トルコ共和国
地質リモートセンシングプロジェクト
運営指導（中間評価）報告書

平成16年8月
（2004年）

独立行政法人　国際協力機構
経済開発部

序　　文

トルコ共和国は様々な鉱物資源を胚胎する地質環境を有しており、トルコ鉱物資源調査・探査総局（MTA）が中心となって露頭鉱床の探査・開発が行われていますが、今後は広域的な地形・地質情報に基づいた潜頭鉱床の探査が必要とされています。

このような状況に対して、MTAでは資源探査に関する地形・地質情報の入手のために、1975年に設立したリモートセンシング部門でアナログ画像判読を開始し、その後も設備増強により同部門の強化に努めてきましたが、現有する技術や設備は潜頭鉱床探査のためのより広域的な画像解析やデータ処理を行うには十分とはいえず、中・長期的な資源確保の基礎となる探査活動の実行が懸念されています。

また、MTAでは自然災害や鉱業分野における環境保全に関する基礎研究として、活断層調査や地形変化モニタリングにもリモートセンシング技術を利用しており、これらの分野における解析技術の高度化も課題となっています。

かかる背景のもと、トルコ共和国政府は、先進的なリモートセンシング技術及びそれに必要な設備を導入することにより、より効率的に地質・地形情報などの調査を行うことを目的とするプロジェクト方式技術協力を我が国に対し要請してきました。

これに対して我が国は、基礎調査及び三度の短期調査を行い、情報収集した結果、前述のようなトルコ共和国の課題への取り組みに対する支援の必要性が認められたため、MTAリモートセンシングセンターの鉱物資源探査技術及び環境・ハザード地域解析技術の向上を目的とした本プロジェクト「地質リモートセンシング」を、2002年８月から４年間の予定で実施する旨をR／Dに取りまとめ、JICAトルコ事務所及びトルコ共和国側とで合意、署名・交換しました。

本報告書は、協力期間の中間時点を迎えた本プロジェクトの活動実績、カウンターパートへの技術移転の進捗状況や達成度に関して、Project Cycle Management（PCM）手法に基づいた評価５項目（妥当性、有効性、効率性、インパクト、自立発展性）の観点から日本・トルコ共和国側双方で中間評価を行い、プロジェクト後半の活動について協議した結果を取りまとめたものです。

本報告書が今後のプロジェクトの展開や類似案件の実施に広く活用されることを願うとともに、本調査団の派遣に対してご協力頂いた外務省、経済産業省など内外関係機関の方々に深甚の謝意を表します。

平成16年８月

独立行政法人国際協力機構

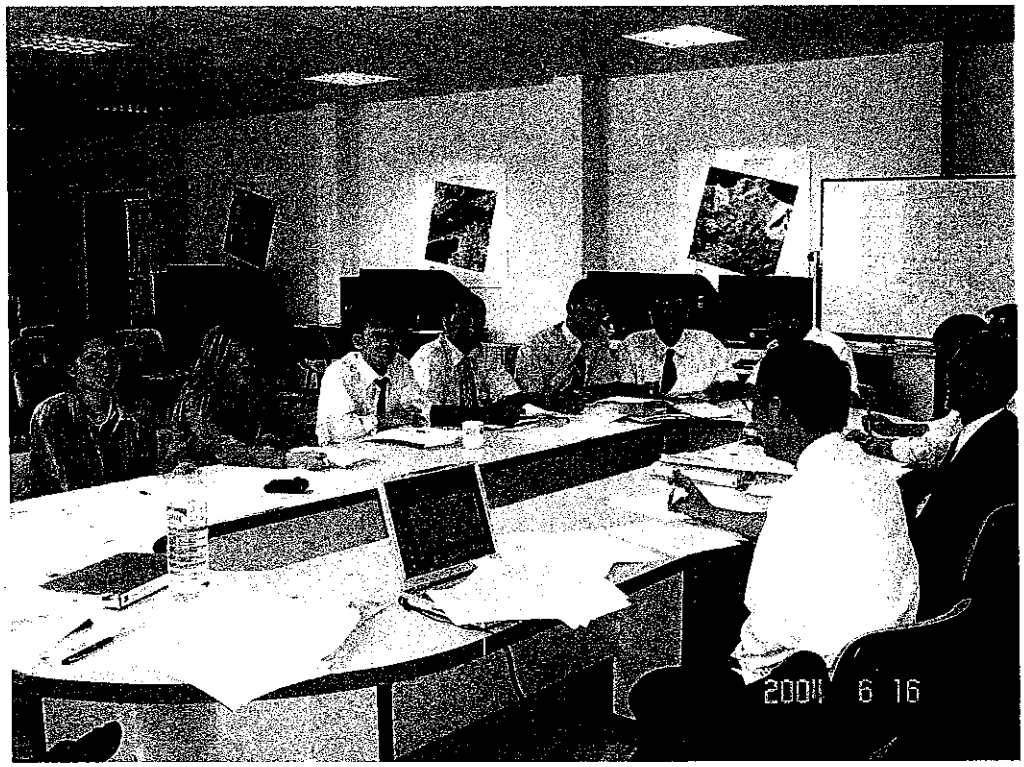
理事　伊沢　正

目　　次

略語表

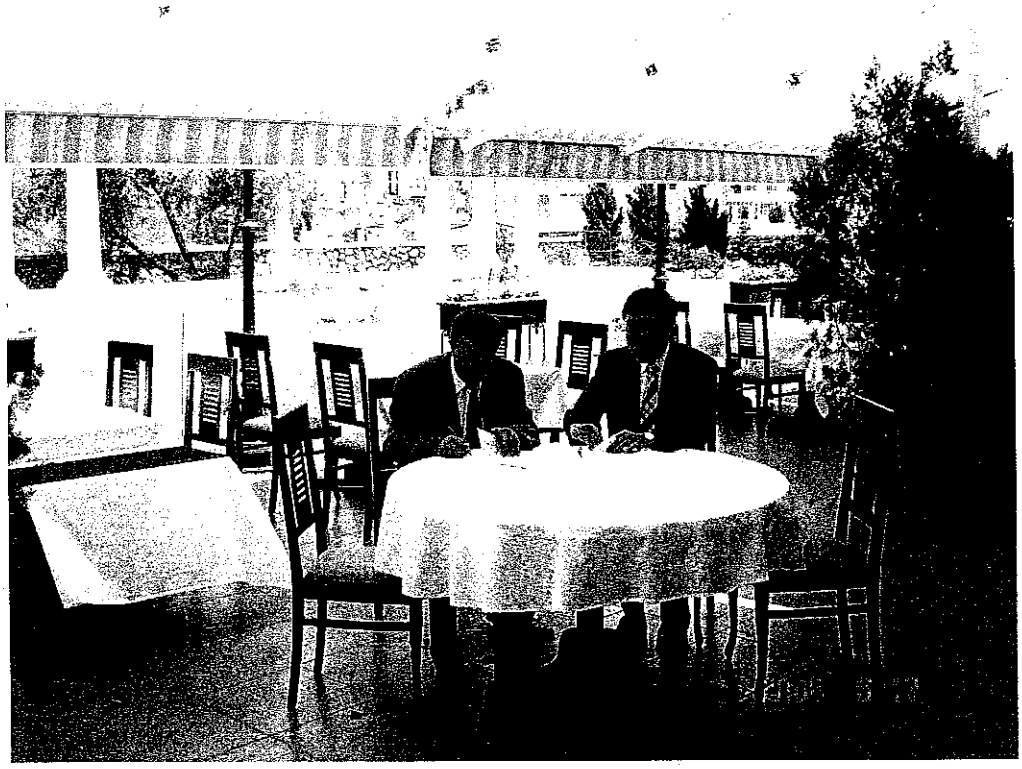
ASTER	Advanced Spaceborne Thermal Emission and Reflection Radiometer	アメリカ航空宇宙局（NASA）と経済産業省との共同プロジェクトにより開発された資源探査用の光学センサ。 高空間分解能、可視～熱赤外域の幅広い波長幅を持つバンド構成、同一軌道による立体視機能等、従来のセンサと比較し、優れた特徴を有している。放射計部分は、可視近赤外（VNIR）、短波長赤外（SWIR）、熱赤外（TIR）のサブシステムより構成されている。
DEM	Digtal Elevation Model	デジタル標高モデル 標高を三次元座標でデジタル表現するモデルをいう。最小単位をピクセル（小さな正方体）とし、そのピクセルごとに地表面の標高値が入力されている。
MTA	General Directorate of Mineral Research and Exploration	トルコ鉱物資源調査・探査総局
MTA/RSC	MTA/Remote Sensing Center	トルコ鉱物資源調査・探査総局リモートセンシングセンター
PALSAR	Phased Array type L-band Synthetic Aperture Radar	フェーズドアレイ方式Lバンド合成開口レーダ 地球資源衛星１号（JERS-１）のSARの後継機。マルチ偏波（マルチポラリメトリー）モードなど、より高度化された観測技術によって、資源探査をはじめ、地球環境状況の把握、災害状況の把握等において、大きな貢献をすることが期待されている。
SAR	Synthetic Aperture Radar	合成開口レーダ 地球観測用の高分解能の映像レーダ。航空機や衛星に搭載され、地表の起伏や構造物等をイメージ化するために利用される。マイクロ波は雲などを通過するので，航空写真と違って天候に左右されることなく観測ができ，資源探査その他の分野で利用されている。また、光学センサと違い、マイクロ波を自ら送信するという能動的センサであるために、目的に最適なパラメーター（波長など）を選択することができる。
SWIR	Short Wave Infrared Radiometer	短波長赤外放射計 地表からの太陽反射光を検出する高分解能、多バンドの光学センサ。SWIRは、空間分解能30mのJERS-１/OPSの短波長赤外放射計（SWIR）を継承するセンサであり、岩石、鉱物、植物等のより精密なデータの取得を目的とする。
TIR	Thermal Infrared Radiometer	熱赤外放射計 地球からの熱赤外線放射を５バンドで高精度に観測するための熱赤外放射計であり、熱放射特性を利用して鉱物資源の判別や大気、地表面、海面状態の観測を主な目的としている。
VNIR	Visible and Near-infrared Radiometer	可視近赤外放射計 可視バンドから近赤外バンドまでの地表の太陽反射光を検出してマルチスペクトラム画像を作成する高性能、高分解能の光学センサ。資源探査、国土調査、植生、環境保護、災害防止等を主な目的としている。

トルコ鉱物資源調査・探査総局（MTA）総裁表敬



協議風景

合同評価委員会



ミニッツ署名

第１章　中間評価の概要

１－１　中間評価

本プロジェクトは協力期間が３年を超え、かつ、５億円以上の投入を伴う案件であるため、討議議事録（R／D）に記載のとおり、協力期間の中間時点でプロジェクトの実績と実施プロセスを把握し、妥当性、効率性など評価５項目の視点から評価のうえ、必要に応じて当初計画（プロジェクト・デザイン・マトリックス：PDM）の見直しや運営体制強化を図ることを目的として、JICA本部から調査団を派遣した。

