014		-0.021	0.968	2.012	10.431	0.195	0.508	0.795	0.639	
Seppong	-3.30	120.40	2015		-0.012	0.963	2.134	8.308	0.177	0.487	0.852	0.611	
Seppong	-3.30	120.40	2016		-0.046	0.995	2.176	3.581	0.183	0.464	0.772	0.531	
Seppong	-3.30	120.40	2017		0.017	0.987	1.952	7.170	0.272	0.505	0.721	0.583	
Seppong	-3.30	120.40	2018		-0.081	0.966	2.475	9.919	0.164	0.428	0.811	0.500	

R^2		Smoothness		Hit rate in contingency sheet	
daily	sum	daily	sum	dasarian	daily
>=0.4	>=0.7	OK (very smoot) <2.0		> 0.6667	
<0.4	<0.7	SM (mostly smooth) 2.0 - 5.0		<0.667	
negatif	negatif	NG (Not smooth) >5.0			

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GSMAP	Lon	Lat	Year	R^2		Smoothness		Proportion		Hit rate in contingency sheet		Reliable
				daily	sum	daily	sum	daily	sum	dasarian	daily	
Stamet Masamba	-2.5	120.4	2008	-0.227	0.999		15.474	0.322	0.918	0.889		
Stamet Masamba	-2.5	120.4	2009	-0.145	0.993		931.296	0.317	1.048	0.806		
Stamet Masamba	-2.5	120.4	2010	-0.192	0.987		5.881	0.362	1.058	0.944		
Stamet Masamba	-2.5	120.4	2011	-0.159	0.997		2.136	0.285	0.937	0.806		
Stamet Masamba	-2.5	120.4	2012	-0.216	0.999		1.859	0.304	0.967	0.889		
Stamet Masamba	-2.5	120.4	2013	-0.260	1.000		1.102	0.261	0.980	0.944		
Stamet Masamba	-2.5	120.4	2014	-0.252	0.996		3.114	0.213	0.834	0.944		
Stamet Masamba	-2.5	120.4	2015	-0.107	0.998		1.993	0.367	1.046	0.889		
Stamet Masamba	-2.5	120.4	2016	-0.231	0.998		2.255	0.285	0.954	0.889		
Stamet Masamba	-2.5	120.4	2017	-0.289	0.993		1.491	0.324	1.029	0.944		
Stamet Masamba	-2.5	120.4	2018	-0.152	0.998		2.277	0.376	1.073	0.806		

R^2		Smoothness		Hit rate in contingency sheet	
daily	sum	daily	sum	dasarian	daily
>=0.4	>=0.7	OK (very smoot) <2.0		> 0.6667	
<0.4	<0.7	SM (mostly smooth) 2.0 - 5.0		<0.667	
negatif	negatif	NG (Not smooth) >5.0			

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GSMAP	Lon	Lat	Year	R^2		Smoothness		Proportion		Hit rate in contingency sheet		Reliable
				daily	sum	daily	sum	daily	sum	dasarian	daily	
Seppong	-3.3	120.4	2008	-0.393	0.991		15.474	0.295	1.513	0.694		
Seppong	-3.3	120.4	2009	-0.272	0.937		931.296	0.270	2.179	0.613		
Seppong	-3.3	120.4	2010	-0.428	0.936		5.881	0.277	1.473	0.694		
Seppong	-3.3	120.4	2011	-0.281	0.931		2.136	0.310	1.489	0.611		
Seppong	-3.3	120.4	2012	-0.290	0.941		1.859	0.382	2.222	0.444		
Seppong	-3.3	120.4	2013	-0.424	0.826		1.102	0.160	1.955	0.441		
Seppong	-3.3	120.4	2014	-0.196	0.944		3.114	0.413	1.930	0.694		
Seppong	-3.3	120.4	2015	-0.314	0.952		1.993	0.215	1.807	0.611		
Seppong	-3.3	120.4	2016	-0.346	0.995		2.255	0.349	1.721	0.625		
Seppong	-3.3	120.4	2017	-0.446	0.981		1.491	0.279	1.630	0.528		
Seppong	-3.3	120.4	2018	-0.339	0.855		2.277	0.385	2.011	0.528		

R^2		Smoothness		Hit rate in contingency sheet	
daily	sum	daily	sum	dasarian	daily
>=0.4	>=0.7	OK (very smoot) <2.0		> 0.6667	
<0.4	<0.7	SM (mostly smooth) 2.0 - 5.0		<0.667	
negatif	negatif	NG (Not smooth) >5.0			

41

Project Of Capacity Development For The Implementation Of Agricultural Insurance In The Republic Of Indonesia

-ENHANCING ABILITIES FOR METEOROLOGICAL/CLIMATOLOGICAL DATA USAGE-

KEY ACTIVITY – 2

Develop Weather Information And Strengthen Abilities For Producing Products For Agriculture

Novi Fitrianti & Rosi Hanif Damayanti

Sub Division For Climate Analysis and Information

Center for Climate Change Information

Indonesian Agency for Meteorology, Climatology, and Geophysics - BMKG

Presented at BMKG

19 Dec 2019

1

OUTLINE

2

PREVIOUS ACTIVITY

EVALUATION AND VERIFICATION ON SEASONAL ONSET FORECAST

EVALUATION AND VERIFICATION ON ENSO PREDICTION (BMKG-SSA)

Jakarta,

June 16^{th} – July 16^{th} ,2019

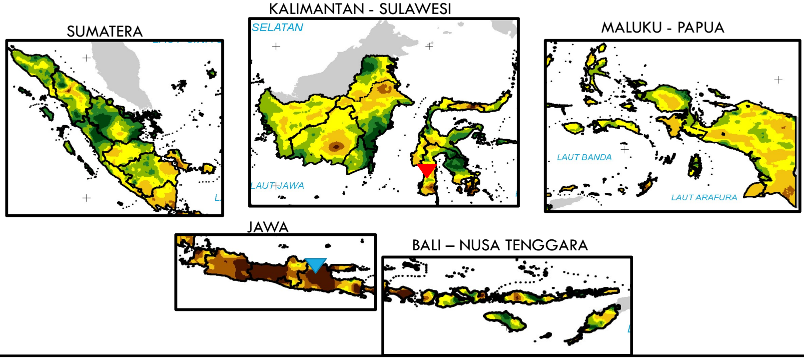
3

1 EVALUATION AND VERIFICATION ON SEASONAL ONSET FORECAST

- Using Contingency Table 3 X 3
- Categories : Earlier than Normal, Near Normal, Later than Normal
  - Near Normal Onset (+/- 1 Decade compared to Normal)
  - Early or Late Onset than Normal (earlier / later 2 decades or more)
  - Undefined Onset Observed : not counted / blank
- Onset Forecast compared to Normal (E, NN, L) vs Onset Observed compared to Normal (E, NN, L)
- Score
  - Observed and forecast onset has same category : 1
  - Different category between observed and forecast : 0

4

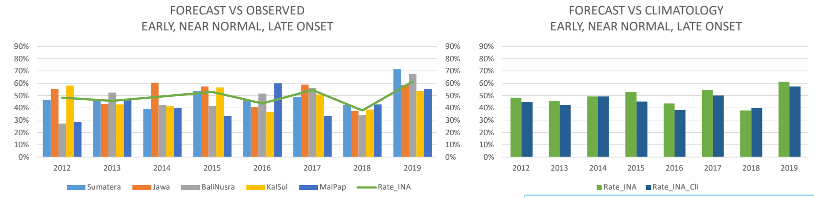
EVALUATION AND VERIFICATION ON SEASONAL ONSET FORECAST



5

EVALUATION AND VERIFICATION ON SEASONAL ONSET FORECAST

HIT RATE – DRY SEASON



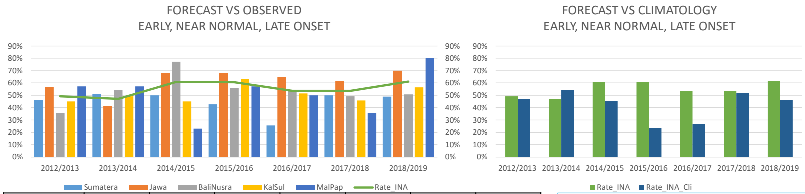
Skill	2012	2013	2014	2015	2016	2017	2018	2019
Skill_INA	0.07	0.08	0.00	0.17	0.15	0.09	-0.05	0.95
Sumatera	0.32	-0.04	0.05	0.32	0.00	0.09	0.10	0.36
Jawa	0.03	-0.11	0.03	0.06	0.72	0.12	-0.15	0.00
BaliNusra	-0.45	0.29	-0.07	0.29	-0.19	0.00	0.11	0.03
KalSul	0.64	0.69	-0.13	0.30	0.05	0.15	-0.04	0.16
MalPap	1.00	0.40	0.50	0.25	0.13	-0.20	0.00	0.00

- Hit Rate for Dry Season's Onset forecast in Indonesia is about ~ 40-60%, as for hit rate in each major island is more diversed.
- Overall, Dry Season's Onset forecast during 2012-2018 is better than climatological forecast, except 2018.

6

EVALUATION AND VERIFICATION ON SEASONAL ONSET FORECAST

HIT RATE - WET SEASON



Skill	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019
Skill_INA	**0.05**	**-0.13**	**0.34**	**1.58**	**1.02**	**0.03**	**1.03**
Sumatera	0.00	0.08	0.13	1.09	0.30	0.09	0.00
Jawa	0.02	-0.27	0.40	1.62	5.13	0.06	0.46
BaliNusra	0.00	-0.14	0.22	0.94	0.03	-0.15	0.20
KalSul	0.12	-0.03	0.93	3.22	0.33	0.12	0.40
MalPap	0.60	0.60	-0.40	1.67	0.00	0.00	0.33

- Hit Rate for Wet Season's Onset forecast in Indonesia is about ~ 50 -60%, as for hit rate in each major island is more diversed.
- Overall, Wet Season's Onset forecast during 2012-2018 is better than climatological forecast, except 2013/2014.

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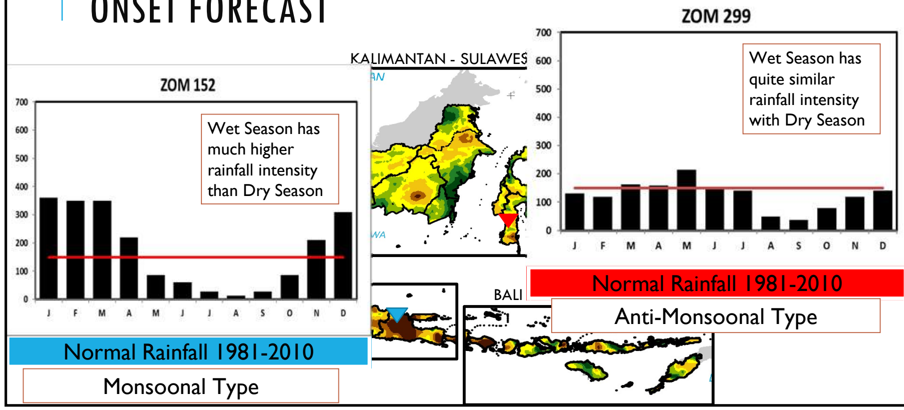
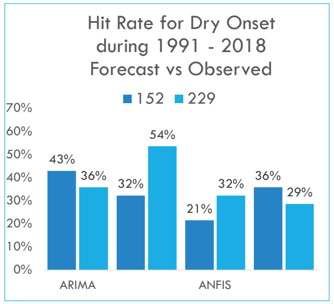
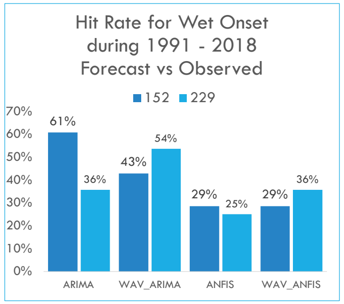
EVALUATION AND VERIFICATION ON SEASONAL ONSET FORECAST



8

EVALUATION AND VERIFICATION ON SEASONAL ONSET FORECAST





- Season's Onset forecast in Zone 152 and 299 using ARIMA and WAV_ARIMA has higher hit rate than ANFIS and WAV_ANFIS.
- ARIMA has best hit rate in Zone 152 (East Java)
- WAV_ARIMA has best hit rate in Zone 299 (South Sulawesi).

- Observed Season's onset for 2 zones during 1981 – 2018
- Re-forecast onset for 2 zones during 1991 – 2018 using 4 statistical method

9

TRAINING ACTIVITY IN JAPAN

Study Visit In:

JMA, JMBSC, SOMPO HOLDING GROUP INSURANCE, JAMSTEC, MRI, NIAES, JAXA, NARO

Japan,
July 29th – August 16th, 2019

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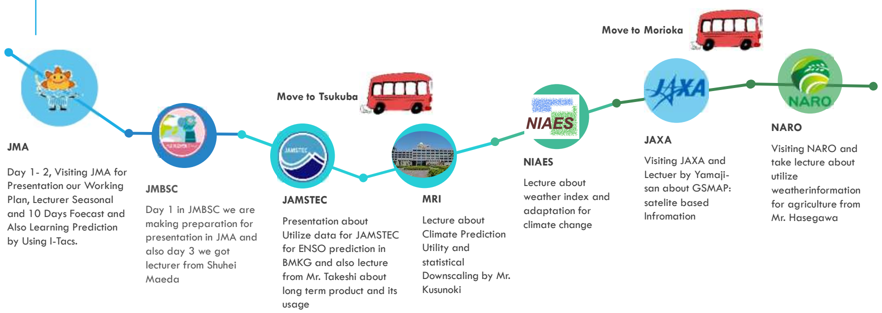
2 TRAINING ACTIVITY IN JAPAN



11

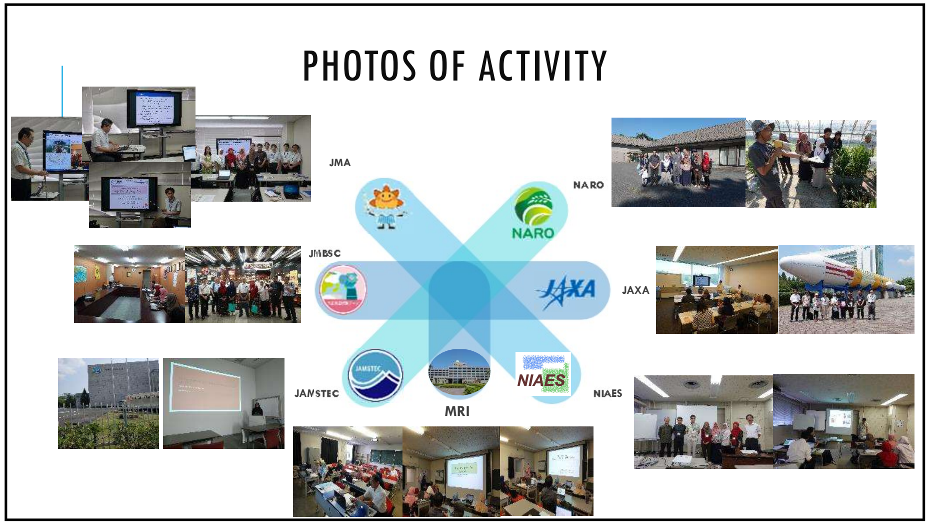
LECTURES THAT CAN BE APPLIED IN OPERATIONAL WORK

In JMA we learning about how dynamical atmospheric circulation can really affect to our seasonal/monthly variability and also we can use I-Tacs as a tools to make the analyse for atmospheric condition. And also we asking them to provide us reforecast data and observed data for ENSO prediction to compared it with our ENSO prediction with SSA

In JAMSTEC we inform them about how we utilize their ENSO prediction as a based for making analogy prediction and also we got to know how well the ENSO prediction by JMA from Mr. Takeshi

In JAXA, we learned how to utilize the GSMAP data and how to get the data and also we know how well the GSMAP data, this kind of infomation really benefit for our sub-division since we are making rainfall analysis by using GSMAP daily data

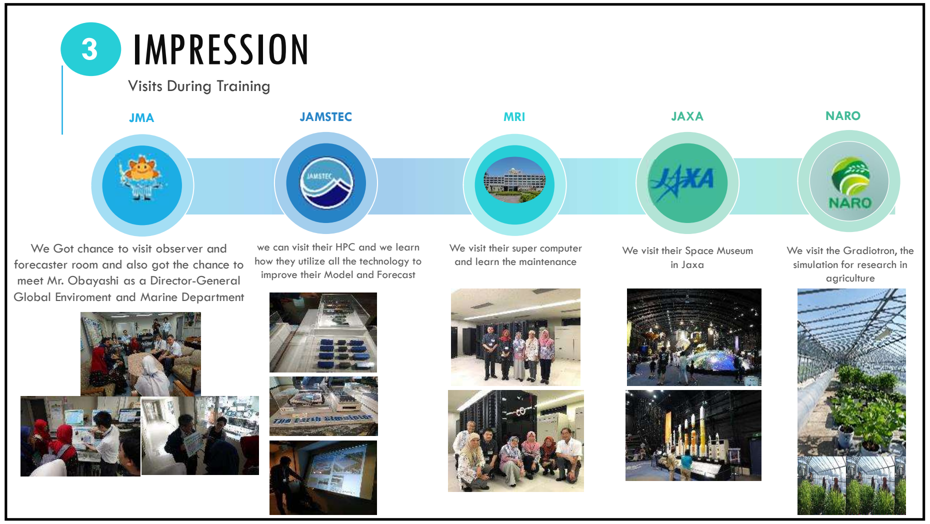
12


PHOTOS OF ACTIVITY
JMA
NARO
JMBSC
JAXA
JAMSTEC
MRI
NIAES

13


IMPRESSION
IMPRESSION DURING TRAINING AND LIVING IN JAPAN

14


3 IMPRESSION
Visits During Training
JMA
JAMSTEC
MRI
JAXA
NARO
We Got chance to visit observer and forecaster room and also got the chance to meet Mr. Obayashi as a Director-General Global Enviroment and Marine Department
we can visit their HPC and we learn how they utilize all the technology to improve their Model and Forecast
We visit their super computer and learn the maintenance
We visit their Space Museum in Jaxa
We visit the Gradiotron, the simulation for research in agriculture

15


DURING STAYING IN JAPAN
Japan can improve advanced technology while maintain its nature and culture:
- Faith
- Culinary
- Fashion
- Historical site
etc
We can see it clearly that those aspects can synchronized in real life.
Japanese people have high sense in responsibility and punctuality for their work.
As foreigner and moslem, We feel grateful to Japanese people for having high respesct and tolerance to us.