１－２　合同評価会の構成

(1) 日本側

1) 調査団

升本　潔	団長／総括	JICA　経済開発部　第二グループ　資源・省エネルギーチーム
牛木　久雄	技術協力アドバイザー	JICA　国際協力専門員
栗原　健一	リモートセンシング技術	財団法人国際鉱物資源開発協力協会　調査部　調査員
佐々木　謙	運営管理	JICA　経済開発部　第二グループ　資源・省エネルギーチーム

2) プロジェクト専門家

藤田　実	チーフアドバイザー
吉田　恭	業務調整員
伊達　二郎	地質リモートセンシング
磯貝　浩一	デジタル画像処理

3) 評価会参加者

門間　俊幸	在トルコ日本大使館　二等書記官
稲葉　秦	JICA　トルコ事務所　所長
齋藤　ゆかり	JICA　トルコ事務所
Mr. Ali BEKIN	JICA　トルコ事務所

(2) トルコ側

1) Ministry of Energy and Natural Resources (MENR)

Mr. Gurkan TUNAY	Deputy Director General of MTA
Dr. Erol TIMUR	Head of Geological Research Department of MTA
Ms. Mesude AYDAN	International Projects and Foreign Affairs of MTA (Adviser)
Ms. Huma Zulal DIKMENLI	Coordinator, International Projects and Foreign Affairs of MTA
Ms. Songul GURCAY	International Projects and Foreign Affairs of MTA
Mr. Engin SUMER	Full-time counterpart (Project Coordinator)

Mr. Onder KAYADIBI	Full-time counterpart
Ms. Burcu PEKESIN	Full-time counterpart
Mr. Murat KORUYUCU	Full-time counterpart
Mr. Bora GURCAY	Full-time counterpart
Ms. Canan OZGUNER	Full-time counterpart
Mr. Taner SAN	Full-time counterpart
Mr. Kerem AVCI	Full-time counterpart

１－３　調査日程

団長他２名　　：2004年６月12日（土）～６月20日（日）
技術協力アドバイザー：2004年６月10日（木）～６月20日（日）
評価コンサルタント　：2004年５月９日（日）～５月21日（金）

		工　程		
		団長（リーダー） リモートセンシング （R／S）技術団員 協力企画団員	技術協力アドバイザー	評価コンサルタント
５月 ９（日）				東京→アンカラ
10（火）	AM			JICAトルコ事務所との打合せ
	PM			評価調査（第三国研修参加）
11（火）				同　上
12（水）				同　上
13（木）				同　上
14（金）				同　上
15（土）				資料整理
16（日）				資料整理
17（月）				トルコ側ヒアリング
18（火）				トルコ側ヒアリング
				JICAトルコ事務所報告
19（水）				資料整理
20（木）				アンカラ→東京
21（金）				
６月 ３（木）		勉強会		勉強会
10（木）		対処方針会議	カブール → アンカラ	対処方針会議
11（金）			JICAトルコ事務所打合せ	
12（土）		東京 → アンカラ	資料整理	
13（日）	AM			
	PM	団内打合せ（対処方針確認）		

14（月）	AM	JICAトルコ事務所打合せ MTA総裁表敬
	PM	MTAとの協議
15（火）	AM	MTAとの協議
	PM	
16（水）	AM	MTAとの協議
	PM	
17（木）	AM	合同評価会 M／M署名
	PM	M／M署名 在トルコ日本大使館報告
18（金）	AM	JICAトルコ事務所報告
	PM	アンカラ
19（土）	/	→ 東京
20（日）	/	

１－４　評価手法

トルコ共和国（以下、「トルコ」と記す）地質リモートセンシングプロジェクトの中間評価調査にあたり、プロジェクト・サイクル・マネジメント（PCM）手法を利用してOECF開発委員会（DAC）による評価５項目の観点から分析する。評価にあたっては、現状を把握分析して、今後のプロジェクト実施に資する教訓を得ることを目的とする。また、原則として、日本・トルコ共同による評価を行う（R／Dに基づく）。

以下、簡略に評価方法その他について説明する。

１－４－１　評価手順

(1) 評価の流れ

本運営指導調査は、PCM手法を用いて実施する。調査団は、中間評価に先立ち日本側とトルコ側の合意のもと、評価のためのプロジェクト・デザイン・マトリクス（PDMe）を作成する。評価に先立ち、調査団は評価方針を簡潔に表す評価グリッドを作成し、これに基づき関連する情報を収集する。

本プロジェクトには、基礎的な情報として、R／D、年間実施計画書（PO）実施期間中に作成された議事録、報告書、アンケート等がある。さらにヒアリング対象として、カウンターパート（C／P）、所属先関係者、日本人専門家等を選び、プロジェクトの成果を評価することができる。また、質問票を用いたアンケート調査を実施し、多面的な評価ができるように努める。さらに、調査団による業務その他の観察結果なども参考とし、収集された情報をもとに「計画の達成度」を把握する。計画達成度は、PDMeにおける指標やPOを用いて、実際の達成状況を①投入実績、②活動の実施状況、③成果の達成状況、④プロジェクト目標や上位目標の観点から把握することとする。

さらに、DACの「評価５項目」の観点から客観的・多面的評価を行う。

(2) 評価５項目による評価

本調査において用いられる「評価５項目」とは、①効率性、②有効性、③効果、④妥当性、⑤自立発展性の５項目で、各項目は次のように定義され、そのPDMに示された各要素との関係は、表１－１のように表される。

1) 効率性

プロジェクトの「投入」から生み出される「成果」の程度を把握する。各投入の質、量、タイミングの適切さを検討する（派遣専門家、C／P配置、機材の供与、研修員受入れ、ローカルコスト、現地活動費）。

2) 有効性

プロジェクトの「成果」の達成度合い、及びそれが「プロジェクト目標」の達成度にどの程度結びついたかを検討する。

3) 効果

プロジェクトが実施されたことにより直接的、間接的な正・負の影響を検討する。当初計画に予想されていない影響を含む。上位目標は「期待される正の効果」として、効果の一つと捉える。

4) 妥当性

評価時においても、プロジェクト目標、上位目標が有効であるかどうかを検討する（トルコ側の開発政策、受益者ニーズ・実施機関ニーズとの整合性、計画設定の妥当性、援助国の支援政策との整合性など）。

5) 自立発展性

自立発展に必要な、要素を見極めつつ、プロジェクト終了後の自立発展の見通しを検討する（実施機関の運営管理、財務、技術、社会経済的側面など）。

表１－１　DAC５項目を利用した評価

<table>
<tr><th></th><th>効率性
(Efficiency)</th><th>有効性
(Effectiveness)</th><th>効果
(Impact)</th><th>妥当性
(Relevance)</th><th>自立発展性
(Sustainability)</th></tr>
<tr><td>上位目標
(Overall Goal)</td><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2">プロジェクトを実施した結果、どのように正負の影響が直接的・間接的に現れたか</td><td rowspan="3">プロジェクトの目標と上位目標は、評価時においても有効であるか</td><td rowspan="4">協力終了後もプロジェクト実施による便益が持続されるかどうか。プロジェクトはどの程度自立しているか</td></tr>
<tr><td>プロジェクト
目標（Purpose）</td></tr>
<tr><td>成果（Output）</td><td rowspan="2">「投入」がどれだけ効果的に「成果」に転換されたか</td><td rowspan="2">「プロジェクト目標」がどれだけ達成されたか</td><td></td></tr>
<tr><td>投入（Input）</td><td></td><td></td><td></td></tr>
</table>

１－４－２　技術移転モデル

本プロジェクトの技術移転の道のりを技術移転モデルとして簡略に示すと、表１－２のようになる。

表１－２　本プロジェクトの技術移転の道のり（概念図）

技移転フェーズ		Ⅰ	Ⅱ	Ⅲ	Ⅲ'	Ⅴ
主要な技術移転の概要		機材の提供及び習熟訓練	C／Pが先進的なR／S技術・データを活用できるようになる	信頼度の高い解析データの提供	R／Sに関連する研修・情報提供等の実施	R／S解析データが様々な政策判断に応用される
期待される成果		供与機材の運用・管理の習熟	鉱物探査のための画像処理の実施 鉱物資源探査のケーススタディの蓄積 GISによる空間解析の実施 災害分析のための信頼性の高いデータの提供 環境分析のための信頼性の高いデータの提供 MTA/RSCが必要に応じた技術的助言を行う	信頼度の高い解析データが（産業界等において）活用される データを必要とするクライアントが特定される 使用目的にあった解析データがタイムリーに提供できる	R／S技術の中央機関としての役割の明確化 周辺各国におけるR／S技術移転の実施機関となる	有望鉱床における鉱物資源生産が新たに開始される 解析データが自然災害の防止に役立てられる
技術移転の道筋	技術の送り手	派遣専門家	派遣専門家	C／P機関（MTA/RSC）の職員	C／P機関（MTA/RSC）の職員	
	技術の受け手	C／P機関（MTA/RSC）の職員	C／P機関（MTA/RSC）の職員	MTAの各部門・トルコ政府のR／S利用各種機関、民間の情報ユーザー	MTAの各部門・トルコ政府のR／S利用各種機関、周辺各国のR／S利用機関等、民間の情報ユーザー	
カークパトリックのモデルの適用（評価の対象）		１から３段階（C／P機関職員対象）	１から３段階（C／P機関職員対象）	３段階(C／P機関職員対象) １段階（ユーザー、クライアント対象）	１から３段階（研修受講者等対象）	
評価の視点（何を計測するか）		・目標との合致 ・学習意欲 レディネス（受講時のレベル） ・投入機材の妥当性・満足度 ・指導法への満足度 ・理解度（学習） ・技能・技術の熟練度	・目標との合致 ・学習意欲 レディネス（受講時のレベル） ・投入機材の妥当性・満足度 ・指導法への満足度 ・理解度（学習） ・技能・技術の熟練度	・利用目的との合致 ・（受講時のレベル） ・データ提供のタイミング ・正確さ(updated) ・顧客への技術的支援能力	・目標との合致 ・学習意欲 レディネス（受講時のレベル） ・指導法への満足度 ・理解度（学習） ・技能・技術の熟練度 ・活動意欲・有意義感・手ごたえ（受講後の意識の変化）・研修成果の活用度 ・技能・技術の熟練度 ・顧客貢献志向度 ・目標達成意欲 ・部下・同僚への指導の程度 ・業務環境の改善程度	・政策的誘導・支援の有無並びにその活用度 ・R／S技術の他省庁等での普及の程度。 MTA/RSCをトルコにおけるR／S技術の中核的な技術センターとして位置付けられる。 具体的な応用事例good practiceなど R／Sの政策面での利用の教訓・提言など
評価の時期（いつ評価をするのが適切か		指導実施直後並びに一か月程度時間をおいて計測する	策定作業中や、完了後、並びに研修プログラム実施期間中を通じて適宜実施する	半期ごと	受講者が所属先に帰ったあと、半年ごとに実施する	半期ごと
評価の方法		受講後アンケート、理解度テスト 実習の観察（実際に操作しているかどうか判断する）	作業中にアンケートや、聞き取りを実施する。出来上がったカリキュラム（教材等）の質の評価実施 実習の観察（実際に単独で指導することは可能か？）	C／Pへの聞き取り、クライアント機関への聞き取り等 顧客へのアンケート調査など	理解度テスト 観察による評価 研修への貢献度（質問・議論への参加） レポート提出（半年後・一年後提出） 電話や工場訪問によるアドバイス等	事業所訪問・各省庁への聞き取り調査などの実施

ここで、「能力向上」という言葉の定義を説明することとする。
能力には知識、技術、心構えの３つのドメイン（領域）がある。

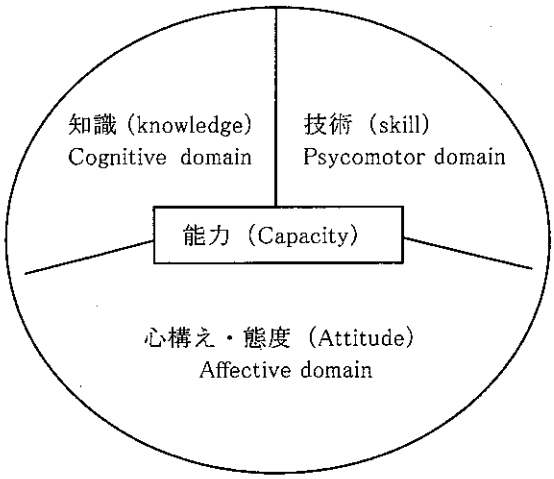


図１－１　能力の領域

「能力向上」は、これらの３つの領域のうちの一つ、または複数について「新しく獲得した能力によって行動変化が発現すること」をいう。カークパトリックは能力向上を以下のモデルによって測定することを提唱している。

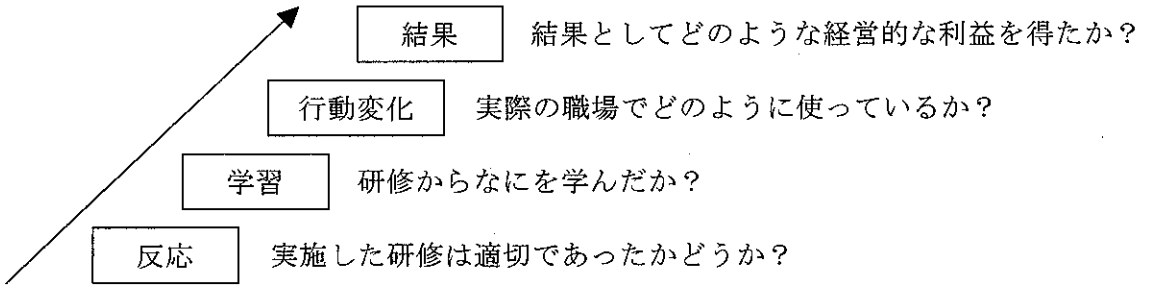


図１－２　能力向上測定モデル（カートパトリック）

本プロジェクト（表１－２）を、図１－１に基づいて整理すると、プロジェクトの活動により、「機材の提供及び習熟訓練」が行われることによって、「C／Pが先進的なR／S技術・データを活用できるようになる」、次いで「信頼度の高い解析データの提供」が可能になり、「R／Sに関連する研修・情報提供等の実施」がなされ、さらに「R／S解析データが様々な政策判断に応用されるようになるということが、本プロジェクト全体のデザインである。

個々人の能力向上が、現行のプロジェクトの結果、トルコ鉱物資源調査・探査総局リモートセンシングセンター（General Directorate of Mineral Research and Exploration：MTA）／Remoto Sensing Center：RSC）の能力向上に結びつくためには、「C／Pの能力向上」「（組織としての）MTA/RSCの能力向上」が必要である。そのため、個人であるC／Pを介して、MTA/RSCの能力向上に伝わる道のりの各ポイントにおいて評価をする必要がある。

〈評価のポイント〉

・C／Pの能力向上：モニタリングによる（既に３回実施済み）
・C／Pへの技術移転の内容：長・短期専門家等に技術移転の内容など
・第三国研修：受講者の数・質の向上（PDMには直接的なプロジェクトの活動に位置づけられていない：質の計測方法は明らかでない）。
・プロジェクト目標～上位目標へのつながりの照査（プロジェクトの成果のトルコ及び周辺各国への伝播：普及インセンティブ、法的枠組みなどの検討継続）
・妥当性の検討：（代替手段：同様な結果を得るのに他の手段がないかどうかの確認）

１－４－３　評価用PDM（付属資料参照）

現行PDMは、サブプロジェクトA、Bの２枚によって構成されているが、２枚にした明確な理由は示されていない。論理的な構造を分析すると、２枚にする明確な理由は見当たらず、むしろ２枚あることが、プロジェクトの理解を妨げているのではないかと考えられる。記述には重複も多く、指標とプロジェクトの概要が混在しているように思われるので、評価を円滑に進めるためには、組み換えが必要と考えられる。

(1) 現行PDMの問題点

上位目標が複数（２枚で６件）あるが、いずれもプロジェクト目標ないし成果の記述に近い。プロジェクト目標は、MTA/RSCの組織としての能力向上をうたっていると考えられる。しかし、成果に（C／P個人の能力として）記述されている内容の言い換え（組織の能力）にとどまっている。これは、PDMの上下のヒエラルキーの関係として捉えるべきかどうかについて、外部条件とともに整理が必要である。むしろ、MTA/RSCが新たに獲得した能力を直接的に計測する指標は何か検討する必要があるのではないか（個人レベルについては、モニタリングが実施されているのでその結果を基礎としたい）。

その他、例としてはOverall Goal２はOutput３ができれば、それを右から左へ公開すればすむことで、これは、Outputの指標と考えられる。

また、Overall Goal３は、論理的には「使えるようになる」結果としてできることで正しいが、そもそもMTA/RSCは研修機関ではないことから、もう少し適切なゴール（よりユーザー側、国民側にたったもの）があるのではないか。

また、プロジェクト目標のレベルでは「使える」という記述よりも、MTA/RSCが先進的なR／S技術で「何をする」ということがあるはずである。それが、組織としてのMTA/RSCが、新しい技術・知識の習得を通じて「行動変化」を起こしたということであろう。しかも、この行動変化によって、どのような便益がトルコ国民（あるいは産業界）に現れるのかを記述すべきと考える。

(2) 評価用PDMの改訂について（PDMe）

評価用PDM（PDMe）は評価調査のためのもので、評価調査団において作成するものである。PDMeは、PDMの変更をめざすものではない。（JICA「事業評価ガイドライン」p.112）

第２章　調査結果

２－１　対処方針と調査結果

	現状及び問題点	対処方針	調査結果
PDM	本プロジェクトはサブプロジェクトA／Bから構成され、PDMもそれぞれ個別に作成されているが、これまでの経緯や情報を整理すると、サブプロジェクトAが「主」であり、サブプロジェクトBが「副」であるとの認識で本プロジェクトは立ち上げられており、実際のJICA投入もサブプロジェクトAに重点が置かれている。 PDMを２枚のままとした場合、中間評価や終了時評価が行い難く、プロジェクトに対する理解の妨げにもなりかねない。 なお、長期専門家及びJICAトルコ事務所もPDMeを用いた中間評価、並びにPDMを２枚から１枚に取りまとめることについて一定の理解を示している。	PDMeはこれまでのPDMの内容を変更するものではなく、整理し直したものであることを説明し、今回の中間評価はPDMeを用いて行うことをMTAに申し入れる（長期専門家を通じて事前に意図は伝えておく）。 日本・トルコ双方の理解や活動しやすさを向上させるために、PDMを１枚にまとめる（PDMeとする）ことをMTAに提案する。 ただし、PDMの本質的な変更を意図していないため、トルコ側の説得に相当の労力や時間が必要と判断された場合はPDM取りまとめを行わない。	長期専門家とカウンターパート間で評価コンサルタントの報告書に係る打合せを実施していたこともあり、２枚のPDMを１枚に取りまとめ、新たなPDMeで中間評価を行うことでMTAと合意した。 また、日々のプロジェクト活動に影響がないことを説明し、今後のプロジェクト運営・評価をPDM（Ver. 2）{＝PDMe }に従って行うことについてもMTAと合意した。 なお、PDM（Ver. 2）については付属資料のM／MのAnnex１を参照のこと。
中間評価①	コンサルタントによって評価案が作成され、日本側関係者間での合意はほぼ形成されているが、MTAと評価案に関する協議は行っていない。 なお、５項目評価を行うことは、R／D時のM／M（Annex16）に記載し、トルコ側と合意済みである。	コンサルタントによって作成された評価案に基づいて、中間評価に係る５項目評価についてMTAと協議・合意する。	評価内容についてはM／M本文に概要を、Annex３に詳細を記載。
中間評価②	天然資源省傘下の分野に関するリモートセンシング利用についてはMTAに集約されるとのことだが、昨年９月に実施した運営指導調査時にも指摘したとおり、具体的な成果物がないこともあり、環境やハザード分野に係る外部機関との連携やプロダクツ提供といったリモートセンシングセ	昨年９月の運営指導調査時にはC／Pと外部機関を訪問し、個人レベルではあるが、意見交換が開始された模様であるため、その後の状況について確認する。 また、リモートセンシングセンターに対する期待や注目が高まっている状況を鑑み、外部機関との連携が自立発展	多くの政府系機関が環境・自然災害分野への衛星データ適用に関心を持っているが、いまだ明確な役割分担は決まっていないため、本プロジェクトの成果如何によっては当該分野におけるMTA/RSCの存在感は非常に大きなものとなる。