16

AFTER COURSE PLAN

VERIFICATION ON JMA FORECAST
ADVANCED ANALYSIS ON EVALUATION OF SEASONAL ONSET FORECAST

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4 VERIFICATION OF JAM FORECAST
CONTIGENCY TABLE

- BMKG produces monthly deterministic rainfall forecast (mm) which is divided into:
  - 9 categories **Quantitative** (0-20, 21-50, 51-100, 101-150, 151-200, 201-300, 301-400, >500)

CAT	CURAH HUJAN (mm) :	
1	0 - 20	RENDAH
2	20 - 50	
3	50 - 100	
4	100 - 150	MENENGAH
5	150 - 200	
6	200 - 300	
7	300 - 400	TINGGI
8	400 - 500	
9	> 500	SANGAT TINGGI

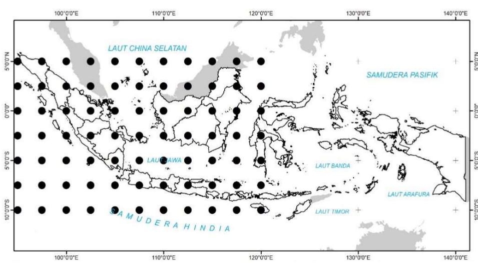
ij		Observasi 1	2	...j...	K	Jml
Prakiraan	1	P_{11}	P_{12}	P_{1j}	P_{1k}	ΣP_{ij}
	2	P_{21}	P_{22}	P_{2j}	P_{2k}	ΣP_{ij}
	...i...	P_{i1}	P_{i2}	P_{ij}	P_{ik}	ΣP_{ij}
	K	P_{k1}	P_{k2}	P_{kj}	P_{kk}	ΣP_{ij}
Jml		ΣP_{ij}	ΣP_{ij}	ΣP_{ij}	ΣP_{ij}	1

Match= $(\sum P_{ii} + \sum P_{i,i+1} + \sum P_{i+1,i}) \times 100\%$
Not Match = 100 % - Match

- Match : if observation rainfall categories has difference maximum 1 category with the forecast (difference value -1, +1, 0 defined as Match).

18

VERIFICATION OF JMA FORECAST
CONTIGENCY TABLE



Grid Plot of 1 Month Forecast JMA

- Forecast
  - Rainfall Daily
  - Resolution: 2.5°
  - Issued twice a week
  - IC during 2018
  - IC for verification : end of the month for 1 lead time (1 month)
  - Forecast up to 1 month ahead
  - Not available for target month : June, July, August 2018

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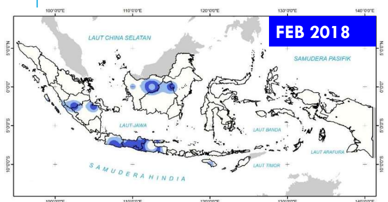
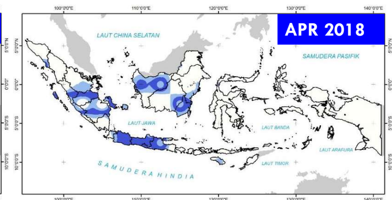
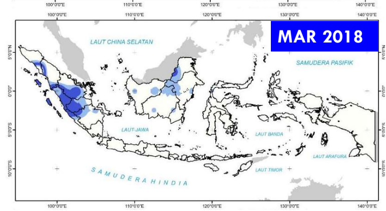
VERIFICATION OF JMA FORECAST
CONTIGENCY TABLE



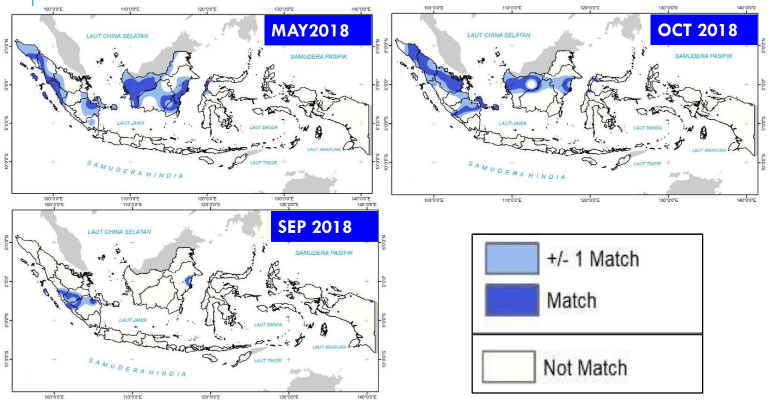




(light blue)	+/- 1 Match
(dark blue)	Match
(white)	Not Match

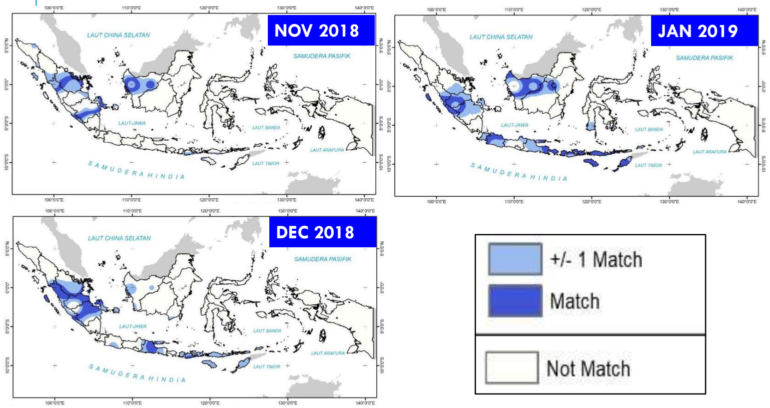
20

VERIFICATION OF JMA FORECAST
CONTIGENCY TABLE



21

VERIFICATION OF JMA FORECAST
CONTIGENCY TABLE

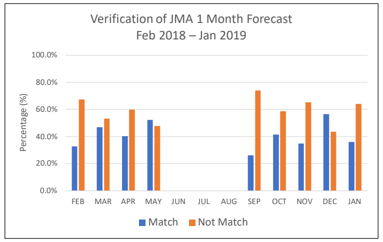


22

VERIFICATION OF JMA FORECAST
CONCLUSION

VERIF	COUNT SCORE											
	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Match	30	43	37	48				24	38	32	52	33
Not Match	62	49	55	44				68	54	60	40	59
Total	92	92	92	92				92	92	92	92	92

VERIF	PERCENTAGE											
	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Match	32.6%	46.7%	40.2%	52.2%				26.1%	41.3%	34.8%	56.5%	35.9%
Not Match	67.4%	53.3%	59.8%	47.8%				73.9%	58.7%	65.2%	43.5%	64.1%
Total	100%	100%	100%	100%				100%	100%	100%	100%	100%



- Overall, JMA 1 month forecast in western part Indonesia has less than 60% match forecast.
- Highest % of match forecast : December 2018
- Lowest % of match forecast : September 2018
- During forecast for Feb 2018 until Jan 2019, generally match forecast occur in middle part of Sumatra and west part of Kalimantan while other regions only for particular months.

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ADVANCED ANALYSIS ON EVALUATION OF SEASONAL ONSET FORECAST

Advanced analysis is carried out for seasonal forecast which has low skill (worse than climatological forecast)

Dry Season Onset : 2018

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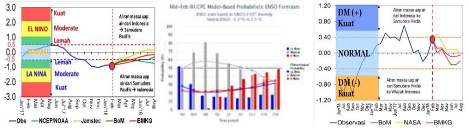
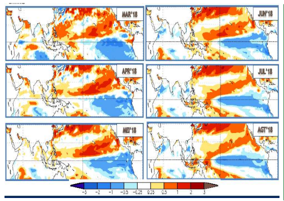
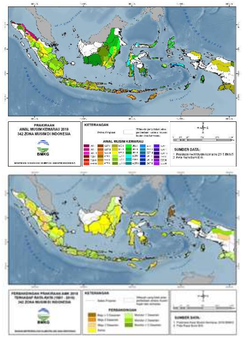
4

FORECAST
DRY SEASON ONSET 2018





Forecast
- ENSO : Weak La Nina to Neutral (likely to be Neutral during MAM – JJA 2018)
- IOD : Neutral
- ASST Ina is normal during Mar-May 2018 then warming in Jun
- ASST Nino 3.4 is negative until Aug 2018
- ASST Indian is warm in Mar then is likely to be Normal during Apr – Aug 2018



Forecast
- Generally, dry onset was predicted to occur during Apr-Jun 2018 forecast: ~80% ZOMs
- Dry Onset was mostly predicted to occur in May 2018
- Dry Onset 2018 is predicted to be mostly later than Normal or near normal.

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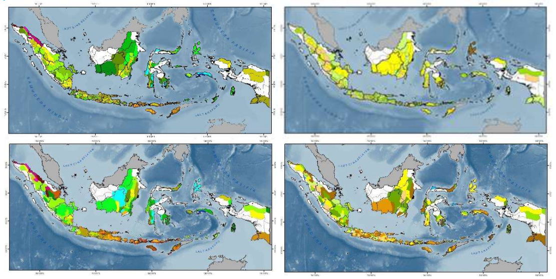
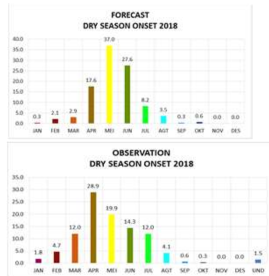
FORECAST VS OBSERVATION
DRY SEASON ONSET 2018

Forecast (consensus : Feb 2018)

Observation





- Forecast of Dry Season Onset 2018 over Indonesia is a little worse than its climatological forecast (skill : -0.05).
- Generally, dry onset was predicted to occur during Apr-Jun 2018 (similar with observation) but different in percentage (forecast: ~80% ZOMs, observed: ~60% ZOMs)
- Dry Onset was mostly predicted to occur in May 2018, but observation show that it mostly occurred in Apr 2018 (1 month earlier).
- Dry Onset 2018 was predicted to be mostly later than Normal or near normal but in observation mostly earlier than Normal

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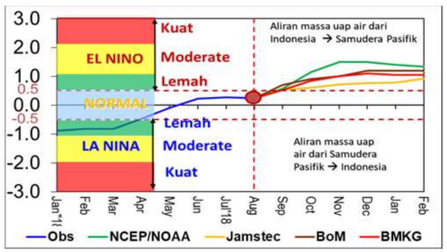
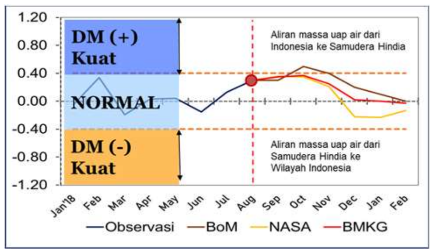
OBSERVATION
ENSO & IOD





ENSO
- Mar 2018 : Weak La Nina
- Apr – Aug 2018 : Neutral/Normal

IOD
- Mar – Aug 2018 : Normal

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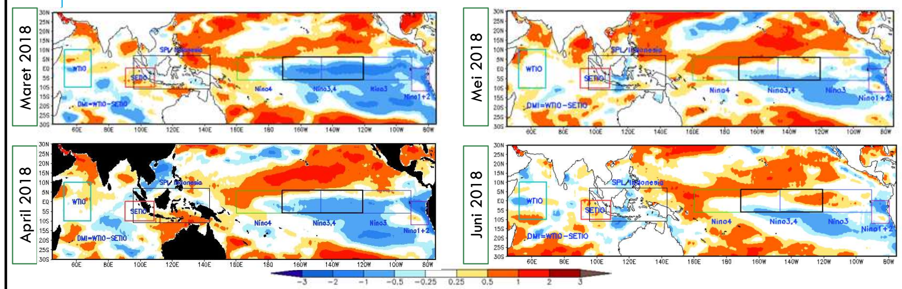
OBSERVATION
SEA SURFACE TEMPERATURE



- Overall, SST forecast and observation in Indian Ocean and Nino 3.4 is pretty much alike
- But observed SST in Indonesia is cooler than its forecast except SST in west of Sumatra and north of Papua that is warmer than the forecast.

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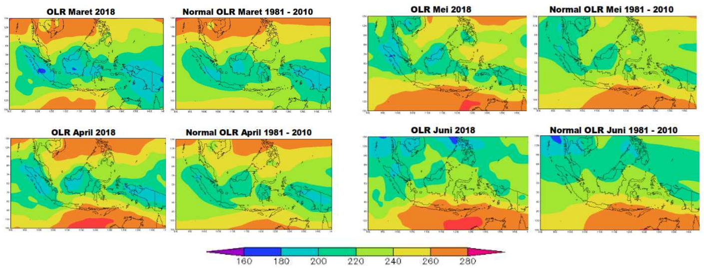
OBSERVATION
OUTGOING LONGWAVE RADIATION



- Mar 2018: East Java , Bali, NTB, partly NTT had less clouds formation than its climatology
- Apr - Jun 2018: area with less clouds formation than its climatology become larger (Java, Bali, Nusa Tenggara)
- Java, Bali, Nusa Tenggara had less clouds than its climatology during Mar – Jun 2018 while northern Indonesia had more clouds formation than its climatology

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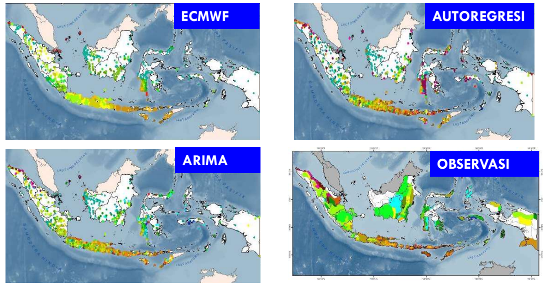
FORECAST
DYNAMIC AND STATISTICAL MODELS



- ECMWF and ARIMA predicted dry season onset 2018 mostly occur in May 2018 (similar with consensus)
- Autoregressive predicted dry season onset 2018 mostly occur in Apr 2018 (a slight higher than May 2018)
- CFSv2 and ECMWFcorr predicted dry season onset 2018 mostly occur in Jun 2018

30

DRY SEASON ONSET 2018
CONCLUSION

Forecast	Observation
• ENSO : Weak La Nina to Neutral • IOD : Neutral • ASST Ina is normal during Mar-May 2018 then warming in Jun • ASST Nino 3.4 is negative until Aug 2018 • ASST Indian is warm in Mar then is likely to be Normal during Apr – Aug 2018	• ENSO : Weak La Nina to Neutral • IOD : Neutral • Overall, SST forecast and observation in Indian Ocean and Nino 3.4 is pretty much alike but observed SST in Indonesia is cooler than its forecast except SST in west of Sumatra and north of Papua that is warmer than the forecast. • Java, Bali, Nusa Tenggara had less clouds than its climatology during Mar – Jun 2018 while northern Indonesia had more clouds formation than its climatology
•Generally, dry onset was predicted to occur during Apr-Jun 2018 forecast: ~80% ZOMs •Dry Onset was mostly predicted to occur in May 2018 •Dry Onset 2018 is predicted to be mostly later than Normal or near normal.	•Generally, dry onset occured during Apr-Jun 2018 : ~60% ZOMs •Dry Onset mostly occurred in Apr 2018 (1 month earlier than forecast). •Dry Onset 2018 was mostly earlier than Normal

•Model Forecast cannot capture cooling SST over Indonesia and warming SST in west Sumatra
•Among individual models, Autoregressive is individual model that is the most similar to observed Dry Onset 2018 over Java, Bali, Nusa Tenggara.

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DRY SEASON ONSET 2018
CONCLUSION

•Model Forecast cannot capture cooling SST over Indonesia and warming SST in west Sumatra
•Among individual models, Autoregressive is individual model that is the most similar to observed Dry Onset 2018 over Java, Bali, Nusa Tenggara.

Still need to analysis other parameters like wind, monsoon, etc
Difficult to evaluate where to improve because model forecast cannot capture the cooling SST in Indonesia
We expect your advice for this study case.

32

S2S (SUB SEASONAL TO SEASONAL) PREDICTION FOR EXTREME EVENT IN JAKARTA

- Extreme events such high rainfall cause flood in Jakarta.
- We need to provide early warning information to avoid damage and loss. One of the ways, we need to enhance capability of S2S prediction for climate early warning.
- So, for this study case we would like to identify ECMWF S2S Prediction for LT 1-3 dasarian (ten-daily/dekad)

- Loss of Flood Jakarta 2007
  - 4.3 trillion rupiah.
  - The displaced population reached 320,000 by 7 February 2007.