	ンターの将来像についてMTAの方針が定まっていない。 上記理由もあって、今回のコンサルタント評価案においてもプロジェクトの自立発展性の評価が困難であった。	性を高めるとの認識のもと、MTAに対して改めてリモートセンシングセンターの将来像について確認する。 トルコ側の予算措置確認についてコンサルタントから長期専門家に依頼してあるため、その状況を聞き取り調査する。	MTAは当該分野のうち地震や地滑り等へのRS技術の適用を考えているようだが、その他については、外部機関との連携が重要であるとの認識のもと、引き続き連携促進することで合意した。 なお、予算についてはM／MのAnnex８に示すとおり申請されている。
PALSAR	現状、PALSARを搭載予定の衛星ALOSが打ち上げられていないため、サブプロジェクトBに係る技術移転を計画的に進めることが困難である。技術移転のみであればJERS-１SARによる過去の採取データで事足りるものの、その技術を活用（応用）するためには現存機による採取データが必要であるが、PALSARと同等の値段での入手は困難である。 また、仮にPALSARが打ち上げられたとしても、データのダウンロードが商業ベースで可能になるのは打ち上げから６か月から１年程度必要であると想定される。	InSARは現在開発中の利用技術であるものの、将来はリモートセンシングによる地域モニタリングの主要技術であり、本プロジェクトの重要な柱と位置付けていることをMTAと再確認したうえで、プロジェクト期間を考慮して、既存の代替データを用いてサブプロジェクトBに係る技術移転を進めることとし、PALSARのデータが利用可能になった場合にはその利用をプロジェクト活動に取り込むこととしたい旨を提案する。	プロジェクトも左記同様の方針で既に活動を進めており、具体的にはJERS-１ SARのデータを用いた技術移転を行う計画である。 非公式ではあるが、トルコ側との協議中に衛星打ち上げ遅延による技術移転の遅れがあった場合はプロジェクト期間の延長等の追加支援を検討してほしいとの発言があった。延長要否は終了時評価時に改めて検討する必要がある。
技術移転の「質」	プロジェクト運営上は能力指標と合わせて画像処理数を示して管理することとしているが、PDMに明記されていないことや、本プロジェクトの技術移転内容が高度であり、その多くが暗黙知であるため、長期専門家の作成したモニタリングの中に習得目標が明示化されているにもかかわらず、技術の質についてC／Pが十分に理解していないとの指摘がある。 また、他プロジェクトの範となるべきモニタリングではあるが、その作業量が膨大なものになっているとの指摘もある。	技術の質についてC／Pに理解させ、かつ、モニタリングに係る作業量を低減するためラーニング・コントラクトの導入を提案する。	長期専門家とC／P間で評価コンサルタントの報告書に係る勉強会を実施しており、既存手法をそのまま本プロジェクトに導入することは難しいとのことであったため、今後、プロジェクトを中心にトルコ版ラーニング・コントラクトの導入について検討していくこととした。 また、調査団ではモニタリングに係る作業量について懸念していたが、プロジェクト初期においては確かに大変であったものの、現在は長期専門家及びC／P側ともスムーズに作業できているとのことであった。

２－２　５項目評価結果

評価の結果は、DAC５項目に基づいて合同評価報告書（Joint Evaluation Report）としてまとめられた（付属資料参照）。

(1) 総論

プロジェクト全般としては、効果的な手法によって実施されており、一部明らかにプロジェクトの成果といえるものを生み出し始めている。プロジェクトは中間点を終えたところで、なお多くの課題や向上すべき諸点を残しているが、MTA/RSCに所属するC／Pは、既にプロジェクトを通じて新たに獲得した先進的なリモートセンシングに関する技能と知識を自らのものとして行動に表すことができるようになっている。

本プロジェクトでは、リモートセンシングに関する実践的なトレーニングを通じて、C／Pそれぞれの専門とする分野において、新しい技能と知識を学ぶことができている。

プロジェクトの成果は、JICAトルコ事務所などが支援している第三国研修において、すぐに生かされている。同研修は、長期専門家から最小限の支援のみで実質的にはトルコ側の自主的な運営において実施されていることから、C／Pはそれぞれがプロジェクト実施前から持っていた経験や能力を、プロジェクトを通じて新たに獲得した学習の内容を統合することによって、能力向上のための良い機会になった。

現在実施されている第三国研修は、MTA/RSCの自主的な運営において、周辺各国の25名の研修生を対象にして実施されているもので、その企画・運営・指導内容の開発、トレーニングの実施、ロジスティック支援の実施などほとんどの業務をトルコ側が行っている。トレーニングの内容を見ても、本プロジェクトによって指導した新しい内容（特にASTERを用いた先進的なリモートセンシング技術）がそのカリキュラムの中に含まれており、指導の内容もこれまでの内容に沿ったものであることから、プロジェクトでの指導内容がMTA/RSCの知見として蓄積され始めている証左ととらえることができる。

しかしながら、プロジェクトにはリモートセンシングをトルコに普及させ、そのインパクトを最大化するために、まだ向上すべき点も数多く見受けられる。例えば、長期専門家が準備した学習目標は、PDMの中に明示的に示されていないことから、日本・トルコ双方において「質の向上を目指す」という点で具体的になにをもって「質の向上なのか」について必ずしも共有されていない。後述するように本プロジェクトは、多数の画像を処理するプロセスを通じて「言語化しにくい知識」である「こつ」や「手順」の習得を通して質の向上を図ることになっている。プロジェクト運営上、能力指標と併せて画像処理の数量を示して監理することになっている。これまでの２年間では、一定レベルの技術・知識についての習得を行って成果を挙げている。今後は、プロジェクトが実施する範囲（あるいは量）に加えて、その深さ（あるいは質）について、双方の理解が明示的に共有される必要がある。そのような議論のプロセスを通じて、MTA/RSCが必要とする技術の質が双方で理解されるとともに、現実的な習得目標が明らかになると考える。

最後に、現在行われているモニタリングは、プロジェクトの管理上有効な手段として機能している。プロジェクト前半までの教訓に基づいて、その実施方法について改善すべき点があれば改善を行い、継続していくことが重要と考える。さらに、本プロジェクトにおいて改善が検討されているモニタリング手法は、JICAの類似技術協力プロジェクトの中でも模範と

なるものである。

(2) 妥当性

以下の２点においてプロジェクトの妥当性は高い。

第一に、MTAが推進している新たな鉱物資源をより効率的に発見するという優先度の高い業務に照らし合わせて、先進的なリモートセンシング技術の移転を行うことの妥当性は高いと判断される。

第二に、リモートセンシング技術の応用分野は、鉱業セクターに限定されていない。技術移転の内容〔アメリカ航空宇宙局（NASA）と経済産業省との共同プロジェクトにより開発された資源探査用の光学センサASTERとフェーズドアレイ方式Lバンド合成開口レーダPALSARの活用〕は、トルコにおけるリモートセンシング技術を使用する機関・業界等における嚆矢となっている。本プロジェクトは、MTAのプロジェクトに新たな探査ツールを提供するばかりか、トルコにおける同技術の主導的な役割を果たすことができることから、本プロジェクトの妥当性は高いと考えられる。さらにASTERは、その開発に日本が主導的な役割を果たしてきたことから、その技術移転に関して様々な分野での協力が考えられる。以上のことは、日本の政府開発援助の考え方とも一致している。

(3) 有効性

プロジェクト目標である、「MTA/RSCはASTERまたはPALSARのような先進的なリモートセンサーによって収集されたデータを用いて、鉱物探査、自然災害防止、環境保全を目的とした地質学的な分析を行うことができる。」は、いくつかの面で到達し始めている。MTA/RSCのC／Psは、プロジェクト開始以前から持っていた能力を、新たに獲得した技能と知識と統合することができている。リモートセンシングを使用した日常業務の進め方を見ると、多くの面で改善されたということができる。

しかしながら、プロジェクトの認識はその到達点はまだ調和が取れていない。現在実施しているモニタリングでは、４つのケーススタディグループを対象にして行っており、C／P個人のレベルではない。それぞれのグループは、所属する個人のもつユニークな能力を持ち寄ってグループとして作業し、それぞれ業務を実施している。技能と知識の向上はこのようなグループワークを前提としていることから、そのグループごとの進捗も様々である。リモートセンシング技術の利用は、このようにグループによる仕事の進めることを前提としていることから、グループレベルでの進捗が監理されていれば、個人レベルの学習を強調する必要なないと考える。

むしろ、本評価の結果からグループを基礎とした自己管理手法を用いるほうが、学習をより効果的に進めることができると考える。その理由は、実際の鉱床探査の仕事はグループを基礎に行われることが多いということによる。

(4) 効率性

投入された資源は適切に使用され、その結果として成果を挙げつつある。各C／Pは、なお技能・知識ともにプロジェクト実施期間の残りにおいてさらに成長することが求められているが、全体としてプロジェクトの運営は支障ないと判断された。

(5) インパクト

プロジェクトは、予見されたもの予見されないものの両面でいくつかの正のインパクトを与えつつある。例えば、(予見されたものとして) プロジェクトの実施を通じて、MTA/RSCリモートセンシング技術の利用に関して多くの信頼と注目を集め始めていることが挙げられる。また、(予見されないものとして) 多くの大学などの研究機関において、MTA/RSCの持つリモートセンシング技術に関する関心が高まり、その技術の普及のために指導に出かける要請が増えてきたということである。それらがどのような形で実を結ぶか、現在その行方を予想することはできないが、正のインパクトとしてさらに注目したい。

(6) 自立発展性

現在の時点で、自立発展性を正確に評価することは困難である。しかし、トルコ特有の経済環境の変動に脆弱な問題を考えると以下の点に注意が必要である。

第一に、現在進めている4つのケーススタディは、先進的なリモートセンシング技術利用の入り口にしかすぎない。MTA/RSCは、先進的リモートセンシング技術利用における、自らの役割・責任範囲及びそれに基づく組織の方向性について検討すべき時期にきていると考える。

第二に、将来の計画としてMTA/RSCは、より広範なクライアントに対して様々なデータプロダクトを、その要求する品質・時間で提供することを考えている。このような方向性は、MTA/RSCの経済的視点から自立発展性を高めることにつながると考えられる。しかしその方向は、トルコにおける民間セクターの役割とリモートセンシング市場の育成に影響を与えるということが考えられる。

第３章　今後への提言

３－１　PDMの改定（PDMeの作成）

現行のPDMがサブプロジェクトごとに２枚あることが、当初の意図を反映していない問題点として指摘される。そのため、中間評価のために評価用のPDM（PDMe）を作成した。変更内容とその理由等については付属資料のとおり。

３－２　本プロジェクトの特徴に関する一考察

本プロジェクトの技術移転を評価するうえで注意すべき特徴は、以下の２点である。

(1) 技術移転の受け手側の、当該分野に関する既存の能力が高い。

受け手側の既存の能力が高度であるということは、求める能力が比較的高度・かつ先端的・先進的な内容となる。そのため、与える技術が高度であるのみならず、教える手法や、習得した能力を評価する方法も、高度なものとなる。例えば、教える手法は「講義」などの一方的な知識の提供では不十分で、「座学と実習の組み合わせ」のみならず、実際の現場での分析、解析を基礎として、プロフェッショナルな水準での「論文」の執筆、並びに「セミナー開催」、「学会発表」、「(査読のある) 学会誌への論文発表」など、複数かつ高度な方法を用いる必要がある。これらは、いずれも高度な知見を技術移転するための手段であり、その成果品を評価することによって、C／Pの学習（習得レベル）を判断することができる。