BIG FLOOD IN JAKARTA

1996 → 2002 → 2007 → 2013

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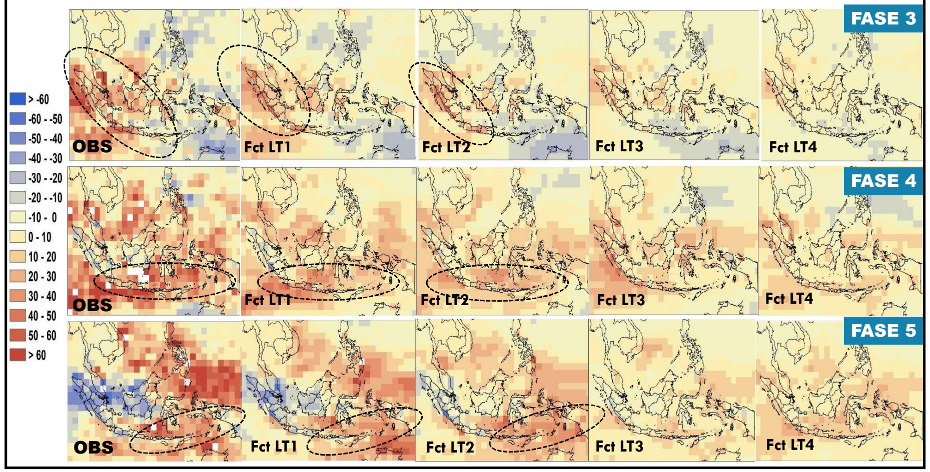
HASIL DAN PEMBAHASAN

S2S ANALISIS KOMPOSIT MJO EVENT (OBS VS MODEL)



34

Terima Kasih
Arigatou Gozaimasu

35

PROJECT OF CAPACITY DEVELOPMENT FOR THE IMPLEMENTATION OF AGRICULTURAL INSURANCE IN INDONESIA

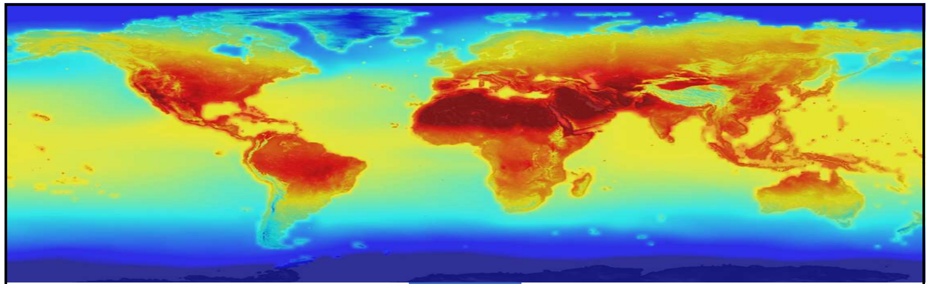
TRAINING SUMMARY / ACTION PLAN

ENHANCING ABILITIES FOR METEOROLOGICAL / CLIMATOLOGICAL DATA USAGE

July 29th, 2019 – August 16th, 2019

BMKG JICA

1



KEY ACTIVITY 3 (ENHANCE ANALYSIS ABILITIES OF RISK ANALYSIS FOR CLIMATE CHANGE DATASET)

Current Activity	Next Activity	Key activity 3 is supposed to provide climate change projection data and information to support the implementation of climate change adaptation technology within the agricultural insurance project
3 days in MRI, 5 participants	2.5 months in MRI, using MRI's HPC for 2 researchers	
Medium resolution AGCM (20 km) based on global warming scenarios	Support for further downscaling into 5km resolution	

2

2

PERSONAL GOALS

- To learn an example / best practice regarding the practical application of climate information towards disaster risk reduction initiatives, from early warning to preventive action
- To understand how the future climate projection data would be used as one of the main consideration for a series of policy making, particularly in terms of spatial planning
- To learn the process of preparing a high-performance computing system for climate operational purpose, from planning, procuring, setting the infrastructure, installing the system, resource management, and maintenance
- To learn JMA's data policy and its connection towards the national integrated spatial information

3

3

RELATED ACTIVITIES

MRI Tsukuba
Dr. Shoji Kusunoki
August 5 – 7, 2019

NIAES Tsukuba (NARO)
Dr. Motoki Nishimori
August 8, 2019

University of Tsukuba
Prof. Hiroyuki Kusaka
August 9, 2019

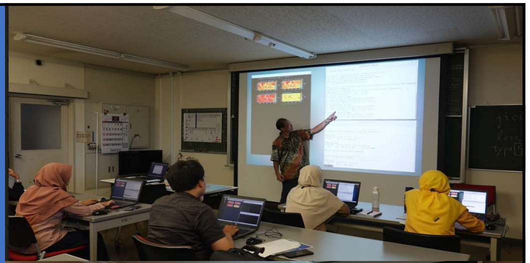
TARC/NARO Morioka (NARO)
Dr. Toshihiro Hasegawa
August 13, 2019

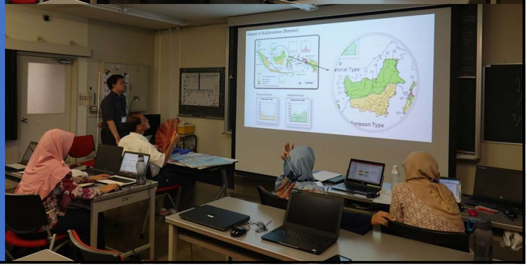
JICA Tokyo
Dr. Koichi Kurihara
August 14, 2019

4

MRI TRAINING

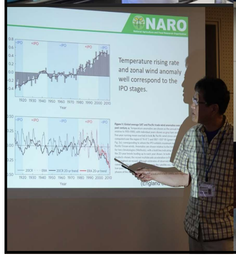
- Introduction to MRI activity
- Explanation on global warming situation and IPCC report
- Explanation on climate projection dataset
- Utilization of MRI-AGCM data for analyzing future climate projection
- Exercise on the utilization of GrADS-based tools for producing figures, charts, and analysis of MRI-AGCM data
- Presentation session from each participants regarding future condition of climate condition in Indonesia





5

NIAES LECTURE



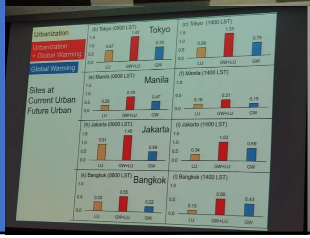
- Introduction to NARO and NIAES
- Summary of climate impact and adaptation in Asia-Pacific region
- Introduction to the CORDEX-ESD
- Review of climate index insurance research in Indonesia (cooperation work of SOMPO, RESTEC, BMKG, and NIAES)
- Lecture of the effect of hydrometeorological extremes on serial productivity in Indonesia (cooperation work of SOMPO, RESTEC, BMKG, and NIAES)
- Introduction to NARO-APCC crop forecast service

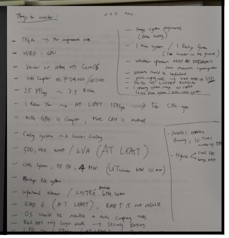
6

TSUKUBA UNIV. LECTURE

- Visit to the new CCS GPU-based supercomputing system
- Lecture on impact of urbanization within the model simulation of Asian mega-cities
- Discussion of the best practice of HPC system preparation, including:

1. Consideration of GPU/CPU based system
2. Price-to-performance ratio
3. Electrical power infrastructure and cooling system
4. HDD Filesystem
5. Backup options
6. OS images / Disk-less system





7

TARC/NARO VISIT

- Summary of future climate projection
- Introduction to the AgMIP activity
- Explanation of the project regarding the sensitivity of rice crop towards the effect of CO_2 fertilization
- Implementation of the climate extreme warning for cold summer case in Tohoku region
- Visit to the Gradiotron
- Explanation on the utilization of the Gradiotron facility for global warming studies

8

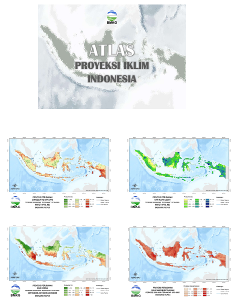
FINAL LECTURE

- Explanation on the role of JMA in disseminating information during the a disaster event
- Explanation about the working process and responsible parties in the mitigation effort of a disaster event
- Explanation on how to approach public users in anticipating disaster events

9

WORK PLAN

AUGUST – DECEMBER 2019



KEY ACTIVITY 3 IS SUPPOSED TO PROVIDE CLIMATE CHANGE PROJECTION DATA AND INFORMATION TO SUPPORT THE IMPLEMENTATION OF CLIMATE CHANGE ADAPTATION TECHNOLOGY WITHIN THE AGRICULTURAL INSURANCE PROJECT

CLIMATE PROJECTION INFORMATION

- To finish the climate change atlas of Indonesia based on the future climate projection data
- To finish the high-resolution climate change atlas of Maluku and Papua area based on the statistical downscaling result
- To extend the analysis for the future climate projection data using the lesson learned from this training
- To provide high-resolution future climate projection information of Indonesian area based on research activities of 2 BMKG scientists in MRI (August – November)

10

WORK PLAN

AUGUST – DECEMBER 2019

KEY ACTIVITY 3 IS SUPPOSED TO PROVIDE CLIMATE CHANGE PROJECTION DATA AND INFORMATION TO SUPPORT THE IMPLEMENTATION OF CLIMATE CHANGE ADAPTATION TECHNOLOGY WITHIN THE AGRICULTURAL INSURANCE PROJECT

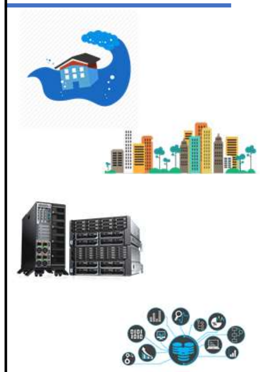
INTERACTIVE CLIMATE ATLAS

- To finish the interactive climate atlas platform with the additional climate indexes specifically adjusted for the climate risk upon rice and maize crops
- To expand the other WebGIS based platform in displaying climate change information for the purpose of serving the needs of climate change information in CEWS

11

WORK PLAN

AUGUST – DECEMBER 2019



KEY ACTIVITY 3 IS SUPPOSED TO PROVIDE CLIMATE CHANGE PROJECTION DATA AND INFORMATION TO SUPPORT THE IMPLEMENTATION OF CLIMATE CHANGE ADAPTATION TECHNOLOGY WITHIN THE AGRICULTURAL INSURANCE PROJECT

OTHERS

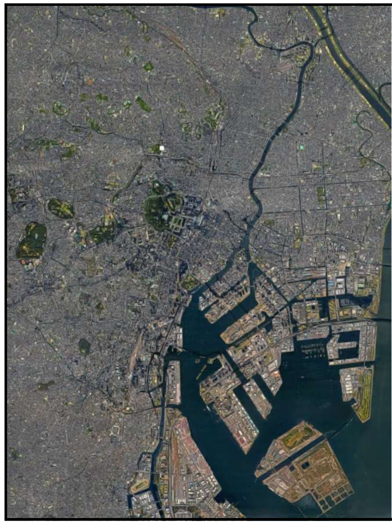
- To continue support various institution/agencies/ministries in terms of implementing the convergence of climate change information towards disaster risk reduction effort
- To support the next JICA project (Climate Change Phase II) in terms of using the climate projection information for spatial planning
- To deliver the information regarding HPC development for technical meeting forum later in Jakarta. BMKG is right now currently preparing high budget to initiate an integrated HPC system.

12

IMPRESSIONS

- Appropriate arrangement of training agenda and schedule
- Supportive and helpful program coordinator
- Welcoming and supportive lecturers and counterparts
- Fancy lunch and dinner occasions
- Several interesting site visits
- Respectful environment

13



THANK YOU
ありがとう ございます

ganeshatrichandrasa@gmail.com
ganesha.chandrasa@bmkg.go.id

14

NHRCM high-resolution climate simulation over INDONESIA

Ari Kurniadi / Apriliana Rizqi Fauziyah

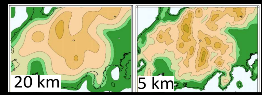
1

OUTLINE


1. Background


2. Earth Simulator

3. MRI Cluster System



4. NHRCM for INDONESIA

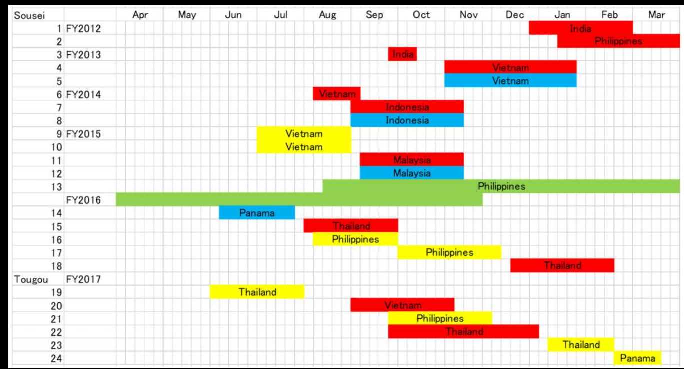
2

BACKGROUND

- The international collaborative research with developing countries is conducted by the MRI to produce the detail structure of the future climate change projection in tropical and sub-tropical Asian regions.
- This work was partially conducted under the framework of “the Integrated Research Program for Advanced Climate Modeling” supported by the TOUGOU Program of MEXT of Japan.

3

BACKGROUND



Fund: SOUSEI or TOUGOU own Ministry of Land, Infrastructure, Transport and Tourism Japan Society for the Promotion of Science

4

Sistem yang digunakan selama di MRI

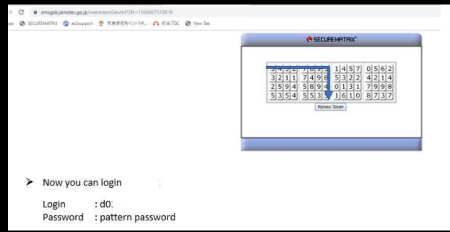
1. ES (Earth Simulator) ; supercomputer milik JAMSTEC yang kami gunakan untutk running model NHRCM

2. MRI Cluster system ; pengolahan sekaligus penyimpanan output hasil downscaling

5

Earth Simulator komponen

1. lunar (lunar.jamstec.go.jp)



2. moon (moon.es3.jamstec.go.jp)
3. mars (mars.jamstec.go.jp)

6

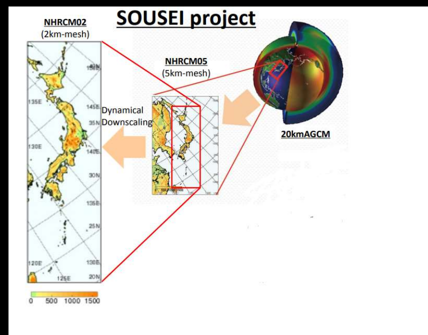
MRI cluster

appc130.mri-jma.go.jp

- tempat penyimpanan hasil keluaran NHRCM

7

Methodology



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- Menggunakan satu scenario yaitu RCP8.5
- Untuk data 1 bulan pertama tidak dipakai menghindari efek dari model spin-up

9

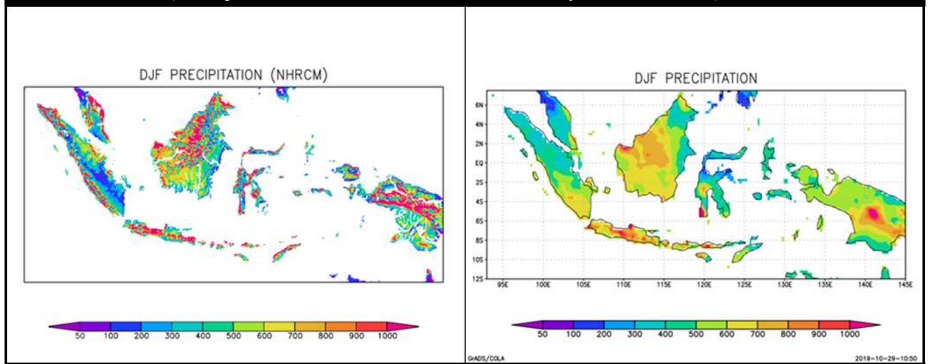
Running

10

Hasil Hujan

11

Hasil (Hujan DJF NHRCM vs Aphrodite)



12

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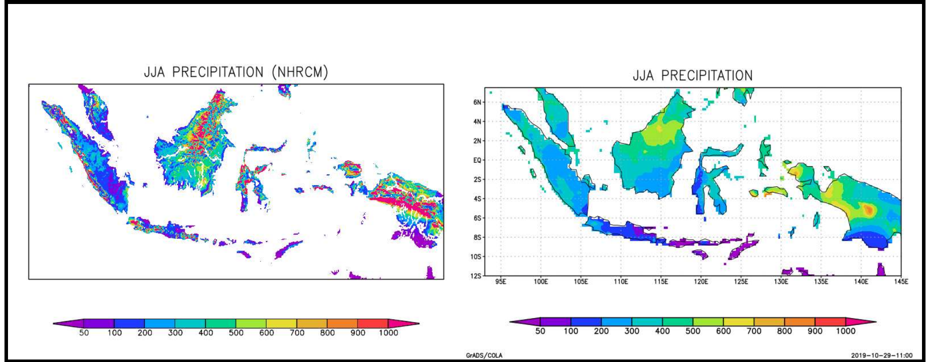

13

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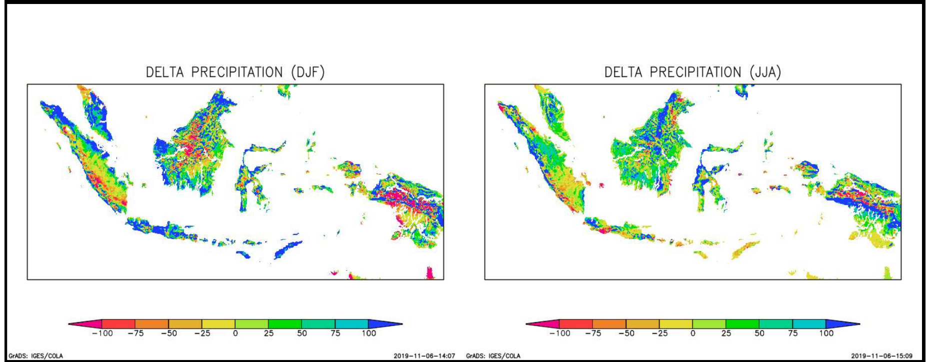
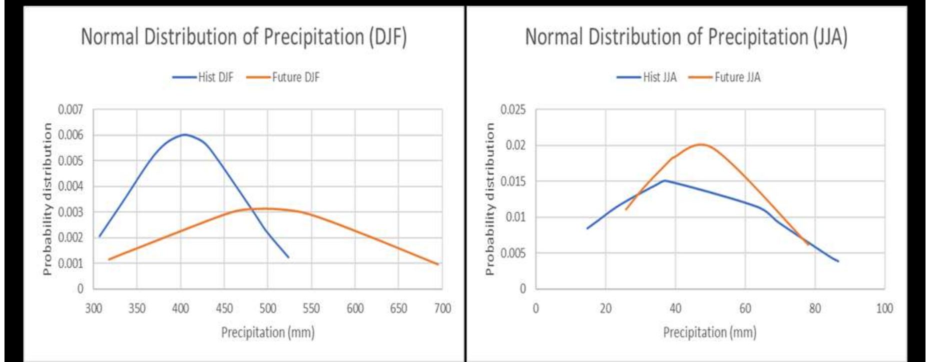


14

Hasil (Probability Distribution Hujan Indonesia)