（これまで、JICAのプロジェクト評価では、本部を中心として多くの場で「紙と鉛筆によるテスト」の適用が議論されてきた。しかし、評価手法は、様々な方法が様々な技術の内容によって決められるべきであると考える。）

(2) 技術移転の内容の多くは、「暗黙知」である。

本プロジェクトの技術移転において、最も特徴的なことは、技術移転の内容の多くが「暗黙知」であることである。

暗黙知とは、

・言語化し得ない・言語化しがたい知識
・経験や五感から得られる直接的知識
・主観的・個人的な知識
・アナログ的現場の知
・身体的経験を伴う、共有・発展・増殖が可能な知識である。

リモートセンシングはデジタルデータを扱う技術であるが、それを解析する手順・手法には様々なアプローチがあり、複数の方法のうち何を選択するかによって得られる解に差がでる。鉱物探査にリモートセンシング技術を応用すると、リモートセンシングから得られたデータに併せて、既存のデータや知見の取捨選択、判断（既存の地質図の読み取り、解釈など）アナログ的な知見・経験の積み重ねに負う部分が非常に多い。

３－３　終了時評価にむけた評価方法に関する提言

前節に書いた２つの特徴は「特殊なものではない」ので「通常の評価手法が適用される」と考

えるが、評価を実施するうえでは通常の評価技術を基礎としながら、リモートセンシング技術に関する知見に併せ、教育技術（Instructional Technology）の知見が求められる。

具体的な評価方法として以下の提言を行う。

(1) 習得目標の整理

現在、実施されているモニタリングでは、習得目標が明示化されている（付属資料参照）。同目標は、具体的な手順と併せて、アウトプットに求める質が明らかになっているので、これを明示的に活用（機会があるごとにC／Pと質の議論をする際に、これを用い、C／Pが「質」を意識するレベルまで明示的に活用する）し、トルコ側と共有する。

(2) 自己管理の強化（モニタリング方法の多様化）

現行のモニタリングはこのまま実施すべきである。ただ、(1)と併せてプロジェクトがモニタリングに費やす作業量は膨大なものになっている。今後、質に対する評価の明確化が求められるのであれば、質の管理をC／P自身が行うような方法を検討すべきである。その一例として、ラーニングコントラクト（Learning Contract学習契約書）を提案した（付属資料）。

(3) 最終的な能力向上の計測方法についての一考察

これらを実施したとしても、最終的にC／Pの能力がどのように向上したのかを客観的に評価するには工夫が必要である。その理由は、３－２(1)及び(2)に述べたとおりである。

そのために、今から終了時評価までの適切な時点を選んで、「卒業プロジェクト」のような形式の卒業試験を提案する。この方法は、これまでに全く経験したことのない解析（ケーススタディ以外の画像を用いる）を行って、その解析結果について発表し、相互に評価しあう。解析の内容（評価のポイント：手法手順の正確さ、判断の妥当性、得られた成果や内容の正確さ、報告の分かりやすさなど）を評価するとともに、討議・質疑応答の内容によって、グループの習得の度合いを最終的に評価するというものである。

３－４　教　訓

教訓として明らかになった点を以下にあげる。

(1) グループの作り方

本プロジェクトは、比較的若手のリモートセンシング、コンピューター技術に優れた人材と、地質解析に経験豊富だけれどもリモートセンシングの経験のない中堅を組み合わせてグループを作っている。そのため様々な知見・経験を各グループに持ち込んで、全体としての能力向上に寄与している。この点が、本プロジェクトの特徴をよく生かしている。

(2) 座学・実習の組み合わせ

本プロジェクトでは、座学を早い時期に終わらせており、ワークステーションを活用した実習に切り替えている。また、現場視察の割合も高く、現場への適用性もきわめて高い設計になっている点が評価できる。

第４章　総括（団長所感）

(1) 概要

途中、MTA総裁の辞任という大事件はあったものの、調査自体はプロジェクト及びC／Pの積極的な協力もあり、順調に進めることができた。

施設的には申し分なく、またC／Pのレベルも高く、本プロジェクトに対する意識もおおむね積極的であり、順調なプロジェクトの進捗を確認することができた。

対処方針にかかる調査結果概要は下記のとおり。

(2) 中間評価について

コンサルタントが作成したドラフト案に基づき、調査団、プロジェクト、トルコ側C／Pが真摯に議論を行い、最終ドラフト案を作成し、その最終案を合同評価委員会で承認した。基本的には順調に進んでいるプロジェクトであり、特に大きな問題・課題は指摘されなかった。

他方、C／PがPDMの達成目標の設定内容について繰り返し問題提起を行うなど、こうした評価に対する良い意味でのC／Pのかかわりが覗えた。しっかりとガイドをしていけば、より良い成果を得られるものと期待している。

(3) PDMの変更について

PDMの変更については、特にトルコ側に異存はなく、二つのPDMを一つにまとめること、及びその内容についてほぼ問題なく合意を得ることができた。

そもそもは、環境・防災にかかる活動を確実に担保する目的でPDMを二つに分けたものと思われるが、そうした変則的な設定を行うに足る十分な論拠が残っていないことや、実際にはMTAとして行いうる範囲の環境・防災にかかる取り組みは積極的に行っていることから、当初の（二つに分ける）目的は既に果たしたものと考えられる。

(4) MTA/RSCの資源・環境分野での将来的な役割

この問題は2003年（９月）の運営指導調査団のときに議論が行われ、特にユーザーとなりうる関係諸機関との関係構築が課題として提示されている。それ以降、特に画期的な進捗は認められないが、一部の機関との関係構築が図られるなど若干の進展があり、また大学や政府・民間機関等からMTA/RCAに対する情報提供依頼がいくつもあるなど、公開セミナー等を通じたプロモーション活動は実を結びつつあるものと考える。

MTA/RSCのC／Pレベルでは、少なくともRSCの有するリモートセンシング情報・技術が関係する範囲では積極的にこうした分野にも貢献していきたいとの姿勢は見えることから、今後とも関係諸機関との連携を促進していくことが重要であると考える。

(5) 技術移転の質の問題とラーニング・コントラクト

今回の評価調査の中での大きな論点の一つが、技術移転の質の向上を促進・評価するための手法の必要性である。技術移転レベルが高度になると、定量評価に馴染まない部分が多くなってくることから、新たな評価・管理手法が必要ではないか、という評価コンサルタントからの提言がきっかけとなったものである。ラーニング・コントラクトというMBA教材等で使われて

いる手法がコンサルタントから例示されたが、具体的な適用・活用方法は現場レベルでプロジェクトとC／Pが一緒になって議論し考え出していくべきものであると考える。

今回の調査で基本的な問題意識は共有できたものと考えており、トルコ版のラーニング・コントラクトの導入についてプロジェクトで検討することとなっており、今後の進捗が期待される。

(6) PALSAR

PALSAR搭載衛星の打ち上げの遅れについて情報提供を行い、今後の対応策について議論を行ったが、基本的には既存の情報の活用でプロジェクト活動はほぼ予定通り実施できるとのことであった。PALSARからのデータがプロジェクト期間内に活用可能となることが最も望ましいが、少なくとも基礎的な技術移転を済ませておき、実際に当該データが活用可能となった時点で、すぐに利用できるような体制にしておくことが必要である。

今後の衛星の打ち上げ状況次第であるが、終了時評価時点でJICAの追加支援の是非を検討する必要がある。議論の中でMTA/RSC側からも追加支援の要請（非公式）があった。

(7) 今後の進め方について

今回の評価では特に大きな課題は確認されておらず、いろいろな微修正や改善の必要性はあるものの、現在の方針のもとで、着実な実行を図っていければ確実な成果が得られるのではないかと考えている。

将来的な自立発展性や本プロジェクトのインパクトを考えた場合、特に環境・防災面でのリモートセンシング技術の活用を図るうえでの、MTA/RSCでの技術の活用は常に意識していかねばならない課題である。また、同時にMTA内でのRSCプロダクツの活用も引き続き促進していく必要があろう。

これまでのMTA総裁は本プロジェクトの積極的なサポーターであったということであり、C／Pも優秀なスタッフを配置するなど、本プロジェクトの着実な進捗にかかる貢献は計り知れない。今般のMTA総裁の交代により、プロジェクトの進行に悪影響がでないことを期待しつつ、方針変更等についてはしっかりとウォッチし、適切な対応を行っていくことが必要であると考える。

付　属　資　料

調査団議事録（M／M）

MINUTES OF MEETING BETWEEN
THE JAPANESE MID-TERM EVALUATION TEAM
AND
THE GENERAL DIRECTORATE OF MINERAL RESEARCH AND EXPLORATION
ON THE JAPANESE TECHNICAL COOPERATION
FOR THE GEOLOGIC REMOTE SENSING PROJECT
IN THE REPUBLIC OF TURKEY

The Japanese Mid-term Evaluation Team (hereinafter referred to as "the Team") organized by Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Mr. Kiyoshi MASUMOTO visited the Republic of Turkey from June 11 to June 18 2004 for the purpose of conducting Mid-term Evaluation and of discussing plans for the second half of the Geologic Remote Sensing Project (hereinafter referred to as "the Project").

During its stay in the Republic of Turkey, the Team had a series of discussions and exchanged views with the authorities concerned of the government of the Republic of Turkey (hereinafter referred to as "the Turkish side") for the successful implementation of the Project.

As a result of the discussions, the Team and Turkish sides (hereinafter referred to as "both sides") agreed upon the matters referred to in the document attached hereto.

Ankara, June 17, 2004

Mr. Kiyoshi MASUMOTO

Leader
Mid-term Evaluation Team
Japan International Cooperation Agency
Japan

Mr. Gurkan TUNAY

Deputy General Director
General Directorate of Mineral Research
and Exploration(MTA)
Ministry of Energy and Natural Resources
The Republic of Turkey

1 Results of Mid-term Evaluation

The Mid-term Evaluation was implemented under the cooperation of both sides along the Record of Discussions (R/D). The following result of the Mid-term Evaluation was endorsed in the joint evaluation meeting held on June 17, 2004. This evaluation was carried out on a newly prepared single PDM, which the original two PDMs (consisting of sub-projects, A and B) were revised for use in the evaluation (refer to Annex 1).

1.1 Overall Evaluation

In general, the Project has been implemented effectively and has begun to produce some tangible outcomes. Though there are much to improve, C/Ps at MTA/RSC are able to demonstrate newly acquired skills and knowledge on advanced remote sensing technology.

Through hands-on training for the remote sensing training, the most C/Ps at MTA/RSC are able to acquire new knowledge and skills in their respective fields of expertise

The Project's outcomes can be immediately utilized through separate Third Country Training Program assisted by JICA. With minimal assist provided by the LT experts from Japan, the training program served as an opportunity for C/Ps to integrate the newly acquired learning from the Project and their own capacities.