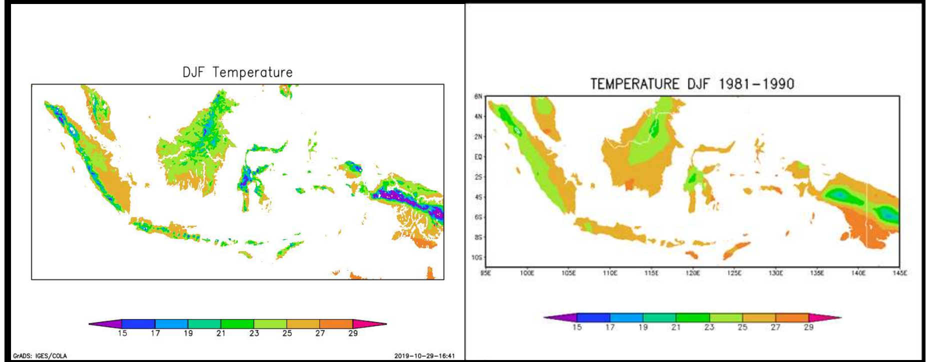


15

Hasil Temperatur

16

Hasil (Temperatur DJF – NHRCM vs APHRODITE)



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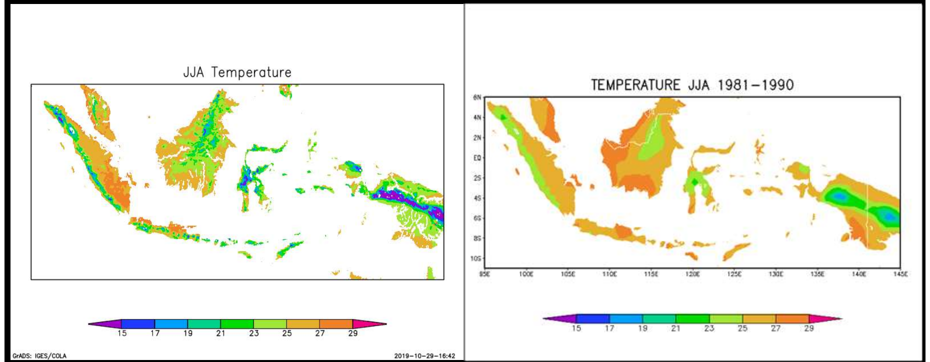

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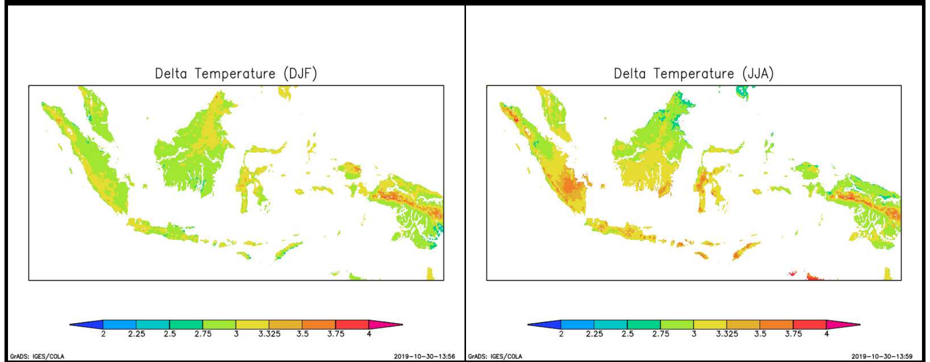


19

CONCLUSION

- Simulasi NHRCM dengan resolusi 5 km untuk Indonesia selama 10 tahun periode present (1981-1990) dan 10 tahun periode future (2079-2088) telah dilaksanakan untuk wilayah Indonesia.
- Hasil simulasi NHRCM dapat merepresentasikan hujan musiman di Indonesia
- Hasil simulasi NHRCM dapat merepresentasikan suhu Indonesia, namun overestimate di wilayah dataran tinggi terutama wilayah gunung.
- NHRCM memiliki keunggulan dalam merepresentasikan topografi Indonesia baik dalam menampilkan hujan dan suhu.

20

Next

- Untuk memenuhi target proyek mereka, NHRCM untuk Indonesia masih perlu dilakukan untuk perioda 10 tahun baik untuk present dan future dengan resolusi 5 km dengan menggunakan RCP8.5.
- Target selanjutnya adalah resolusi 2 km untuk pulau tertentu.
- Manual proses pengerjaan NHRCM berdasarkan proses yang sudah dilakukan sudah dibuatkan (https://drive.google.com/file/d/1nDIlQFYJxWJ4iU-xahkkGHSaaDBfsEvo/view?usp=sharing)

21

22

NHRCM high-resolution climate simulation over INDONESIA

Ari Kurniadi / Apriliana Rizqi Fauziyah

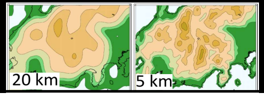
1

OUTLINE

1. Background

2. Earth Simulator

3. MRI Cluster System



4. NHRCM for INDONESIA

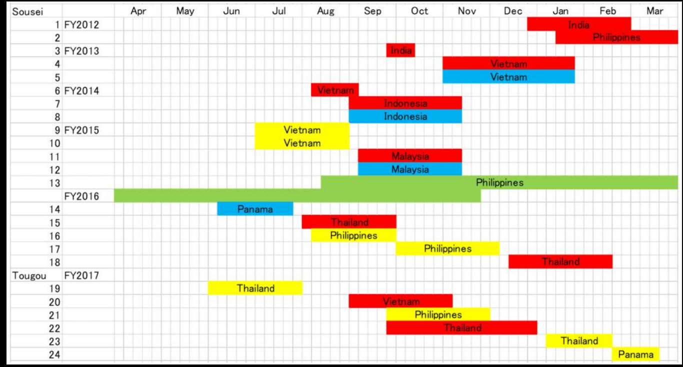
2

BACKGROUND

- The international collaborative research with developing countries is conducted by the MRI to produce the detail structure of the future climate change projection in tropical and sub-tropical Asian regions.
- This work was partially conducted under the framework of "the Integrated Research Program for Advanced Climate Modeling" supported by the TOUGOU Program of MEXT of Japan.

3

BACKGROUND



Fund: SOUSEI or TOUGOU own Ministry of Land, Infrastructure, Transport and Tourism Japan Society for the Promotion of Science

4

Sistem yang digunakan selama di MRI

1. ES (Earth Simulator) ; supercomputer milik JAMSTEC yang kami gunakan untutk running model NHRCM

2. MRI Cluster system ; pengolahan sekaligus penyimpanan output hasil downscaling

5

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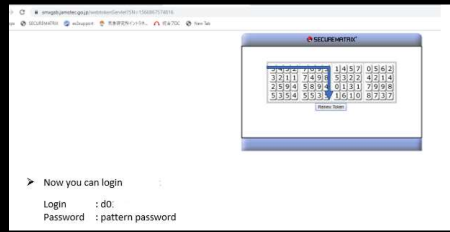

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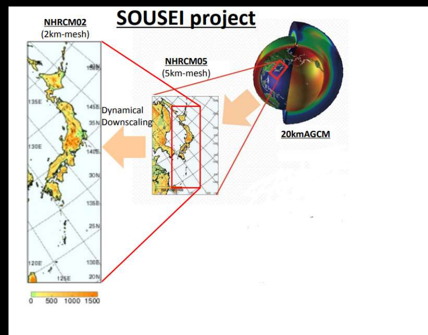

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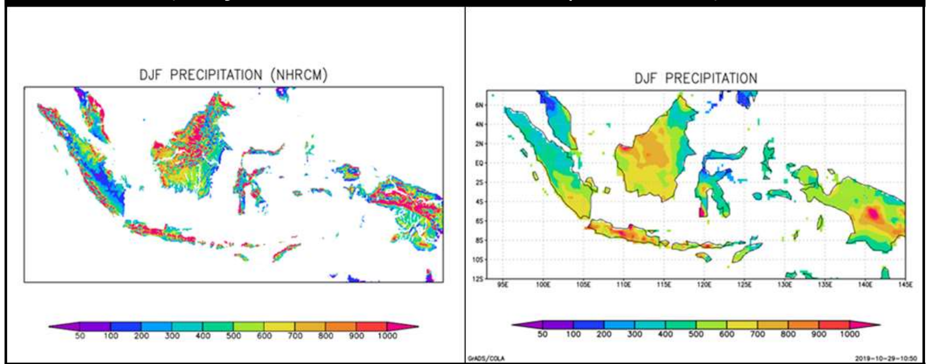

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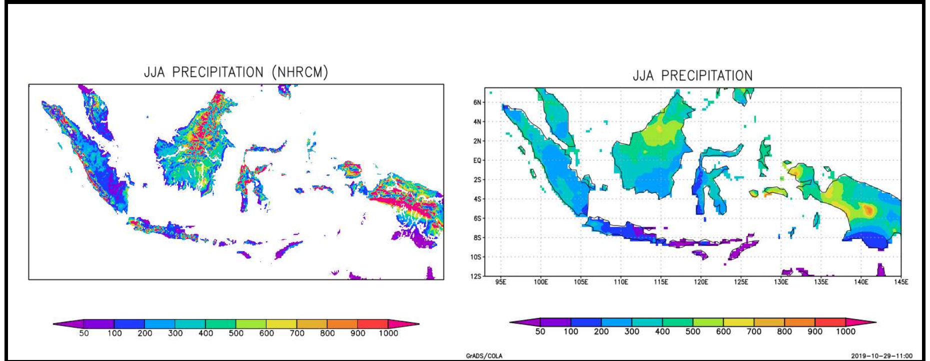

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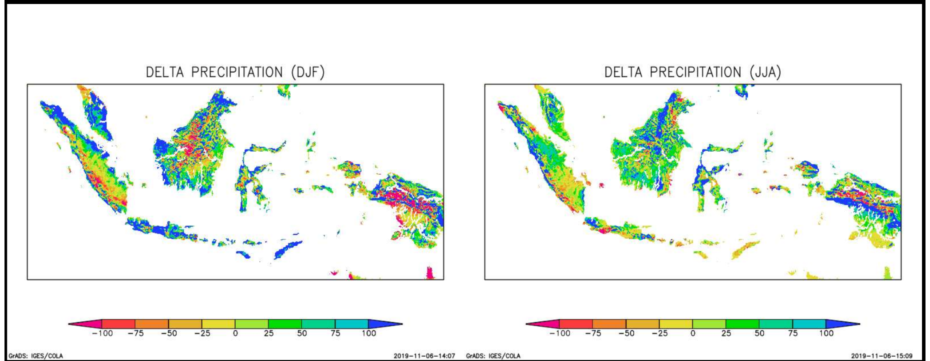

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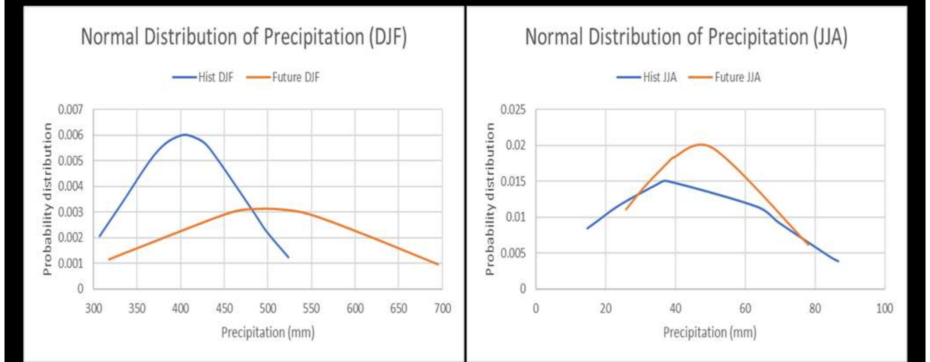

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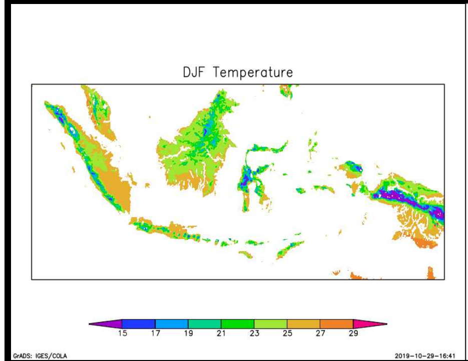

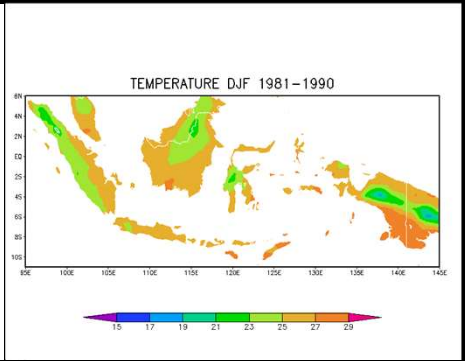

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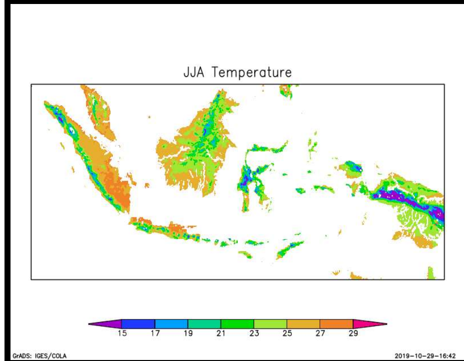

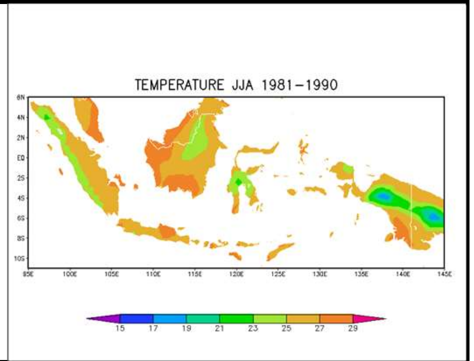

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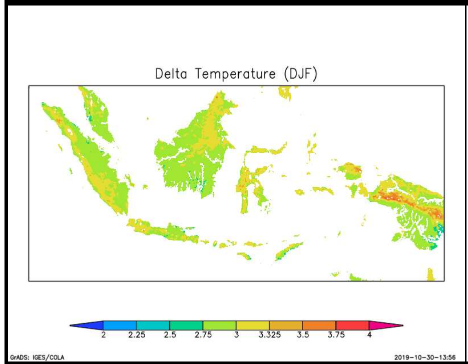

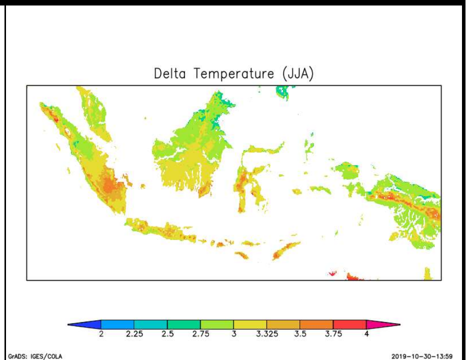

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21

22

PROJECT OF CAPACITY DEVELOPMENT FOR THE IMPLEMENTATION OF AGRICULTURAL INSURANCE IN INDONESIA

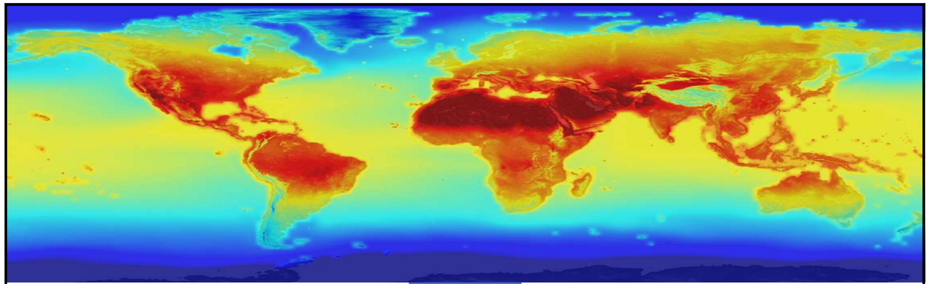
TRAINING SUMMARY / ACTION PLAN

ENHANCING ABILITIES FOR METEOROLOGICAL / CLIMATOLOGICAL DATA USAGE

July 29th, 2019 – August 16th, 2019

BMKG JICA

1



KEY ACTIVITY 3 (ENHANCE ANALYSIS ABILITIES OF RISK ANALYSIS FOR CLIMATE CHANGE DATASET)

Current Activity	Next Activity	
3 days in MRI, 5 participants	2.5 months in MRI, using MRI's HPC for 2 researchers	Key activity 3 is supposed to provide climate change projection data and information to support the implementation of climate change adaptation technology within the agricultural insurance project
Medium resolution AGCM (20 km) based on global warming scenarios	Support for further downscaling into 5km resolution	

2

2

PERSONAL GOALS

- To learn an example / best practice regarding the practical application of climate information towards disaster risk reduction initiatives, from early warning to preventive action
- To understand how the future climate projection data would be used as one of the main consideration for a series of policy making, particularly in terms of spatial planning
- To learn the process of preparing a high-performance computing system for climate operational purpose, from planning, procuring, setting the infrastructure, installing the system, resource management, and maintenance
- To learn JMA's data policy and its connection towards the national integrated spatial information

3

3

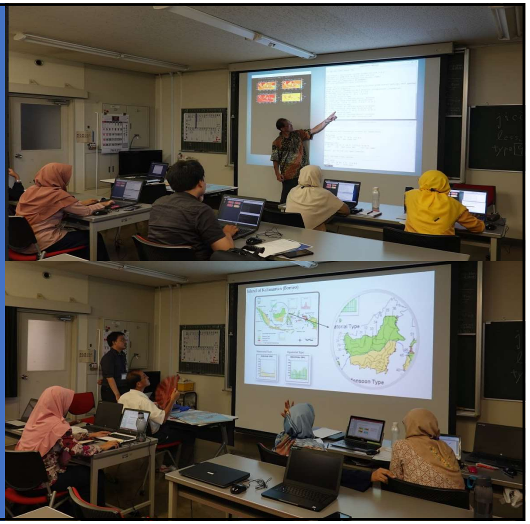
RELATED ACTIVITIES

Institution	Person	Date
MRI Tsukuba	Dr. Shoji Kusunoki	August 5 – 7, 2019
NIAES Tsukuba	Dr. Motoki Nishimori	August 8, 2019
University of Tsukuba	Prof. Hiroyuki Kusaka	August 9, 2019
TARC/NARO Morioka	Dr. Toshihiro Hasegawa	August 13, 2019
JICA Tokyo	Dr. Koichi Kurihara	August 14, 2019

4

MRI TRAINING

- Introduction to MRI activity
- Explanation on global warming situation and IPCC report
- Explanation on climate projection dataset
- Utilization of MRI-AGCM data for analyzing future climate projection
- Exercise on the utilization of GrADS-based tools for producing figures, charts, and analysis of MRI-AGCM data
- Presentation session from each participants regarding future condition of climate condition in Indonesia