One concrete example is that MTA/RSC's own Third Country Training Program which is organized and implemented separately with the Project, technical training on remote sensing technology to neighboring countries is utilizing newly acquired skills and knowledge obtained from the Project and developing newly added curriculums.

Finally the on-going efforts of strengthening monitoring need to be continued. The monitoring system in the Project has been improved through lesson learned from the first half of the Project. The on-going discussion to upgrade the monitoring methodology has a potential to develop an example applicable to similar technical cooperation projects by JICA.

1.2 Evaluation under Five Components

(1) Relevance

The Project is relevant enough with regard to the following two items:

First, the utilization of advanced remote sensing technology in mining sector is MTA's urgent needs to improve effectiveness and efficiency of discovering mineral resources. The Project provides all MTA departments to utilize MTA/RSC's improved capacity to apply advanced remote sensing technology in their projects. While the use and application of advanced remote sensing technology need to improve in the remaining period of the Project, the MTA/RSC's role in the mining sector has been much strengthened in the course of the Project.

Second, the application of advanced remote sensing technology is not limited to the mining sector. While the contents of technology transfer (use of ASTER and/or PALSAR, for example) is pioneer in Turkey's remote sensing business circle, MTA/RSC can play a significant role to promote effectiveness of use of the technology. Since ASTER is initially developed in Japan, she has much to offer to transfer her remote sensing experiences to Turkey.

(2) Effectiveness

Project Purpose, "MTA/RSC is able to utilize the advanced remote sensor data such as ASTER and/or PALSAR data for geological analysis aiming at mineral resources

exploration and natural disaster prevention" has begun to be achieved in various parts of the Project. C/Ps of MTA/RSC are able to integrate previously owned their capacities and newly acquired skills and knowledge. Much has been improved and renewed in various aspects of training and day-to-day remote sensing related activities.

Currently monitoring is undertaken at four case study groups, not individual level. Each group can perform assigned tasks by bringing different expertise of participating members. Because development of skill and knowledge relies on such group work, overall progress may vary. For remote sensing requires such group work, individual learning may not be stressed, as long as group performance is carefully monitored.

It was concluded that self-directed group work serves more efficiently to enhance learning because real-world situation of mineral resources searches using remote sensing is also carried out by a group study. Therefore the on-going technical transfer is implemented by simulating a work - place situations, which is practical and useful.

(3) Efficiency

The planned outputs have begun to achieve by effectively utilizing the given input while individual C/Ps have some additional capacities to grow in the remaining duration of the Project.

(4) Impact

The Project has already started to produce some positive impacts both expected and unexpected. Firstly, for instance, the Project activities increased the strength and visibility of MTA/RSC in utilizing advanced remote sensing technology. Secondly, MTA/RSC extends its capacity to universities and other governmental organizations and private sectors in response to their request to teach or train. Some C/Ps are invited to these institutions to give lecture on application of advanced remote sensing technology. MTA/RSC also receives interns from universities every year.

(5) Sustainability

It is still early to predict the sustainability of the Project. Under the c urrent economic circumstances, the following two issues need to be addressed:

First, the current focus on the four case study areas is only the beginning of accumulating data products. MTA/RSC should discuss future roles, responsibility and direction of the organizations.

Second, in the future plan, MTA/RSC should extend its services to a wider range of clientele and provide analytical data products meeting their needs in a timely manner. While the latter is a viable direction to improve the sustainabilit y of the MTA/RSC financially, the proposed direction may affect the role of the private sector and development of remote sensing market in Turkey in the long -run.

2 Major Issues Discussed

2.1 Modification of Project Design Matrix (PDM)

Although there were originally two separate PDMs for the Project (consisting of sub-project A and B), the existence of two PDMs with different goals tends to cause some for project management and evaluation. On the other hand, the outputs and activities of the project stipulate d in the two PDMs are considerably overlapping. Thus for this mid-term evaluation, a single PDM for evaluation was prepared by merging the two PDMs together.

Under this background, JICA considered that it is more logical to use the single PDM,

which was prepared for evaluation, for the management and evaluation of this project from now on, instead of two original PDMs. The team suggested this change and the Turkish side agreed on it.

It should be noted that the daily activities of the project has not been affected by this change.

2.2 Quality of Technical Transfer

C/Ps have advanced knowledge and skills in remote sensing and, thus, the level and requirements of technology transfer is far advanced than novice or intermediate level. A challenge of technology transfer for advanced learner is that a large potion of competency to be transferred has tacit knowledge and skills. It is difficult to evaluate invisible outcomes of developing capacity in objectively verifiable manner.

The Team recommended the introduction of a new management method for controlling quality, such as the Learning Contract. The Learning Contract is a written agreement and commitment between a C/P and an Expert regarding a particular amount of works. The Project agreed to study the introduction of the new methodology.

2.3 PALSAR

Since the launch of satellite ALOS, on which PALSAR sensor will be mounted, is expected to be postponed almost one year, technology transfer related to sub-project B using PALSAR data on schedule appears to be difficult.

It has already been planned to use JERS-1 SAR data for transferring a part of the techniques. The Team proposed to use available alternative data for transferring the rest of techniques and introduce PALSAR data if it becomes available within the project period.

The Project agreed on the proposals from the viewpoint of smooth transferring of technology.

2.4 Role and function of MTA/RSC in Environment and Natural Hazard Sectors

The application of satellite data to environment and natural hazard sectors is a focal concern for many governmental institutions. As a due course, some of those institutions have set out initial commitment in international satellite schemes, like BILSAT 1 from TUBITAK.

However, there is no clear mandate assigned to the specific institutions in the specific usage and management of the satellite data. Therefore, the sector is left in a grey zone in terms of institutional mandate in Turkish administration. Eventually, the role of MTA/RSC is still open in this particular sector without any restriction. If ASTER imageries from MTA/RSC are fully utilized, it may contribute greatly to the sector and appeal MTA/RSC's role tremendously.

Both sides agreed that the communication among institutions concerned is very important and should be promoted.

ANNEX LIST

PROJECT DESIGN MATRIX

Ver.2.0 June 17, 2004

Project Name : Geologic Remote Sensing Project | Duration : 4 years (01 August, 2002- 31 July, 2006) | Implementing Agency in Japan : JICA

Project Site : Ankara | Target Group : MTA Geologists | Implementing Agency in Turkey : MTA

Narrative Summary	Objective Verifiable Indicators	Means of Verification	Important Assumption
(Super Goal) Investment in the mineral resources development is increased			
(Overall Goal) MTA/RSC plays the central roles in providing advanced remote sensing services in Turkey and neighboring countries.	By 2008: 1. Analytical data prepared by MTA/RSC is utilized for a variety of public policy decision-making such as investment for new mineral resources discovery and management of natural disaster prevention and environment. 2. System of data distribution is established and basic data with analytical results utilizing advanced remote sensor data are supplied to mining and other institutions 3. Analysis of domestic priority areas for environment and natural hazard is accumulated and additional data analysis may be carried out in a timely manner when other institutes requests 4. Performance of the survey in the extracted areas based on the proposals.	1. Annual Report of MTA 2. Records of distribution. 3. Annual report, Analysis data, Data supply records 4. Report on the analysis of extraction of potential target.	Overall economic and investment conditions of Turkey maintain current level.
(Project Purpose) MTA/RSC is able to utilize the advanced remote sensor data such as ASTER and/or PALSAR data for geological analysis aiming at mineral resources exploration, natural disaster prevention and environmental conservation.	By the end of the Project 1 Methodology of exploration of possible mineral deposit is established. 2. Methodology of diagnosis of high-probable risk areas for disaster prevention and environmental conservation is established. 3. Extraction of several promising areas (each area consists of 1,000km²) and submission of proposals explaining the next survey step prepared by C/Ps. 4 Training curriculum and means of information dissemination focusing on the advanced remote sensing is developed and provided to other institutes and third countries	- Report of analysis for the evaluation of mineral potential of the area and risks of natural disaster - Report of the field survey of the selected area - Training curriculum, textbooks, plan and record of training course	- - No hindrance for field activities in the target areas. - The government policies concerning mining sectors are maintained. - A proper scheme is prepared disseminate information on the training course in/outside Turkey.
(Outputs) 1 The project operation unit (RSC) is established. 2 Equipment and advanced satellite data necessary for utilizing satellite data are operated and maintained properly. 3 Image processing of ASTER data for mineral resources exploration can be carried out by the C/P personnel. 4 Case studies for mineral resources exploration utilizing ASTER data are accumulated. 5 Spatial analysis with GIS is carried out by the C/P personnel. 6 C/P personnel can provide reliable products of SAR and ASTER data for improved hazard analysis by the staffs of relevant section of MTA and other related organizations. 7 C/P personnel can provide reliable products of advanced remote sensor data for improved environmental analysis by the staffs of relevant section of the MTA and other governmental offices. 8 MTA/RSC can provide necessary technical support to implement training courses.	1-1 Personnel, budgets and facilities of the MTA/RSC are secured. 1-2 Monitoring and meeting of the committee are working as planned. 2 Contents and condition of equipment are put in order. 3 Essential part of the technology of image processing is transferred by 2004. 4 100 or more scenes of ASTER data coverage over three (3) proposed case study areas are processed and interpreted by 2006. 5 Essential part of the technology of spatial analysis by GIS is completed by 2004. 6 Essential part of the technical transfer for natural hazard area analysis is completed by 2005. 7 Essential part of the technical transfer for environmental analysis is completed by 2004. 8-1 Quality of two Third Country Training Programs (TCTP) on remote sensing planned in 2004 and 2005. 8-2 Number and quality of other training on remote sensing technology.	1-1, 1-2 Annual reports, monitoring reports and records of meetings 2 Property records, operation and maintenance records 3 Records of evaluation made by both side 4 The number of produced images of ASTER data 5 Records of interpretation and analysis 6,7 Records of analysis Records of evaluation made by both side 8 Program, textbooks and materials for training	- Project budget is properly allocated as planned. - Trained C/P personnel continue to work at the MTA/RSC

Narrative Summary	Objective Verifiable Indicators	Means of Verification	Important Assumption
(Activity) 1-1 Allocate staff as planned. 1-2 Make plan of operation. 1-3 Make budgetary plan. 1-4 Make and implement monitoring plan. 1-5 Operate the Joint Coordinating Committee. (In common with the sub-project A and B) 2-1 Procure and install necessary equipment. 2-2 Operate and maintain equipment properly. 3-1 Introduce application of ASTER data. 3-2 Introduce processing of VNIR and SWIR data. 3-3 Analyze TIR data. 3-4 Generate regional DEM processing ASTER stereo mode data. 3-5 Transfer technology of effective application of ASTER data. 3-6 Carry out data acquisition of spectrometer and construction of spectral database. 4-1 Collect data of the proposed areas and input data. 4-2 Analyze data of the proposed areas. 4-3 Select the promising areas. 4-4 Carry out ground-truth. 5-1 Transfer technology of integrated spatial analysis integrating various geologic data. 5-2 Transfer technology how to select exploration areas utilizing GIS. 5-3 Carry out resource area evaluation utilizing GIS 6 C/P personnel can provide reliable products of SAR and ASTER data for improved hazard analysis by the staffs of relevant section of MTA and other related organizations. 7 C/P personnel can provide reliable products of advanced remote sensor data for improved environmental analysis by the staffs of relevant section of the MTA and other governmental offices. 8-1 Make technical support program for TCTP. 8-2 Carry out training courses (other than TCTP) (In common with the sub-project A and B)	(Inputs) Japanese side 1 Dispatch of experts (Long-term) - Chief Adviser - Coordinator - Image Processing expert - Geologic Remole Sensing expert (Short-term) - Expert(s) on (1) TIR analysis (2) DEM processing with ASTER data (3) Interferometry with SAR data (4) Environmental analysis (5) GIS-based integrated spatial analysis (6) Photo-geology 2 Training of C/P in Japan One(1) or two(2) per year 3 Provision of equipment Turkish side 1 Buildings and facilities 2 Allocation of C/P 3 Preparation of equipment 4 Local costs		· C/P personnel remain at the MRT/RSC · Equipment is delivered and installed without delay (Preconditions) · Renovation of building and facilities for the project is completed.

LIST OF ATTENDANTS

June 17, 2004
Ankara, TURKEY

-Turkish side

01. Mr. Ergin ERAYMAN/ Department Head, Renewable Energy Resources Department, Ministry of Energy and Natural Resources (MENR)
02. Mr. Hasan ERDOGAN/ Renewable Energy Resources Department (MENR)
03. Mr. Gurkan TUNAY/ Deputy Director General of MTA
04. Dr. Erol TIMUR/ Head of Geological Research Department of MTA (Deputy Project Director)
05. Ms. Mesude AYDAN/ International Projects and Foreign Affairs of MTA (Adviser)
06. Ms. Huma Zulal DIKMENLI/ Coordinator, International Projects and Foreign Affairs of MTA
07. Ms. Songul GURCAY / International Projects and Foreign Affairs of MTA
08. Mr. Engin SUMER/ Full-time counterpart (Project Coordinator)
09. Mr. Onder KAYADIBI/ Full-time counterpart
10. Ms. Burcu PEKESIN/ Full-time counterpart
11. Mr. Murat KORUYUCU/ Full-time counterpart
12. Mr. Bora GURCAY/ Full-time counterpart
13. Ms. Canan OZGUNER/ Full-time counterpart
14. Mr. Taner SAN/ Full-time counterpart
15. Mr. Kerem AVCI/ Full-time counterpart

-Japanese side

01. Mr. Kiyoshi MASUMOTO/ Leader, Mid-term Evaluation Team
    Natural Resources and Energy Conservation Team, Group II (Natural Resources and Energy), Economic Development Department, JICA
02. Mr. Hisao USHIKI/ Technical Cooperation Adviser, Mid-term Evaluation Team
    Senior Adviser, Institute for International Cooperation, JICA
03. Mr. Kenichi KURIHARA/ Remote Sensing Technology, Mid-term Evaluation Team
    Geological Survey Department, Japan Mining Engineering Center for International Cooperation
04. Mr. Ken SASAKI/ Cooperation Planning, Mid-term Evaluation Team
    Natural Resources and Energy Conservation Team, Group II (Natural Resources and Energy), Economic Development Department, JICA
05. Mr. Toshiyuki MOMMA/ Second Secretary, Embassy of Japan
06. Mr. Yasushi INABA/ Resident Representative, JICA Turkey Office
07. Ms. Yukari SAITO/ Assistant Resident Representative, JICA Turkey Office
08. Mr. Ali BEKIN/ Administrative Officer, JICA Turkey Office
09. Mr. Minoru FUJITA/ Chief advisor
10. Dr. Jiro DATE/ / Long-term Expert, Remote Sensing
11. Mr. Koichi ISOGAI/ Long-term Expert, Digital Image Processing
12. Mr. Kyo YOSHIDA/ Project Coordinator

Result of Mid-Term Evaluation

There are two (2) PDMs in this Project (consisting of sub-projects, A and B). Please note that the following evaluation is carried out based on a single PDM revised for use in the evaluation (hereinafter referred as PDMe).

Evaluation Result

0. Overall

- In general, the Project has been implemented effectively and has begun to produce some tangible outcomes. Though there are much to improve, C/Ps at MTA/RSC are able to demonstrate newly acquired skills and knowledge on advanced remote sensing technology.
- Through hands-on training for the remote sensing training, the most C/Ps at MTA/RSC are able to acquire new knowledge and skills in their respective fields of expertise.
- The Project's outcomes can be immediately utilized through separate Third Country Training Program assisted by JICA. With minimal assist provided by the LT experts from Japan, the training program served as an opportunity for C/Ps to integrate the newly acquired learning from the Project and their own capacities.
- One concrete example is that MTA/RSC's own Third Country Training Program which is organized and implemented separately with the Project, technical training on remote sensing technology to neighboring countries is utilizing newly acquired skills and knowledge obtained from the Project and developing newly added curriculums.
- Finally the on-going efforts of strengthening monitoring need to be continued. The monitoring system in the Project has been improved through lesson learned from the first half of the Project. The on-going discussion to upgrade the monitoring methodology has a potential to develop an example applicable to similar technical cooperation projects by JICA.

1. Relevance

- The Project is relevant enough with regard to the following two items:
- First, the utilization of advanced remote sensing technology in mining sector is MTA's urgent needs to improve effectiveness and efficiency of discovering mineral resources. The Project provides all MTA departments to utilize MTA/RSC's improved capacity to apply advanced remote sensing technology in their projects. While the use and application of advanced remote sensing technology need to improve in the remaining period of the Project, the MTA/RSC's role in the mining sector has been much strengthened in the course of the Project.
- Second, the application of advanced remote sensing technology is not limited to the mining sector. While the contents of technology transfer (use of ASTER and/or PALSAR, for example) is pioneer in Turkey's remote sensing business circle, MTA/RSC can play a significant role to promote effectiveness of use of the technology. Since ASTER is initially developed in Japan, she has much to offer to transfer her remote sensing experiences to Turkey.

1.1 Relevance of Super Goal

- The Super Goal is defined as "Investment in the mineral resources development is increased." The statement is in line with the mission of MTA and its remote sensing center. Therefore the Super Goal is relevant as a justification of technical cooperation in remote sensing technology.
- Majority of known deposits have been exploited for many years in Turkey. Therefore exploration of new deposits employing new technology has high priority. MTA/RSC believes that advanced remote sensing technology such as ASTER/PALSAR has high demand once analytical methodology suitable to Turkey is developed.

1.2 Relevance of Overall Goal

- The Overall Goal of the Project is defined as "MTA/RSC plays the central roles in providing advanced remote sensing services in Turkey and neighboring countries." Given the mission of MTA/RSC is in line with the Project, the Overall Goal is valid.
- The technical cooperation has served as a good initiator for MTA/RSC to demonstrate strengthened capacities in utilizing advanced remote sensing technology for applying to mineral exploration. Since the remote sensing technology employing ASTER/PALSAR is introduced to only Turkey in this region by the Project, MTA/RSC will continue to play a leading role in the respective technology.
- In light of on-going efforts to be the candidacy for the EU membership, Turkey is required to comply with various international environmental accords and treaties. In particular, improved capacity in environmental conservation and monitoring is one of many measures to improve in order for Turkey to comply with EU's environmental standards. In order to achieve such goals, acquisition of advanced remote sensing technology would provide Turkey a powerful tool for enforcing environmental policies.
- Turkey's development is quite fast in the past few decades. Demand for well-trained and qualified people is also very high. Technical cooperation at MTA/RSC is viable because the demand for remote sensing technology and well trained personnel are high in Turkey.

1.3 Relevance of Project Purpose

- The purpose of the Project is defined as "MTA/RSC is able to utilize the advanced remote sensor data such as ASTER and/or PALSAR data for geological analysis aiming at mineral resources exploration and natural disaster prevention." MTA/RSC's mission of promoting remote sensing is consistent with the Project Purpose.
- By looking at the current MTA/RSC's current functions and capacity, the purpose of the Project is defined in specific, measurable, attainable, realistic and time-bound.
- Current technical cooperation has a focus on application of remote sensing technology to the mining sector; the technology has a wide application. When MTA/RSC's capacity is much strengthened, application of the technology would be much extended to other department of MTA, the private sector and academia. Though the Project is much concentrated to the completion of the pre-designed case studies, skills, knowledge and attitude acquired through the Project can be applicable to different type of projects.
- The center is considered as a pioneer of utilizing ASTER/PALSAR technology in Turkey and among neighboring countries. The center has highest potential to become region's technical center for advanced remote sensing technology. Though the Project is still in progress and much to improve, on-going Third Country Training Program (TCTP) is one of evidence for MTA/RSC to demonstrate their capacity to integrate their own and newly acquired through the Project.

1.4 Relevance of implementing the Project as Japanese ODA

- Public sector institutions play significant role in application of remote sensing technology in mining sector because it involves investment risks. Preparing remote sensing data along with other mining related data is regularly considered as government's responsibility in many countries. Therefore technical assistance of this kind is relevant for Japan's ODA.

1.5 Factors Diminishing the Relevance

- There have been observed no factors that could diminish the relevance of the Project.

2. Effectiveness

- Project Purpose, "MTA/RSC is able to utilize the advanced remote sensor data such as ASTER and/or PALSAR data for geological analysis aiming at mineral resources exploration and natural disaster prevention" has begun to be achieved in various parts of the Project. C/Ps of MTA/RSC are able to integrate previously owned their capacities and newly acquired skills and knowledge. Much has been improved and renewed in various aspects of training and day-to-day remote sensing related activities.

- Currently monitoring is undertaken at four case study groups, not individual level. Each group can perform assigned tasks by bringing different expertise of participating members. Because development of skill and knowledge relies on such group work, overall progress may vary. For remote sensing requires such group work, individual learning may not be stressed, as long as group performance is carefully monitored.
- It was concluded that self-directed group work serves more efficiently to enhance learning because real-world situation of mineral resources searches using remote sensing is also carried out by a group study. Therefore the on-going technical transfer is implemented by simulating a work-place situations, which is practical and useful.

2.1 Achievement of Project Purpose, "MTA/RSC is able to utilize the advanced remote sensor data such as ASTER and/or PALSAR data for geological analysis aiming at mineral resources exploration and natural disaster prevention"

【Indicator: Methodology of exploration of possible mineral deposit is established】

- Through hands-on training and instructions from LT and ST experts, C/Ps are able to acquire new knowledge and skills in their respective field of expertise.
- The case study method employed by the Project, at the same time, worked as an opportunity for C/Ps to test their newly acquired capacity in real-world settings. Though the level of newly acquired knowledge and skills is still developing, it has been to produce and analyze remote sensing data from ASTER.
- Overall satisfaction level of the participants who participate to the Project in the past two years is generally high according to the preliminary interview and questionnaire conducted during the mid term evaluation.