5

NIAES LECTURE

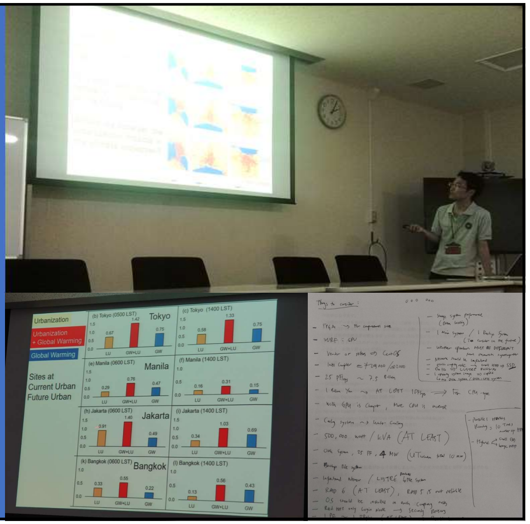
- Introduction to NARO and NIAES
- Summary of climate impact and adaptation in Asia-Pacific region
- Introduction to the CORDEX-ESD
- Review of climate index insurance research in Indonesia (cooperation work of SOMPO, RESTEC, BMKG, and NIAES)
- Lecture of the effect of hydrometeorological extremes on serial productivity in Indonesia (cooperation work of SOMPO, RESTEC, BMKG, and NIAES)
- Introduction to NARO-APCC crop forecast service

6

TSUKUBA UNIV. LECTURE

- Visit to the new CCS GPU-based supercomputing system
- Lecture on impact of urbanization within the model simulation of Asian mega-cities
- Discussion of the best practice of HPC system preparation, including:

1. Consideration of GPU/CPU based system
2. Price-to-performance ratio
3. Electrical power infrastructure and cooling system
4. HDD Filesystem
5. Backup options
6. OS images / Disk-less system



7

TARC/NARO VISIT

- Summary of future climate projection
- Introduction to the AgMIP activity
- Explanation of the project regarding the sensitivity of rice crop towards the effect of CO_2 fertilization
- Implementation of the climate extreme warning for cold summer case in Tohoku region
- Visit to the Gradiotron
- Explanation on the utilization of the Gradiotron facility for global warming studies

8

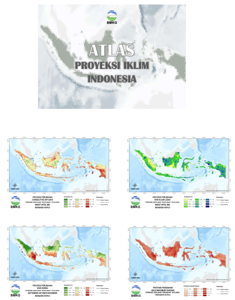
FINAL LECTURE

- Explanation on the role of JMA in disseminating information during the a disaster event
- Explanation about the working process and responsible parties in the mitigation effort of a disaster event
- Explanation on how to approach public users in anticipating disaster events

9

WORK PLAN

AUGUST – DECEMBER 2019



KEY ACTIVITY 3 IS SUPPOSED TO PROVIDE CLIMATE CHANGE PROJECTION DATA AND INFORMATION TO SUPPORT THE IMPLEMENTATION OF CLIMATE CHANGE ADAPTATION TECHNOLOGY WITHIN THE AGRICULTURAL INSURANCE PROJECT

CLIMATE PROJECTION INFORMATION

- To finish the climate change atlas of Indonesia based on the future climate projection data
- To finish the high-resolution climate change atlas of Maluku and Papua area based on the statistical downscaling result
- To extend the analysis for the future climate projection data using the lesson learned from this training
- To provide high-resolution future climate projection information of Indonesian area based on research activities of 2 BMKG scientists in MRI (August – November)

10

WORK PLAN

AUGUST – DECEMBER 2019

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INTERACTIVE CLIMATE ATLAS

- To finish the interactive climate atlas platform with the additional climate indexes specifically adjusted for the climate risk upon rice and maize crops
- To expand the other WebGIS based platform in displaying climate change information for the purpose of serving the needs of climate change information in CEWS

11

WORK PLAN

AUGUST – DECEMBER 2019

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OTHERS

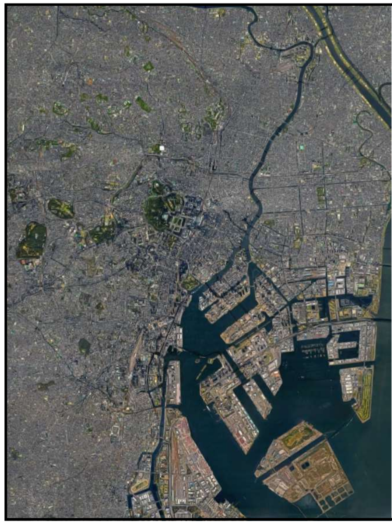
- To continue support various institution/agencies/ministries in terms of implementing the convergence of climate change information towards disaster risk reduction effort
- To support the next JICA project (Climate Change Phase II) in terms of using the climate projection information for spatial planning
- To deliver the information regarding HPC development for technical meeting forum later in Jakarta. BMKG is right now currently preparing high budget to initiate an integrated HPC system.

12

IMPRESSIONS

- Appropriate arrangement of training agenda and schedule
- Supportive and helpful program coordinator
- Welcoming and supportive lecturers and counterparts
- Fancy lunch and dinner occasions
- Several interesting site visits
- Respectful environment

13



THANK YOU
ありがとう ございます

ganeshatrichandrasa@gmail.com
ganesha.chandrasa@bmkg.go.id

14

Project of Capacity Development for the Implementation of Agricultural Insurance

"Enhancing Abilities for Meteorological / Climatological Data Usage"

Japan, July 29 – August 16 2019

BMKG JICA

1

Key activities

1. Provide/prepare reliable meteorological data for agricultural insurance.
2. Develop weather information and strengthen abilities for producing products for agriculture.
3. Enhance analysis abilities of risk analysis for climate change data-set.

2

Activity Output 1
Provide/ Prepare Reliable Meteorological Data for Agriculture Insurance

1. Leni Nazarudin
2. Noveta Chandra

3

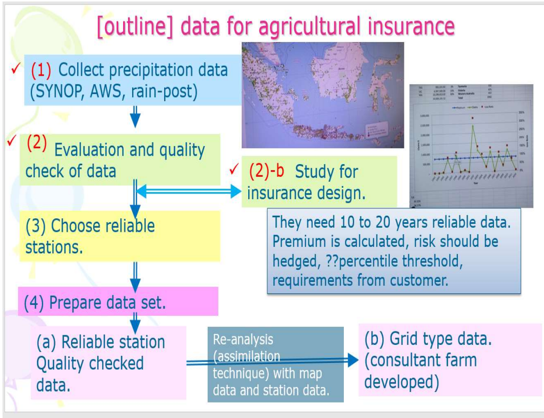
Outline

- Previous Activity
- Japan Training Activity
- Working Plan
- Progress

4

Previous activity

Activity (1) – (2)



5

Detail for (1) and (2) activity

Preparation → Working steps → Evaluation

6

Preparation

Identify whats kind of data

List up SYNOP and rain post stations

Collect daily precipitation data for SYNOP and rain post station at least for 10 years and hopefully 30 years

Download GSMaP data and develop a software to pickup hourly data from GSMaP data based on station list by JICA Expert

7

Working Steps

1st step

- Make 30 years daily precipitation data for agricultural insurance
- Compare rain post with SYNOP data in daily precipitation

2nd step

- Compare SYNOP and rain post data with GSMaP daily / decadal data
- Evaluate, its efffectivity for agricultural insurance or not

8

Case study :
East Java and South Sulawesi

Evaluation

- Synop vs Rain Post
- Synop vs GSMaP
- Rain Post vs GSMaP

R^2		Smoothness		Hit rate in contingency sheet	
daily	sum	daily	sum	dasarian	daily
>=0.4	>=0.7	OK (very smoot) <2.0		> 0.6667	
<0.4	<0.7	SM (mostly smooth) 2.0 - 5.0		<0.667	
negatif	negatif	NG (Not smooth) >5.0			

9

Advice from maros and malang climatology station

- Attention about the data lag time
- Separated the source of the data, like the rain post station and SMPK (Agro Meteorological Station)
- For the sample, it would be better in normal years, not in elnino or lanina periode
- When weather index insurances will be apply, MoU should be involved BMKG local station
- Please share the result of the quality control data to BMKG local station

10

Case study :
East Java and South Sulawesi

3(a). Next step 1.

Hopefully by training in Japan.

- SYNOP-rain-post comparison.
- Extend comparison from only for 2015 or 2018 to 10 years.
- Make summarize table and figures for each year and for 10 years.

→ Finished for 6 synop and 6 rain post stations

- Trial for scripts and software.
- Extract GSMaP data and pick up data from GSMaP (2006~2013).
- Try scripts and software on Linux and confirm it works.

→ Finished for 4 years (2009-2013)

- [Challenge] develop software.
- Let's try to develop software (Python or C) referring Excel sheet equations.
- Tonouchi tries to code it in C, hopefully until next visit(probably Jan. 2020).

11

East Java

Synop Banyuwangi vs Kaliklatak

R^2	Synop vs Rain post		Synop vs GSMaP		Rain post vs GSMaP	
	daily	sum	daily	sum	daily	sum
2009	0.146	0.748	-0.027	0.977	0.091	0.955
2010	0.014	0.987	-0.189	0.996	-0.054	0.994
2011	0.001	0.955	-0.093	0.995	0.015	0.876
2012	0.103	0.923	-0.117	0.984	0.087	0.845
2013	-0.127	0.973	0.876	0.996	0.096	0.963
2014	-0.830	0.979	0.783	0.968	0.237	0.947
2015	0.015	0.977	0.732	0.992	0.152	0.981
2016	-0.072	0.975	0.746	0.974	0.238	0.989
2017	-0.047	0.948	0.870	0.964	0.088	0.874
2018	0.008	0.956	0.876	0.978	0.046	0.839

Synop Banyuwangi vs Kaliklatak

Smoothness	Synop vs Rain post		Synop vs GSMaP		Rain post vs GSMaP	
	daily	sum	daily	sum	daily	sum
2009	1.91	9.02		3.84		3.21
2010	1.75	51.60		2.50		44.20
2011	2.00	6.68		2.10		8.92
2012	1.98	7.99		2.76		7.27
2013	3.62	3.47		1.47		4.26
2014	2.66	3.38		3.71		5.92
2015	3.22	3.02		2.01		2.40
2016	3.11	4.36		4.88		2.94
2017	2.23	6.47		4.91		7.45
2018	2.39	4.29		3.34		6.95

Synop Banyuwangi vs Kaliklatak

Proportion	Synop vs Rain post		Synop vs GSMaP		Rain post vs GSMaP	
	daily	sum	daily	sum	daily	sum
2009	0.47	0.90	0.29	0.94	0.38	0.96
2010	0.61	0.99	0.17	0.88	0.08	0.99
2011	0.46	1.19	0.30	1.19	0.32	0.85
2012	0.79	1.43	0.22	1.03	0.24	0.70
2013	0.23	1.60	0.69	0.88	0.28	0.58
2014	0.25	1.23	0.80	0.92	0.62	0.83
2015	0.31	1.01	0.87	1.11	0.51	1.11
2016	0.29	1.10	0.85	1.09	0.48	0.98
2017	0.32	0.92	0.81	0.94	0.37	0.94
2018	0.34	1.00	0.83	0.94	0.27	0.85

Synop Banyuwangi vs Kaliklatak

Hit rate in contingency	Synop vs Rain post		Synop vs GSMaP		Rain post vs GSMaP	
	daily	dasarian	daily	dasarian	daily	dasarian
2009	0.92	0.75		0.86		0.83
2010	0.85	0.78		0.89		0.75
2011	0.92	0.72		0.94		0.69
2012	0.90	0.81		0.94		0.78
2013	0.84	0.83		0.97		0.81
2014	0.92	0.81		0.92		0.83
2015	0.91	0.92		0.97		0.89
2016	0.88	0.81		0.86		0.86
2017	0.87	0.75		0.94		0.75
2018	0.90	0.81		0.97		0.78

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South Sulawesi (Synop Maros vs Gentung rain post) 2009 – 2018

Synop Maros vs Gentung

R^2	Synop vs Rain post		Synop vs GSMaP		Rain post vs GSMaP	
	daily	sum	daily	sum	daily	sum
2009	0.311	0.983	0.478	0.980	0.281	0.958
2010	0.001	0.993	-0.008	0.879	-0.124	0.831
2011	0.046	0.996	0.438	0.988	0.027	0.991
2012	0.268	0.926	0.268	0.963	-0.138	0.787
2013	0.355	0.985	0.388	0.960	0.137	0.966
2014	0.526	0.986	0.510	0.937	0.285	0.950
2015	0.699	0.985	0.225	0.966	0.468	0.979
2016	0.340	0.972	0.510	0.978	0.522	0.980
2017	0.300	0.993	0.498	0.985	0.177	0.975
2018	0.410	0.990	0.273	0.985	0.221	0.991

Synop Maros vs Gentung

Smoothness	Synop vs Rain post		Synop vs GSMaP		Rain post vs GSMaP	
	daily	sum	daily	sum	daily	sum
2009	1.23	2.52		3.77		4.17
2010	1.46	2.85		13.89		18.45
2011	1.88	1.75		3.33		2.37
2012	1.12	10.23		6.79		10.30
2013	0.89	3.15		6.01		6.59
2014	0.81	2.35		6.19		5.78
2015	0.69	2.30		2.91		3.02
2016	0.97	5.38		4.67		3.75
2017	1.01	2.18		3.28		4.16
2018	0.88	2.25		2.62		2.05

Synop Maros vs Gentung

Proportion	Synop vs Rain post		Synop vs GSMaP		Rain post vs GSMaP	
	daily	sum	daily	sum	daily	sum
2009	0.480	0.710	0.550	0.590	0.507	0.710
2010	0.470	0.920	0.220	0.510	0.017	0.530
2011	0.480	1.020	0.440	0.590	0.248	0.560
2012	0.670	0.701	0.423	0.662	0.125	0.857
2013	0.645	0.980	0.566	0.848	0.449	0.815
2014	0.834	1.023	0.804	1.040	0.542	0.927
2015	0.925	1.114	0.588	0.820	0.518	0.657
2016	0.691	0.901	0.486	0.636	0.541	0.740
2017	0.620	0.968	0.571	0.741	0.375	0.690
2018	0.858	1.163	0.494	0.847	0.329	0.637

Synop Maros vs Gentung

Hit rate in contingency	Synop vs Rain post		Synop vs GSMaP		Rain post vs GSMaP	
	daily	dasarian	daily	dasarian	daily	dasarian
2009	0.88	0.81		0.89		0.83
2010	0.75	0.72		0.64		0.61
2011	0.79	0.89		0.92		0.83
2012	0.83	0.80		0.71		0.69
2013	0.86	0.78		0.89		0.83
2014	0.87	0.86		0.83		0.83
2015	0.91	0.89		0.89		0.86
2016	0.86	0.80		0.80		0.77
2017	0.88	0.81		0.86		0.75
2018	0.86	0.86		0.83		0.92

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Japan Training Related Activities

Study visit to Sompo Holding, Inc
- Tokyo, Aug 1 2019
- Lecturer : Kiyosi Fukuwatari

Study visit to Japan Aerospace Exploration Agency (JAXA)
- Tsukuba, Aug 9 2019
- Lecturer : Moeka Yamaji

Study visit to NARO Institute for Agro-Environmental Sciences (NIAES)
- Tsukuba, Aug 8 2019
- Lecturer : Dr. Motoki Nishimori

Study visit to National Agriculture and Food Research Organization (NARO)
- Morioka, Aug 12 2019
- Lecturer : Toshihiro Hasegawa

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Study visit : Sompo Holding Inc in Tokyo

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Sompo's Agricultural Insurance Activities

Main points:

1. Weather Index is calculated by Insurance company, but case in Myanmar and Thailand when using GSMaP data, weather index calculated by private company (RESTEC/ The Remote Sensing Technology Center of Japan)
2. **Meteorological agency prepare reliable meteorological data and the data should be accessable by public**
3. The length of climate data affects premium price
4. GSMaP data used to filling missed observation data

(case study : Myanmar and Thailand)

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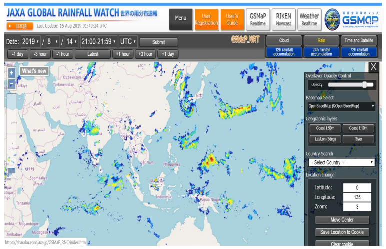
Study visit : Japan Aerospace Exploration Agency (JAXA) in Tsukuba

GSMaP website :
http://sharaku.eorc.jaxa.jp/GSMaP



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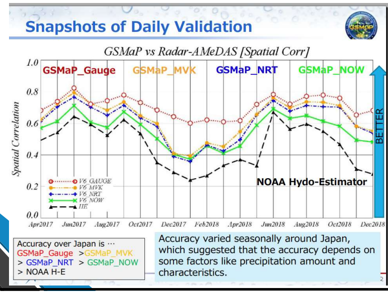
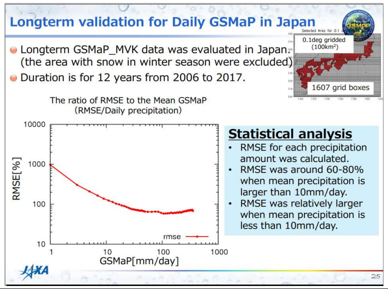
Japan Aerospace Exploration Agency (JAXA)

GSMaP products :

- NOW >> Real time, a few minutes latency
- NRT >> Near real time, 4 hours latency
- MVK >> Standart, 3 days latency





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Japan Aerospace Exploration Agency (JAXA)

GSMaP Recommendation Products for agricultural insurance:

Standard/v6/	GSMaP_gauge (standard with gauge-calibration Ver.6, 3-day data latency, since March 2014
	GSMaP_Gauge_RNL (reanalysis with gauge-calibration Ver.6, a period from March 2000 to February 2014)
The GSMaP_Gauge_RNL is almost same as Gauge	GSMaP_Gauge is the product after the launch of the GPM Core Observatory in Feb 28 2014
	GSMaP_Gauge_RNL is the reprocessed product for the past duration before GPM launch

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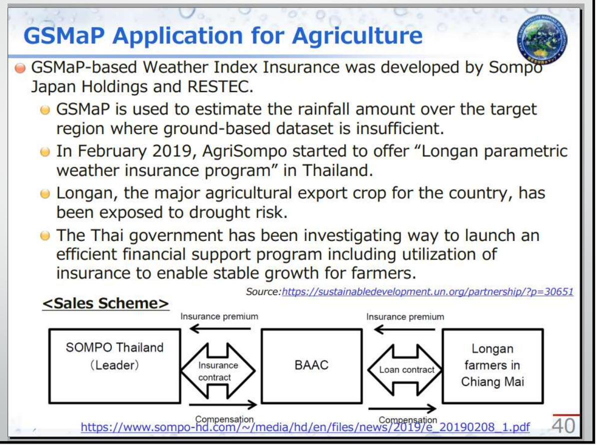
Japan Aerospace Exploration Agency (JAXA)

GSMap Application for Agriculture



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Study visit : NARO Institute for Agro-Environmental Sciences (NIAES)

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NARO Institute for Agro-Environmental Sciences (NIAES)

- Collaboration Research on Cimate Index Insurances for farmers in Indonesia with SOMPO, RESTEC and BMKG funded by JICA-BOP (Bojonegoro, East java) **>> claim threshold for insurance was 79 mm from oct-nov in Bojonegoro**
- Hydrological and Extreme Effects on Serial Production Variabilities in Indonesia *referred to Dr. Lizumi's collaboratted with T.Sakai (NIAES) and JICA-BMKG Training Program 2014 **>> index extreme per comodity**

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Study visit : National Agriculture and Food Research Organization (NARO)

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National Agriculture and Food Research Organization (NARO) in Morioka

Main points:

1. Agricultural under Changing Climate
   - Projected Climate Change
   - International efforts to project the impact on rice future
   - Early Warning System for current climatic variability
2. Visit Gradiotron (an open laboratory)
   - Temperature gradient chamber
   - CO_2 supply and control

The combine effects of T and CO_2 can be tested

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Work Plan
August – December 2019

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August – December 2019

1. Not reliable stations >> Look for reasons (different big value, missing data, etc)

2. Reliable stations :
   - Store as reliable data with quality check information (missing data period)
   - Compare reliable stations (SYNOP/rain-post) and GSMaP data
   - Check proportion of GSMaP data to observation data

Make reliable station data package 10 to 20 years (daily/decadal)

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Time line

Week	August	September	October	November	December
I	Japan training	Data processing	Evaluation 1	Evaluation 2	Evaluation 3
II	Japan training	Data processing	Data processing	Data processing	Data processing
III	Making report about japan training	Data processing	Data processing	Data processing	Data processing
IV	sharing with the team about the results of the training and make evaluation	Data processing	Data processing	Data processing	Final resume (relliable stations) and report

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Data Processing

Evaluate all of the rain post in East Java and South Sulawesi, if there are reliable or not

(each around 200 rain post in East java and South Sulawesi)

Make reliable station data package 10 to 20 years (daily/decadal)

East Java (PIC Veta)

South Sulawesi (PIC Leni)

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Progress December 2019

Trial for scripts and software.

- Continue to extract GSMaP data and pick up data from GSMaP (2005~2008) >> done

SYNOP-rain-post comparison.

- Continue to extend comparison from 2009 – 2018 to 2005 – 2018 for the other SYNOP – rain post in East Java and South Sulawesi
- East Java : 3 SYNOP and 7 rain post, has finished for 2005 – 2018.
- South Sulawesi : 3 SYNOP and 3 rain post, has finished for 2008 – 2018.

[Challenge] develop software.

- Let's try to develop software (Python or C) referring Excel sheet equations.
- Tonouchi tries to code it in C, hopefully until next visit(probably Jan. 2020)

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Rain Post	Lat	Lon	Year	Distance (km)	R^2 daily	R^2 sum	Smoothness daily	Smoothness sum	Proportion daily	Proportion sum	Hit rate in contingency sheet dasarian	Hit rate in contingency sheet daily	Reliable
Stamet Banyuwangi	-8.21667	114.3833											
Kaliklatak	-8.18533	114.3402	2005	6	0.008	0.943	2.236	5.110	0.483	1.581	0.778	0.877	
Kaliklatak	-8.18533	114.3402	2006		0.167	0.976	1.725	4.397	0.749	1.396	0.833	0.918	
Kaliklatak	-8.18533	114.3402	2007		0.063	0.998	1.826	149.724	0.977	0.998	0.694	0.855	
Kaliklatak	-8.18533	114.3402	2008		0.106	0.976	1.758	3.714	0.734	1.725	0.857	0.885	
Kaliklatak	-8.18533	114.3402	2009		0.146	0.748	1.909	9.017	0.471	0.900	0.750	0.918	
Kaliklatak	-8.18533	114.3402	2010		0.014	0.987	1.752	51.598	0.609	0.987	0.778	0.855	
Kaliklatak	-8.18533	114.3402	2011		0.001	0.955	1.998	6.682	0.461	1.191	0.722	0.923	
Kaliklatak	-8.18533	114.3402	2012		0.103	0.923	1.978	7.989	0.792	1.426	0.806	0.902	
Kaliklatak	-8.18533	114.3402	2013		-0.127	0.973	3.617	3.469	0.235	1.598	0.833	0.841	
Kaliklatak	-8.18533	114.3402	2014		-0.083	0.979	2.660	3.377	0.251	1.230	0.806	0.923	
Kaliklatak	-8.18533	114.3402	2015		0.015	0.977	3.220	3.039	0.306	1.011	0.917	0.910	
Kaliklatak	-8.18533	114.3402	2016		-0.072	0.975	3.107	4.364	0.287	1.099	0.806	0.877	
Kaliklatak	-8.18533	114.3402	2017		-0.047	0.948	2.227	6.472	0.315	0.924	0.750	0.874	
Kaliklatak	-8.18533	114.3402	2018		0.008	0.956	2.388	4.294	0.335	0.998	0.806	0.901	

R^2 daily	R^2 sum	Smoothness daily	Smoothness sum	Hit rate in contingency sheet dasarian	Hit rate in contingency sheet daily
>=0.4	>=0.7	OK (very smoot) <2.0		> 0.6667	
<0.4	<0.7	SM (mostly smooth) 2.0 - 5.0		<0.667	
negatif	negatif	NG (Not smooth) >5.0			

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GSMAP	Lon	Lat	Year	R^2 daily	R^2 sum	Smoothness daily	Smoothness sum	Proportion daily	Proportion sum	Hit rate in contingency sheet dasarian	Hit rate in contingency sheet daily	Reliable
Stamet Banyuwangi	-8.21667	114.3833	2005	0.167	0.994		2.017	0.477	0.905	0.889		
Stamet Banyuwangi	-8.21667	114.3833	2006	-0.029	0.956		5.671	0.274	0.927	0.889		
Stamet Banyuwangi	-8.21667	114.3833	2007	0.002	0.988		2.949	0.229	0.759	0.917		
Stamet Banyuwangi	-8.21667	114.3833	2008	-0.064	0.994		1.860	0.240	0.884	0.971		
Stamet Banyuwangi	-8.21667	114.3833	2009	-0.027	0.977		3.840	0.293	0.942	0.861		
Stamet Banyuwangi	-8.21667	114.3833	2010	-0.189	0.996		2.498	0.175	0.884	0.889		
Stamet Banyuwangi	-8.21667	114.3833	2011	-0.093	0.995		2.102	0.300	1.186	0.944		
Stamet Banyuwangi	-8.21667	114.3833	2012	-0.117	0.984		2.762	0.217	1.028	0.944		
Stamet Banyuwangi	-8.21667	114.3833	2013	0.876	0.996		1.474	0.687	0.877	0.972		
Stamet Banyuwangi	-8.21667	114.3833	2014	0.783	0.968		3.708	0.803	0.923	0.917		
Stamet Banyuwangi	-8.21667	114.3833	2015	0.732	0.992		2.011	0.871	1.109	0.972		
Stamet Banyuwangi	-8.21667	114.3833	2016	0.746	0.974		4.884	0.854	1.094	0.861		
Stamet Banyuwangi	-8.21667	114.3833	2017	0.870	0.964		4.914	0.808	0.942	0.944		
Stamet Banyuwangi	-8.21667	114.3833	2018	0.876	0.978		3.338	0.828	0.939	0.972		

R^2 daily	R^2 sum	Smoothness daily	Smoothness sum	Hit rate in contingency sheet dasarian	Hit rate in contingency sheet daily
>=0.4	>=0.7	OK (very smoot) <2.0		> 0.6667	
<0.4	<0.7	SM (mostly smooth) 2.0 - 5.0		<0.667	
negatif	negatif	NG (Not smooth) >5.0			

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GSMAP	Lon	Lat	Year	R^2		Smoothness		Proportion		Hit rate in contingency sheet		Reliable
				daily	sum	daily	sum	daily	sum	dasarian	daily	
Kaliklatak	-8.18533	114.3402	2005	-0.029	0.9548		4.873	0.186	0.516	0.75		
Kaliklatak	-8.18533	114.3402	2006	0.220	0.868		9.954	0.335	0.642	0.778		
Kaliklatak	-8.18533	114.3402	2007	0.101	0.963		7.286	0.130	0.231	0.556		
Kaliklatak	-8.18533	114.3402	2008	0.198	0.983		3.407	0.315	0.507	0.829		
Kaliklatak	-8.18533	114.3402	2009	0.091	0.955		3.206	0.375	0.956	0.833		
Kaliklatak	-8.18533	114.3402	2010	-0.054	0.994		44.202	0.078	0.994	0.750		
Kaliklatak	-8.18533	114.3402	2011	0.015	0.876		8.914	0.317	0.854	0.694		
Kaliklatak	-8.18533	114.3402	2012	0.087	0.845		7.268	0.244	0.704	0.778		
Kaliklatak	-8.18533	114.3402	2013	0.096	0.963		4.283	0.280	0.577	0.806		
Kaliklatak	-8.18533	114.3402	2014	0.237	0.947		5.916	0.622	0.834	0.833		
Kaliklatak	-8.18533	114.3402	2015	0.152	0.981		2.404	0.507	1.114	0.889		
Kaliklatak	-8.18533	114.3402	2016	0.238	0.989		2.936	0.481	0.977	0.861		
Kaliklatak	-8.18533	114.3402	2017	0.088	0.874		7.454	0.369	0.935	0.750		
Kaliklatak	-8.18533	114.3402	2018	0.046	0.839		6.950	0.273	0.846	0.778		

R^2		Smoothness		Hit rate in contingency sheet	
daily	sum	daily	sum	dasarian	daily
>=0.4	>=0.7	OK (very smoot) <2.0		> 0.6667	
<0.4	<0.7	SM (mostly smooth) 2.0 - 5.0		<0.667	
negatif	negatif	NG (Not smooth) >5.0			

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Rain Post	Lat	Lon	Year	Distance	R^2		Smoothness		Proportion		Hit rate in contingency sheet		Reliable
				(km)	daily	sum	daily	sum	daily	sum	dasarian	daily	
Stamet Banyuwangi	-8.21667	114.3833											
Alas Malang	-8.316	114.252	2005	18	-0.061	0.971	3.018	4.242	0.340	1.267	0.667	0.874	
Alas Malang	-8.316	114.252	2006		0.011	0.987	2.180	3.194	0.580	1.680	0.806	0.888	
Alas Malang	-8.316	114.252	2007		-0.008	0.968	2.158	11.201	0.372	1.575	0.806	0.901	
Alas Malang	-8.316	114.252	2008		-0.108	0.981	2.845	3.141	0.288	1.509	0.771	0.879	
Alas Malang	-8.316	114.252	2009		0.028	0.950	2.553	5.311	0.508	1.308	0.833	0.890	
Alas Malang	-8.316	114.252	2010		-0.139	0.985	2.914	4.546	0.344	1.660	0.667	0.808	
Alas Malang	-8.316	114.252	2011		-0.060	0.867	3.772	9.867	0.215	1.276	0.750	0.921	
Alas Malang	-8.316	114.252	2012		-0.077	0.945	4.183	4.640	0.337	1.630	0.861	0.885	
Alas Malang	-8.316	114.252	2013		0.085	0.963	1.537	5.712	0.589	1.367	0.750	0.879	
Alas Malang	-8.316	114.252	2014		0.148	0.948	1.761	4.766	0.713	1.478	0.750	0.901	
Alas Malang	-8.316	114.252	2015		0.003	0.933	2.924	4.297	0.589	1.959	0.861	0.888	
Alas Malang	-8.316	114.252	2016		0.182	0.985	1.422	4.045	1.147	2.139	0.750	0.866	
Alas Malang	-8.316	114.252	2017		0.028	0.981	1.702	4.026	0.718	1.959	0.667	0.838	
Alas Malang	-8.316	114.252	2018		0.399	0.968	1.070	4.021	1.066	1.575	0.833	0.915	

R^2		Smoothness		Hit rate in contingency sheet	
daily	sum	daily	sum	dasarian	daily
>=0.4	>=0.7	OK (very smoot) <2.0		> 0.6667	
<0.4	<0.7	SM (mostly smooth) 2.0 - 5.0		<0.667	
negatif	negatif	NG (Not smooth) >5.0			

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GSMAP	Lon	Lat	Year	R^2		Smoothness		Proportion		Hit rate in contingency sheet		Reliable
				daily	sum	daily	sum	daily	sum	dasarian	daily	
Alas Malang	-8.316	114.252	2005	-0.080	0.945		6.460	0.179	0.665	0.611		
Alas Malang	-8.316	114.252	2006	0.031	0.993		1.903	0.205	0.580	0.833		
Alas Malang	-8.316	114.252	2007	-0.031	0.9892		35.057	0.172	0.989	0.861		
Alas Malang	-8.316	114.252	2008	-0.100	0.959		4.418	0.150	0.628	0.771		
Alas Malang	-8.316	114.252	2009	-0.047	0.952		4.511	0.183	0.709	0.778		
Alas Malang	-8.316	114.252	2010	-0.054	0.982		5.410	0.078	0.571	0.667		
Alas Malang	-8.316	114.252	2011	-0.158	0.892		471.246	0.115	0.115	0.722		
Alas Malang	-8.316	114.252	2012	-0.114	0.942		3.952	0.115	0.637	0.889		
Alas Malang	-8.316	114.252	2013	-0.147	0.969		4.699	0.100	0.650	0.806		
Alas Malang	-8.316	114.252	2014	-0.070	0.867		7.742	0.124	0.621	0.750		
Alas Malang	-8.316	114.252	2015	-0.065	0.975		3.296	0.129	0.531	0.778		
Alas Malang	-8.316	114.252	2016	-0.160	0.981		4.288	0.113	0.499	0.722		
Alas Malang	-8.316	114.252	2017	-0.125	0.968		5.944	0.120	0.495	0.722		
Alas Malang	-8.316	114.252	2018	-0.045	0.970		2.914	0.158	0.585	0.889		

R^2		Smoothness		Hit rate in contingency sheet	
daily	sum	daily	sum	dasarian	daily
>=0.4	>=0.7	OK (very smoot) <2.0		> 0.6667	
<0.4	<0.7	SM (mostly smooth) 2.0 - 5.0		<0.667	
negatif	negatif	NG (Not smooth) >5.0			

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Rain Post	Lat	Lon	Year	Distance	R^2		Smoothness		Proportion		Hit rate in contingency sheet		Reliable
				(km)	daily	sum	daily	sum	daily	sum	dasarian	daily	
Stamet Paotere	-5.11	119.42											
Barombong	-5.20	119.50	2008	13	0.075	0.974	1.780	3.123	0.226	0.495	0.850	0.833	
Barombong	-5.20	119.50	2009		0.355	0.936	1.330	3.964	0.306	0.385	0.906	0.903	
Barombong	-5.20	119.50	2010		0.113	0.972	1.636	4.781	0.173	0.509	0.792	0.639	
Barombong	-5.20	119.50	2011		0.287	0.988	1.300	2.571	0.398	0.583	0.858	0.889	
Barombong	-5.20	119.50	2012		0.207	0.970	1.360	3.675	0.362	0.692	0.899	0.806	
Barombong	-5.20	119.50	2013		0.366	0.850	1.008	8.383	0.484	0.657	0.893	0.800	
Barombong	-5.20	119.50	2014		0.176	0.966	1.437	3.448	0.252	0.488	0.885	0.861	
Barombong	-5.20	119.50	2015		0.499	0.990	0.891	1.928	0.396	0.542	0.915	0.778	
Barombong	-5.20	119.50	2016		0.378	0.849	0.868	11.536	0.307	0.273	0.928	0.844	
Barombong	-5.20	119.50	2017		0.313	0.948	1.019	5.276	0.314	0.557	0.871	0.778	
Barombong	-5.20	119.50	2018		0.500	0.986	0.752	2.388	0.397	0.534	0.879	0.861	

R^2		Smoothness		Hit rate in contingency sheet	
daily	sum	daily	sum	dasarian	daily
>=0.4	>=0.7	OK (very smoot) <2.0		> 0.6667	
<0.4	<0.7	SM (mostly smooth) 2.0 - 5.0		<0.667	
negatif	negatif	NG (Not smooth) >5.0			

36

GSMAP	Lon	Lat	Year	R^2		Smoothness		Proportion		Hit rate in contingency sheet		Reliable
				daily	sum	daily	sum	daily	sum	dasarian	daily	
Stamet Paotere	-5.1137	119.4198	2008	0.282	0.981		3.831	0.496	0.801	0.830		
Stamet Paotere	-5.1137	119.4198	2009	0.069	0.968		4.426	0.390	0.824	0.972		
Stamet Paotere	-5.1137	119.4198	2010	-0.065	0.985		4.133	0.353	0.924	0.833		
Stamet Paotere	-5.1137	119.4198	2011	0.017	0.977		3.930	0.369	0.777	0.833		
Stamet Paotere	-5.1137	119.4198	2012	0.006	0.986		2.503	0.253	0.908	0.944		
Stamet Paotere	-5.1137	119.4198	2013	0.005	0.969		5.710	0.386	0.942	0.944		
Stamet Paotere	-5.1137	119.4198	2014	0.034	0.989		2.541	0.390	0.995	0.833		
Stamet Paotere	-5.1137	119.4198	2015	0.046	0.966		3.188	0.492	1.106	0.861		
Stamet Paotere	-5.1137	119.4198	2016	-0.153	0.987		2.471	0.168	0.926	0.944		
Stamet Paotere	-5.1137	119.4198	2017	-0.016	0.987		3.205	0.303	0.705	0.806		
Stamet Paotere	-5.1137	119.4198	2018	0.014	0.970		4.178	0.357	0.818	0.917		

R^2		Smoothness		Hit rate in contingency sheet	
daily	sum	daily	sum	dasarian	daily
>=0.4	>=0.7	OK (very smoot) <2.0		> 0.6667	
<0.4	<0.7	SM (mostly smooth) 2.0 - 5.0		<0.667	
negatif	negatif	NG (Not smooth) >5.0			

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GSMAP	Lon	Lat	Year	R^2		Smoothness		Proportion		Hit rate in contingency sheet		Reliable
				daily	sum	daily	sum	daily	sum	dasarian	daily	
Barombong	-5.2	119.5	2008	0.181	0.970		3.620	0.757	1.391	0.890		
Barombong	-5.2	119.5	2009	0.202	0.859		5.811	0.796	1.794	0.871		
Barombong	-5.2	119.5	2010	-0.142	0.948		9.420	0.636	1.651	0.611		
Barombong	-5.2	119.5	2011	0.365	0.959		5.176	0.793	1.208	0.806		
Barombong	-5.2	119.5	2012	0.137	0.949		6.188	0.626	1.190	0.833		
Barombong	-5.2	119.5	2013	0.396	0.865		9.666	0.794	1.357	0.794		
Barombong	-5.2	119.5	2014	0.167	0.940		6.556	0.955	1.885	0.722		
Barombong	-5.2	119.5	2015	0.187	0.965		3.921	1.635	1.803	0.778		
Barombong	-5.2	119.5	2016	-0.152	0.777		395.740	0.363	3.635	0.688		
Barombong	-5.2	119.5	2017	0.066	0.952		6.231	0.624	1.175	0.800		
Barombong	-5.2	119.5	2018	0.239	0.937		7.135	0.833	1.444	0.778		

R^2		Smoothness		Hit rate in contingency sheet	
daily	sum	daily	sum	dasarian	daily
>=0.4	>=0.7	OK (very smoot) <2.0		> 0.6667	
<0.4	<0.7	SM (mostly smooth) 2.0 - 5.0		<0.667	
negatif	negatif	NG (Not smooth) >5.0			

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Rain Post	Lat	Lon	Year	Distance (km)	R^2		Smoothness		Proportion		Hit rate in contingency sheet		Reliable
					daily	sum	daily	sum	daily	sum	dasarian	daily	
Stamet Masamba	-2.50	120.40											
Seppong	-3.30	120.40	2008	13	0.029	0.991	1.562	4.811	0.262	0.499	0.749	0.667	
Seppong	-3.30	120.40	2009		-0.035	0.977	2.837	6.849	0.152	0.371	0.830	0.548	
Seppong	-3.30	120.40	2010		-0.167	0.985	2.082	7.222	0.186	0.565	0.668	0.778	
Seppong	-3.30	120.40	2011		-0.061	0.968	1.192	41.495	0.216	0.511	0.808	0.611	
Seppong	-3.30	120.40	2012		-0.022	0.974	2.267	9.269	0.149	0.333	0.790	0.500	
Seppong	-3.30	120.40	2013		-0.063	0.895	2.622	22.319	0.154	0.400	0.780	0.486	
Seppong	-3.30	120.40	2014		-0.021	0.968	2.012	10.431	0.195	0.508	0.795	0.639	
Seppong	-3.30	120.40	2015		-0.012	0.963	2.134	8.308	0.177	0.487	0.852	0.611	
Seppong	-3.30	120.40	2016		-0.046	0.995	2.176	3.581	0.183	0.464	0.772	0.531	
Seppong	-3.30	120.40	2017		0.017	0.987	1.952	7.170	0.272	0.505	0.721	0.583	
Seppong	-3.30	120.40	2018		-0.081	0.966	2.475	9.919	0.164	0.428	0.811	0.500	

R^2		Smoothness		Hit rate in contingency sheet	
daily	sum	daily	sum	dasarian	daily
>=0.4	>=0.7	OK (very smoot) <2.0		> 0.6667	
<0.4	<0.7	SM (mostly smooth) 2.0 - 5.0		<0.667	
negatif	negatif	NG (Not smooth) >5.0			

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GSMAP	Lon	Lat	Year	R^2		Smoothness		Proportion		Hit rate in contingency sheet		Reliable
				daily	sum	daily	sum	daily	sum	dasarian	daily	
Stamet Masamba	-2.5	120.4	2008	-0.227	0.999		15.474	0.322	0.918	0.889		
Stamet Masamba	-2.5	120.4	2009	-0.145	0.993		931.296	0.317	1.048	0.806		
Stamet Masamba	-2.5	120.4	2010	-0.192	0.987		5.881	0.362	1.058	0.944		
Stamet Masamba	-2.5	120.4	2011	-0.159	0.997		2.136	0.285	0.937	0.806		
Stamet Masamba	-2.5	120.4	2012	-0.216	0.999		1.859	0.304	0.967	0.889		
Stamet Masamba	-2.5	120.4	2013	-0.260	1.000		1.102	0.261	0.980	0.944		
Stamet Masamba	-2.5	120.4	2014	-0.252	0.996		3.114	0.213	0.834	0.944		
Stamet Masamba	-2.5	120.4	2015	-0.107	0.998		1.993	0.367	1.046	0.889		
Stamet Masamba	-2.5	120.4	2016	-0.231	0.998		2.255	0.285	0.954	0.889		
Stamet Masamba	-2.5	120.4	2017	-0.289	0.993		1.491	0.324	1.029	0.944		
Stamet Masamba	-2.5	120.4	2018	-0.152	0.998		2.277	0.376	1.073	0.806		

R^2		Smoothness		Hit rate in contingency sheet	
daily	sum	daily	sum	dasarian	daily
>=0.4	>=0.7	OK (very smoot) <2.0		> 0.6667	
<0.4	<0.7	SM (mostly smooth) 2.0 - 5.0		<0.667	
negatif	negatif	NG (Not smooth) >5.0			

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GSMAP	Lon	Lat	Year	R^2		Smoothness		Proportion		Hit rate in contingency sheet		Reliable
				daily	sum	daily	sum	daily	sum	dasarian	daily	
Seppong	-3.3	120.4	2008	-0.393	0.991		15.474	0.295	1.513	0.694		
Seppong	-3.3	120.4	2009	-0.272	0.937		931.296	0.270	2.179	0.613		
Seppong	-3.3	120.4	2010	-0.428	0.936		5.881	0.277	1.473	0.694		
Seppong	-3.3	120.4	2011	-0.281	0.931		2.136	0.310	1.489	0.611		
Seppong	-3.3	120.4	2012	-0.290	0.941		1.859	0.382	2.222	0.444		
Seppong	-3.3	120.4	2013	-0.424	0.826		1.102	0.160	1.955	0.441		
Seppong	-3.3	120.4	2014	-0.196	0.944		3.114	0.413	1.930	0.694		
Seppong	-3.3	120.4	2015	-0.314	0.952		1.993	0.215	1.807	0.611		
Seppong	-3.3	120.4	2016	-0.346	0.995		2.255	0.349	1.721	0.625		
Seppong	-3.3	120.4	2017	-0.446	0.981		1.491	0.279	1.630	0.528		
Seppong	-3.3	120.4	2018	-0.339	0.855		2.277	0.385	2.011	0.528		

R^2		Smoothness		Hit rate in contingency sheet	
daily	sum	daily	sum	dasarian	daily
>=0.4	>=0.7	OK (very smoot) <2.0		> 0.6667	
<0.4	<0.7	SM (mostly smooth) 2.0 - 5.0		<0.667	
negatif	negatif	NG (Not smooth) >5.0			

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Project Of Capacity Development For The Implementation Of Agricultural Insurance In The Republic Of Indonesia

-ENHANCING ABILITIES FOR METEOROLOGICAL/CLIMATOLOGICAL DATA USAGE-

KEY ACTIVITY – 2

Develop Weather Information And Strengthen Abilities For Producing Products For Agriculture

Novi Fitrianti & Rosi Hanif Damayanti

Sub Division For Climate Analysis and Information

Center for Climate Change Information

Indonesian Agency for Meteorology, Climatology, and Geophysics - BMKG

Presented at BMKG

19 Dec 2019

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OUTLINE

01 Previous Activity

Evaluation and Verification on Seasonal Onset Forecast

02 Training Activity in Japan

Study Visit in JMA, JMBSC, Sompo Holding Group Insurance, MRI, NIAES, JAXA and NARO

03 Impression

Impression during Training and Living in Japan

04 After-Course Activity

Advanced analysis for Seasonal Onset Evaluation and Verification on JMA Forecast

2

PREVIOUS ACTIVITY

EVALUATION AND VERIFICATION ON SEASONAL ONSET FORECAST

EVALUATION AND VERIFICATION ON ENSO PREDICTION (BMKG-SSA)

Jakarta,

June 16th – July 16th ,2019

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1 EVALUATION AND VERIFICATION ON SEASONAL ONSET FORECAST

- ❑Using Contingency Table 3 X 3
- ❑Categories : Earlier than Normal, Near Normal, Later than Normal
  - ❑Near Normal Onset (+/- 1 Decade compared to Normal)
  - ❑Early or Late Onset than Normal (earlier / later 2 decades or more)
  - ❑Undefined Onset Observed : not counted / blank
- ❑Onset Forecast compared to Normal (E, NN, L) vs Onset Observed compared to Normal (E, NN, L)
- ❑Score
  - ❑ Observed and forecast onset has same category : 1
  - ❑ Different category between observed and forecast : 0

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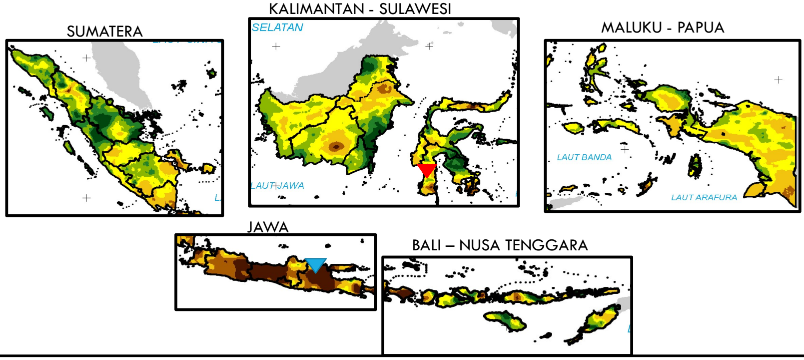
EVALUATION AND VERIFICATION ON SEASONAL ONSET FORECAST



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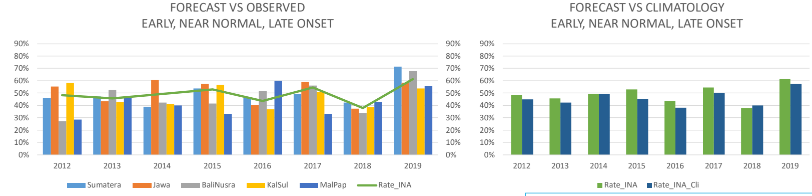
EVALUATION AND VERIFICATION ON SEASONAL ONSET FORECAST

HIT RATE – DRY SEASON



Skill	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Skill_INA	0.07	0.08	0.00	0.17	0.15	0.09	-0.05	0.95
Sumatera	0.32	-0.04	0.05	0.32	0.00	0.09	0.10	0.36
Jawa	0.03	-0.11	0.03	0.06	0.72	0.12	-0.15	0.00
BaliNusra	-0.45	0.29	-0.07	0.29	-0.19	0.00	0.11	0.03
KalSul	0.64	0.69	-0.13	0.30	0.05	0.15	-0.04	0.16
MalPap	1.00	0.40	0.50	0.25	0.13	-0.20	0.00	0.00

- Hit Rate for Dry Season's Onset forecast in Indonesia is about ~ 40-60%, as for hit rate in each major island is more diversed.
- Overall, Dry Season's Onset forecast during 2012-2018 is better than climatological forecast, except 2018.

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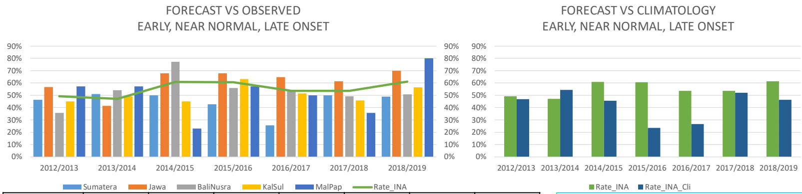
EVALUATION AND VERIFICATION ON SEASONAL ONSET FORECAST

HIT RATE - WET SEASON



Skill	**2012/2013**	**2013/2014**	**2014/2015**	**2015/2016**	**2016/2017**	**2017/2018**	**2018/2019**
Skill_INA	**0.05**	**-0.13**	**0.34**	**1.58**	**1.02**	**0.03**	**1.03**
Sumatera	0.00	0.08	0.13	1.09	0.30	0.09	0.00
Jawa	0.02	-0.27	0.40	1.62	5.13	0.06	0.46
BaliNusra	0.00	-0.14	0.22	0.94	0.03	-0.15	0.20
KalSul	0.12	-0.03	0.93	3.22	0.33	0.12	0.40
MalPap	0.60	0.60	-0.40	1.67	0.00	0.00	0.33

- Hit Rate for Wet Season's Onset forecast in Indonesia is about ~ 50 -60%, as for hit rate in each major island is more diversed.
- Overall, Wet Season's Onset forecast during 2012-2018 is better than climatological forecast, except 2013/2014.

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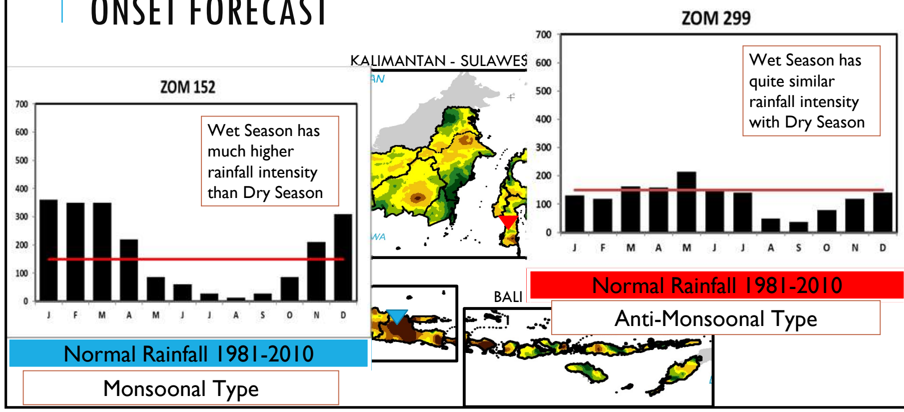
EVALUATION AND VERIFICATION ON SEASONAL ONSET FORECAST



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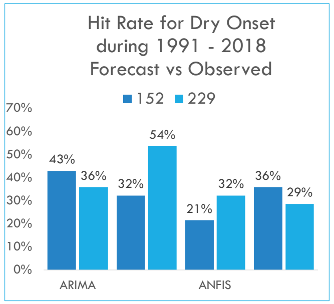
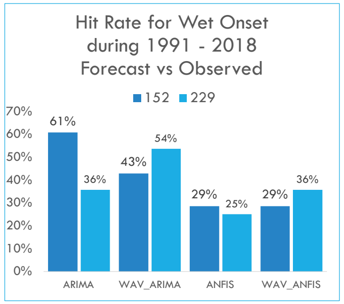
EVALUATION AND VERIFICATION ON SEASONAL ONSET FORECAST





- Season's Onset forecast in Zone 152 and 299 using ARIMA and WAV_ARIMA has higher hit rate than ANFIS and WAV_ANFIS.
- ARIMA has best hit rate in Zone 152 (East Java)
- WAV_ARIMA has best hit rate in Zone 299 (South Sulawesi).

- Observed Season's onset for 2 zones during 1981 – 2018
- Re-forecast onset for 2 zones during 1991 – 2018 using 4 statistical method

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TRAINING ACTIVITY IN JAPAN

Study Visit In:

JMA, JMBSC, SOMPO HOLDING GROUP INSURANCE, JAMSTEC, MRI, NIAES, JAXA, NARO

Japan,
July 29th – August 16th, 2019

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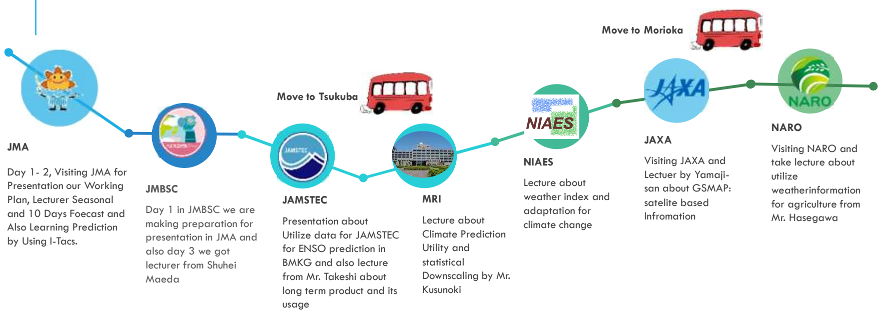
2 TRAINING ACTIVITY IN JAPAN



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LECTURES THAT CAN BE APPLIED IN OPERATIONAL WORK

In JMA we learning about how dynamical atmospheric circulation can really affect to our seasonal/monthly variability and also we can use I-Tacs as a tools to make the analyse for atmospheric condition. And also we asking them to provide us reforecast data and observed data for ENSO prediction to compared it with our ENSO prediction with SSA

In JAMSTEC we inform them about how we utilize their ENSO prediction as a based for making analogy prediction and also we got to know how well the ENSO prediction by JMA from Mr. Takeshi

In JAXA, we learned how to utilize the GSMAP data and how to get the data and also we know how well the GSMAP data, this kind of infomation really benefit for our sub-division since we are making rainfall analysis by using GSMAP daily data

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PHOTOS OF ACTIVITY

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IMPRESSION

IMPRESSION DURING TRAINING AND LIVING IN JAPAN

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3 IMPRESSION

Visits During Training

JMA	JAMSTEC	MRI	JAXA	NARO
We Got chance to visit observer and forecaster room and also got the chance to meet Mr. Obayashi as a Director-General Global Enviroment and Marine Department	we can visit their HPC and we learn how they utilize all the technology to improve their Model and Forecast	We visit their super computer and learn the maintenance	We visit their Space Museum in Jaxa	We visit the Gradiotron, the simulation for research in agriculture

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DURING STAYING IN JAPAN

Japan can improve advanced technology while maintain its nature and culture:
- Faith
- Culinary
- Fashion
- Historical site

etc

We can see it clearly that those aspects can synchronized in real life.

Japanese people have high sense in responsibility and punctuality for their work.

As foreigner and moslem, We feel grateful to Japanese people for having high respesct and tolerance to us.

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AFTER COURSE PLAN

VERIFICATION ON JMA FORECAST
ADVANCED ANALYSIS ON EVALUATION OF SEASONAL ONSET FORECAST

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4 VERIFICATION OF JAM FORECAST
CONTIGENCY TABLE

- BMKG produces monthly deterministic rainfall forecast (mm) which is divided into:
  - 9 categories **Quantitative** (0-20, 21-50, 51-100, 101-150, 151-200, 201-300, 301-400, >500)

CAT	CURAH HUJAN (mm) :	
1	0 - 20	RENDAH
2	20 - 50	
3	50 - 100	
4	100 - 150	MENENGAH
5	150 - 200	
6	200 - 300	
7	300 - 400	TINGGI
8	400 - 500	
9	> 500	SANGAT TINGGI

ij		Observasi				Jml
		1	2	...j...	K	
Prakiraan	1	P_{11}	P_{12}	P_{1j}	P_{1k}	ΣP_{ij}
	2	P_{21}	P_{22}	P_{2j}	P_{2k}	ΣP_{ij}
	...i...	P_{i1}	P_{i2}	P_{ij}	P_{ik}	ΣP_{ij}
	K	P_{k1}	P_{k2}	P_{kj}	P_{kk}	ΣP_{ij}
Jml		ΣP_{ij}	ΣP_{ij}	ΣP_{ij}	ΣP_{ij}	1

Match= $(\sum P_{ii} + \sum P_{i,i+1} + \sum P_{i+1,i}) \times 100\%$
Not Match = 100 % - Match

- Match : if observation rainfall categories has difference maximum 1 category with the forecast (difference value -1, +1, 0 defined as Match).

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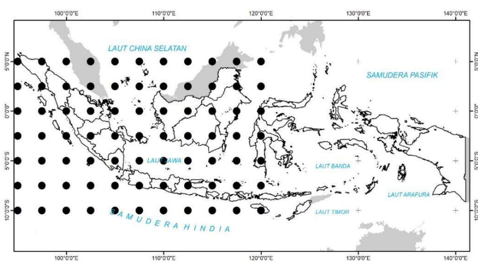
VERIFICATION OF JMA FORECAST
CONTIGENCY TABLE



Grid Plot of 1 Month Forecast JMA

- Forecast
  - Rainfall Daily
  - Resolution: 2.5°
  - Issued twice a week
  - IC during 2018
  - IC for verification : end of the month for 1 lead time (1 month)
  - Forecast up to 1 month ahead
  - Not available for target month : June, July, August 2018

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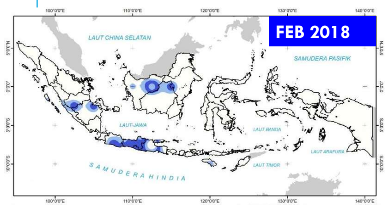
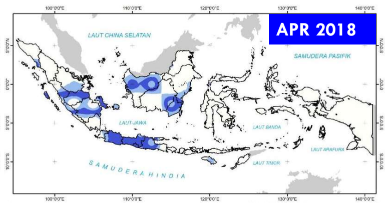
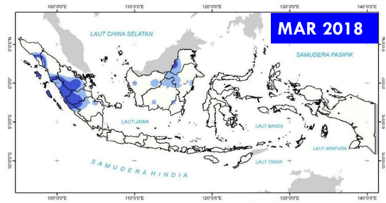
VERIFICATION OF JMA FORECAST
CONTIGENCY TABLE







+/- 1 Match
Match
Not Match

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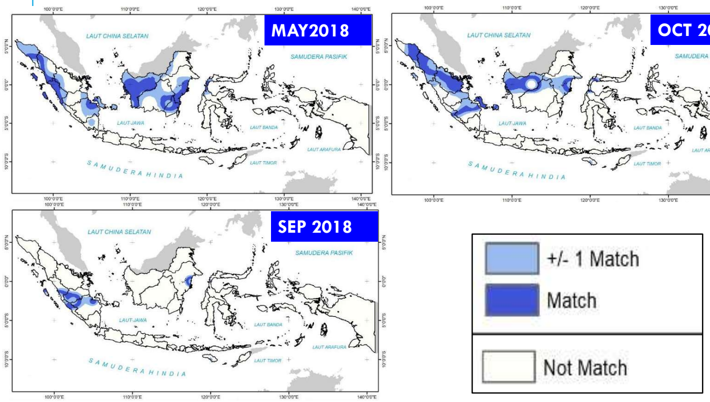
VERIFICATION OF JMA FORECAST
CONTIGENCY TABLE



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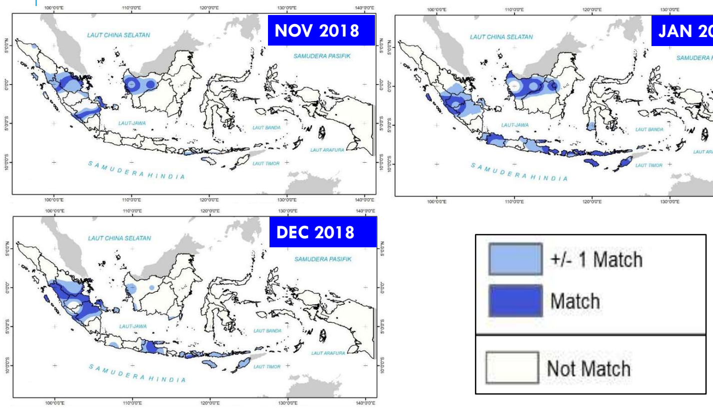
VERIFICATION OF JMA FORECAST
CONTIGENCY TABLE



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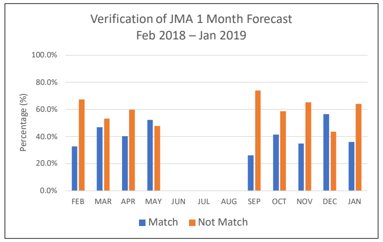
VERIFICATION OF JMA FORECAST
CONCLUSION

VERIF	COUNT SCORE											
	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Match	30	43	37	48				24	38	32	52	33
Not Match	62	49	55	44				68	54	60	40	59
Total	92	92	92	92				92	92	92	92	92

VERIF	PERCENTAGE											
	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Match	32.6%	46.7%	40.2%	52.2%				26.1%	41.3%	34.8%	56.5%	35.9%
Not Match	67.4%	53.3%	59.8%	47.8%				73.9%	58.7%	65.2%	43.5%	64.1%
Total	100%	100%	100%	100%				100%	100%	100%	100%	100%



- Overall, JMA 1 month forecast in western part Indonesia has less than 60% match forecast.
- Highest % of match forecast : December 2018
- Lowest % of match forecast : September 2018
- During forecast for Feb 2018 until Jan 2019, generally match forecast occur in middle part of Sumatra and west part of Kalimantan while other regions only for particular months.

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ADVANCED ANALYSIS ON EVALUATION OF SEASONAL ONSET FORECAST

Advanced analysis is carried out for seasonal forecast which has low skill (worse than climatological forecast)

Dry Season Onset : 2018

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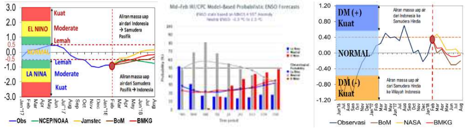
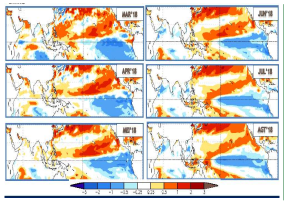
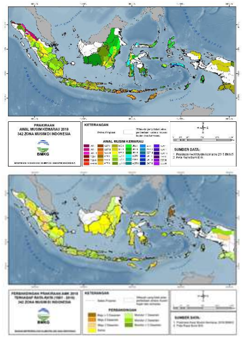
FORECAST
DRY SEASON ONSET 2018



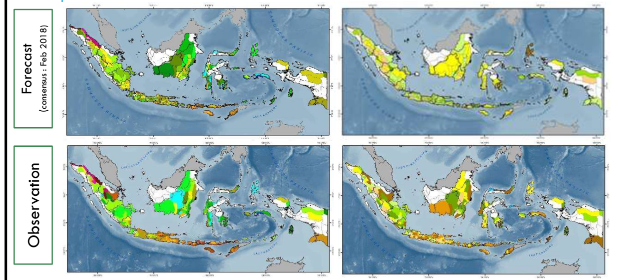


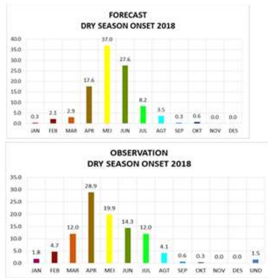
Forecast
- ENSO : Weak La Nina to Neutral (likely to be Neutral during MAM – JJA 2018)
- IOD : Neutral
- ASST Ina is normal during Mar-May 2018 then warming in Jun
- ASST Nino 3.4 is negative until Aug 2018
- ASST Indian is warm in Mar then is likely to be Normal during Apr – Aug 2018



Forecast
- Generally, dry onset was predicted to occur during Apr-Jun 2018 forecast: ~80% ZOMs
- Dry Onset was mostly predicted to occur in May 2018
- Dry Onset 2018 is predicted to be mostly later than Normal or near normal.

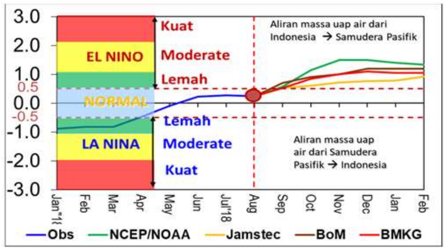
FORECAST VS OBSERVATION
DRY SEASON ONSET 2018

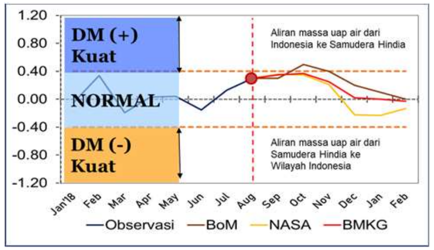




- Forecast of Dry Season Onset 2018 over Indonesia is a little worse than its climatological forecast (skill : -0.05).
- Generally, dry onset was predicted to occur during Apr-Jun 2018 (similar with observation) but different in percentage (forecast: ~80% ZOMs, observed: ~60% ZOMs)
- Dry Onset was mostly predicted to occur in May 2018, but observation show that it mostly occurred in Apr 2018 (1 month earlier).
- Dry Onset 2018 was predicted to be mostly later than Normal or near normal but in observation mostly earlier than Normal

OBSERVATION
ENSO & IOD

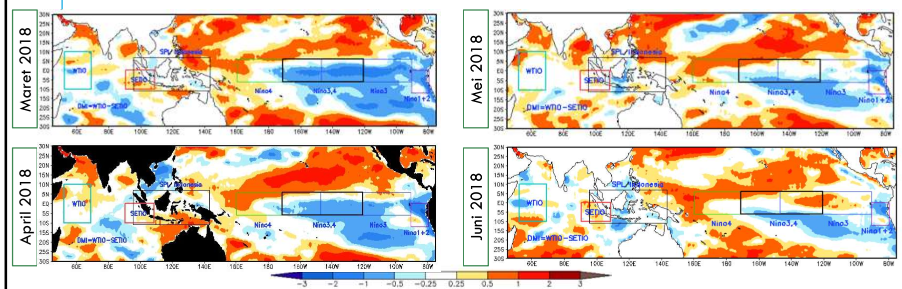




ENSO
- Mar 2018 : Weak La Nina
- Apr – Aug 2018 : Neutral/Normal

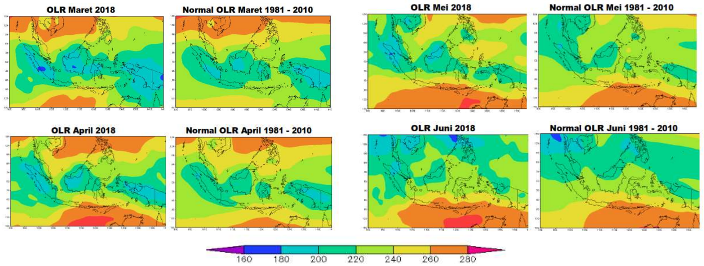
IOD
- Mar – Aug 2018 : Normal

OBSERVATION
SEA SURFACE TEMPERATURE



- Overall, SST forecast and observation in Indian Ocean and Nino 3.4 is pretty much alike
- But observed SST in Indonesia is cooler than its forecast except SST in west of Sumatra and north of Papua that is warmer than the forecast.

OBSERVATION
OUTGOING LONGWAVE RADIATION



- Mar 2018: East Java , Bali, NTB, partly NTT had less clouds formation than its climatology
- Apr - Jun 2018: area with less clouds formation than its climatology become larger (Java, Bali, Nusa Tenggara)
- Java, Bali, Nusa Tenggara had less clouds than its climatology during Mar – Jun 2018 while northern Indonesia had more clouds formation than its climatology

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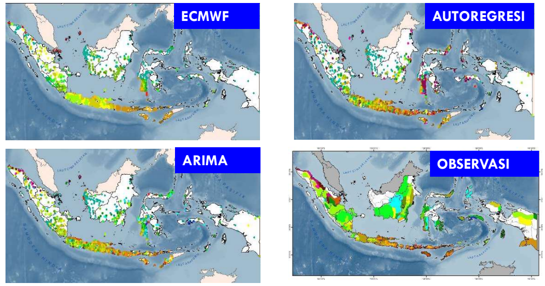
FORECAST
DYNAMIC AND STATISTICAL MODELS



- ECMWF and ARIMA predicted dry season onset 2018 mostly occur in May 2018 (similar with consensus)
- Autoregressive predicted dry season onset 2018 mostly occur in Apr 2018 (a slight higher than May 2018)
- CFSv2 and ECMWFcorr predicted dry season onset 2018 mostly occur in Jun 2018

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DRY SEASON ONSET 2018
CONCLUSION

Forecast	Observation
• ENSO : Weak La Nina to Neutral • IOD : Neutral • ASST Ina is normal during Mar-May 2018 then warming in Jun • ASST Nino 3.4 is negative until Aug 2018 • ASST Indian is warm in Mar then is likely to be Normal during Apr – Aug 2018	• ENSO : Weak La Nina to Neutral • IOD : Neutral • Overall, SST forecast and observation in Indian Ocean and Nino 3.4 is pretty much alike but observed SST in Indonesia is cooler than its forecast except SST in west of Sumatra and north of Papua that is warmer than the forecast. • Java, Bali, Nusa Tenggara had less clouds than its climatology during Mar – Jun 2018 while northern Indonesia had more clouds formation than its climatology
•Generally, dry onset was predicted to occur during Apr-Jun 2018 forecast: ~80% ZOMs •Dry Onset was mostly predicted to occur in May 2018 •Dry Onset 2018 is predicted to be mostly later than Normal or near normal.	•Generally, dry onset occured during Apr-Jun 2018 : ~60% ZOMs •Dry Onset mostly occurred in Apr 2018 (1 month earlier than forecast). •Dry Onset 2018 was mostly earlier than Normal

•Model Forecast cannot capture cooling SST over Indonesia and warming SST in west Sumatra
•Among individual models, Autoregressive is individual model that is the most similar to observed Dry Onset 2018 over Java, Bali, Nusa Tenggara.

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DRY SEASON ONSET 2018
CONCLUSION

•Model Forecast cannot capture cooling SST over Indonesia and warming SST in west Sumatra
•Among individual models, Autoregressive is individual model that is the most similar to observed Dry Onset 2018 over Java, Bali, Nusa Tenggara.

Still need to analysis other parameters like wind, monsoon, etc
Difficult to evaluate where to improve because model forecast cannot capture the cooling SST in Indonesia
We expect your advice for this study case.

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S2S (SUB SEASONAL TO SEASONAL) PREDICTION FOR EXTREME EVENT IN JAKARTA

- Extreme events such high rainfall cause flood in Jakarta.
- We need to provide early warning information to avoid damage and loss. One of the ways, we need to enhance capability of S2S prediction for climate early warning.
- So, for this study case we would like to identify ECMWF S2S Prediction for LT 1-3 dasarian (ten-daily/dekad)

- Loss of Flood Jakarta 2007
  - 4.3 trillion rupiah.
  - The displaced population reached 320,000 by 7 February 2007.

BIG FLOOD IN JAKARTA

1996 → 2002 → 2007 → 2013

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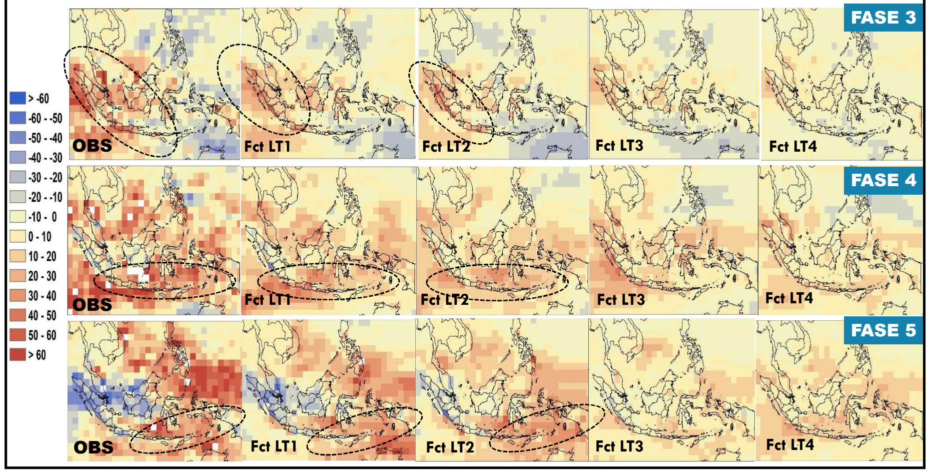
HASIL DAN PEMBAHASAN

S2S ANALISIS KOMPOSIT MJO EVENT (OBS VS MODEL)



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Terima Kasih
Arigatou Gozaimasu

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