【 Indicator: Methodology of diagnosis of high-probable risk areas for disaster prevention and environmental conservation is established. 】

- C/P's acquired basic knowledge and skills in utilizing analytical tools (both hardware and software, etc.) JICA provided. Analysis of ASTER data through case study planned is in progress. Such tasks have provided C/P opportunities to acquire new skill, knowledge and partly attitude necessary for producing data with required quality.

【 Indicator: Extraction of several promising areas (totally around 1000 km2) and submission of proposals explaining the next survey step prepared by C/Ps. 】

- The Project is under in review of number of images that the case study needs to analyze. The original 120 images were estimated number based on the scenes covering the three case study areas. Actual number of images that the case study would analyze is finalized based on the potentials of exploration. (See Annex 11 and 12)
- In order to narrow down promising areas, the Project needs to continue the case study analysis as scheduled. Originally 120 images were planned to analyze. 29 scenes were completed so far. Another 10 ASTER scenes will be completed by the end of July, 2004. (See Annex 11 and 12)

【 Indicator: Training curriculum and means of information dissemination focusing on the advanced remote sensing is developed and provided to other institutes and third countries 】

- Third Country Training Program on remote sensing technology, which is jointly funded by JICA and MTA, is already implemented by MTA/RSC's own initiatives. And other MTA/RSC's own training courses for remote sensing is started. These training programs have served well for C/P to confirm their learning from the technical cooperation by integrating their learning and teaching.
- Combination of practical experience gained through the case study, and being instructors of TCTP on remote sensing training, the C/Ps of MTA/RSC are able to integrate the newly acquired learning from the Project and their own capacities.
- Other activities about providing the most updated technical information on remote sensing is to develop textbook for TCTP and a series of seminars and workshop provided by Japanese experts.
- Web site for introducing the Project as well as MTA/RSC's activities utilizing advanced remote sensing technology is developed and operational in both Turkish and English since August 2003

(URL=http://www.geors.org).

2.2 Factors hindering the achievement of the Project Purpose on basis on Outputs

- The achievements, however, are more weighed toward to the sub-project A, the mineral exploration area, while the sub-project B, hazard prevention and environmental conservation, according to MTA/RCS's visions and finite roles in the respective area. LT experts have suggested that application of remote sensing technology in environmental issues is extensive. While many institutions and departments of Turkish government including MTA are involving in environmental issues in wide variety of directions. Remote sensing is of interest of such institutions because it is considered as a powerful tool. In order for the Project to enhance MTA/RSC's responsibilities and effective use of advanced remote sensing technology in Turkey, MTA/RSC must clarify its roles in the respective issues.

3. Efficiency

- The planned outputs have begun to achieve by effectively utilizing the given input while individual C/Ps have some additional capacities to grow in the remaining duration of the Project.

3.1 Achievement of Outputs

Output 1: The project operation unit (RSC) is established

【Indicators 1-1: Personnel, budgets and facilities of the MTA/RSC are secured.

1-2: Monitoring and meeting of the committee are working as planned.】

- Both sides have brought designated resources to the Project as indicated in Annex 4, 5, 6, 7, 8, 9 and 10.
- MTA/RSC is managed under the leadership of General Director of MTA.
- MTS/RSC's operation is managed by Project Manager, Dr. Erdem COREKCIOGLU. MTA/RSC is staffed with 18 members (1 coordinator, 8 full-time C/Ps and 13 part-time C/Ps). Name, title and duration of involvement is shown in Annex 9
- The structure and duties of the organization is explained in Annex 13.
- Budget of the Project is allocated as indicated in Annex 8.

Output 2: Equipment and advanced satellite data necessary for utilizing satellite data are operated and maintained properly.

【Indicators 2: Contents and condition of equipment are put in order. 】

- Machinery and equipment appropriated have been provided, installed operational and maintained. The list of machinery provided is shown in Annex 5.
- The machinery and equipment mentioned above are well kept and utilized in a good condition at MTA/RSC.
- The Japanese side provided C/Ps with technical assistance about operation and maintenance of the machinery provided. C/Ps have acquired knowledge and skills enough to utilize these machinery and equipment in advanced remote sensing technology.
- According to observations done by the long-term experts, C/Ps are capable of utilizing these equipments for the Project.

Output 3: Image processing of ASTER data for mineral resources exploration can be carried out by the C/P personnel.

【Indicator 3: Essential part of the technology of image processing is transferred by 2004.】

- Technology transfer by JICA experts to the C/Ps in MTA/RSC was implemented through designated activities shown in Annex 11 and 12. Hands-on experiences through the training utilizing hardware and remote sensing software enhance their knowledge and skills in their respective fields.

- As stated above, the level of understanding to utilize the machinery provided in the Project has achieved to the level enough to use the machinery and equipment. Japanese experts have provided additional assistance as necessary and when requested by C/Ps to operate and maintain the machinery and equipment.
- C/Ps have started to integrate newly acquired knowledge and skills through the Project and those of previous training and education. C/Ps are confident and comfortable in teaching at MTA/RSC's on-going TCTP.

Output 4: Case studies for mineral resources exploration utilizing ASTER data are accumulated.

【Indicator 4: 120 images of ASTER data coverage over three (3) proposed case study areas are processed and interpreted by 2006.】

- In sub-project A, currently analyses of 29 images have been completed, though 120 images as the target of the Project is under discussion if quality, rather than quantity, is the ultimate target of the Project. Identifying ultimate target (both quantity and quality) is an issue to discuss among parties concerned. (See Annex 11 and 12)
- C/Ps have started to integrate newly acquired knowledge and skills through the Project and those of previous training and education. C/Ps are more confident and comfortable in teaching at the MTA/RSC's TCTP.
- Long-term experts have observed that the quality of the learning by C/Ps is difficult to evaluate and to verify in objective manner. The grading is difficult, but it can be carried out if the learning goal in the form of behavioral change is explicitly defined. Such learning goal can serve as explicit grading criteria that will ensure the quality of learning in the Project.

Output 5: Spatial analysis with GIS can be carried out by the C/P personnel.

【Indicator 5: Essential part of the technology of spatial analysis by GIS is completed by 2004.】

- Combination of lecture, hands-on analysis employing remote sensing softwares, and ground truth in the field support C/Ps to integrate their knowledge so far given thorough the project imprementation. CPs have requested JICA experts to expand factory-based remote sensing training in the remaining duration of the Project. A larger number of field training, in particular process-specific training by assistance from both long and short-term experts, is necessary to strengthen the capacity of MTA/RSC.
- In order to increase efficiency in providing more accurate analysis, on-going case study analysis needs to continue as scheduled.
- JICA short-term expert in GIS will be dispatched in 2004, and thus completion of this activity will be in 2004.

Output 6: C/P personnel can provide reliable products of SAR and ASTER data for improved hazard analysis by the staffs of relevant section of MTA and other related organizations.

【Indicator 6: Essential part of the technical transfer for natural hazard area analysis is completed by 2005.】

- The fee schedule of data products is established, however, Output 6 is still in progress.As for environmental issue, it is expected that the MTA/RSC is expected to collaborate with other departments specialized with the topic. The Project will continue to provide necessary information for this field. The activities concerning this field need to be explored, as these will support the Project to move on to fulfill the Overall Goal.

Output 7: C/P personnel can provide reliable products of advanced remote sensor data for improved environmental analysis by the staffs of relevant section of the MTA and other governmental offices.

【Indicator 7: Essential part of the technical transfer for environmental analysis is completed by 2004.】

- Output 7 is still in progress. Data required for environmental conservation is extensive and vague. MTA/RSC needs to define who would be the client of data to request, and what are the specified data needed.

Output 8: MTA/RSC can provide necessary technical support to implement training courses

【Indicator 8-1: Quality of two Third Country Training Program (TCTP) on remote sensing planned in 2004 and 2005 and Indicator

8-2: Number and quality of other training on remote sensing technology. 】

- o TCTP is carried out by inviting 25 participants funded by Japan and Turkey.

3.2 Adequacy of timing, quality of Input from the Japanese side

- ➢ Dispatch of Japanese Experts is shown in Annex 7 of the minutes. The duration, number and expertise were in accordance to the R/D.
- ➢ A portion of local cost is supported by Japanese side as shown in Annex 8.
- ➢ C/P training in Japan was carried out as shown in Annex 11, 12 and 13. Trainees are expected to serve as core members of the Project.
- ➢ Machinery and equipment have been provided by the Japanese side as shown in Annex 5. They are already installed and operational. They are properly maintained and utilized by the Project.

3.3 Adequacy of timing and quality of Input from Turkish side.

- ➢ Provision and maintenance of building and facilities are properly carried out. The renovated office space for the Project was provided as scheduled in the R/D.
- ➢ Necessary number of C/P and administrative personnel has been allocated as planned. Overall qualification of C/Ps is high to implement the Project.
- ➢ In addition to original four members of C/Ps, four members participated the Project. The addition provided the Project better utilization of existing capacity of MTA/RS giving more flexibility of forming group to carry out analysis of case study.
- ➢ The Turkish side properly carries out maintenance of the machinery and equipment provided
- ➢ Local cost is covered properly, and the Project acknowledges MTA provides necessary cost, such as travel expenses and per diem to C/Ps, in a proper timing. Because the Project requires extensive field trip for ground truth, such support to the Project is appreciated.

3.4 Relevance of Input and Outputs (Important Assumptions)

- ➢ Economic instability is not negligible for maximizing the impact of the Project. It is commonly understood that the progress of technology transfer and achievement of Overall Goal could be influenced by macro economic conditions.

4. Impact

- ➢ The Project has already started to produce some positive impacts both expected and unexpected. Firstly, for instance, the Project activities increased the strength and visibility of MTA/RSC in utilizing advanced remote sensing technology. Secondly, MTA/RSC extends its capacity to universities and other governmental organizations and private sectors in response to their request to teach or train. Some C/Ps are invited to these institutions to give lecture on application of advanced remote sensing technology. MTA/RSC also receives interns from universities every year.

4.1 Expected positive impact

- ➢ MTA/RSC becomes a reliable resource for advanced remote sensing technology in Turkey. From time to time, universities and the private sector professional request MTA/RSC to give lectures on use of advanced remote sensing technology to their students and employees. As MTA/RSC demonstrates their capacities in TCTP, it can provide the most complete and updated training program on remote sensing technology in Turkey.
- ➢ Other than above, it is still too early to predict impacts from the Project.

4.2 Unexpected positive impact

- ➢ Some C/Ps are beginning to prepare writing academic articles on use of remote sensing technology.

4.3 Expected negative impact

- No negative impact was identified at the time of the evaluation.

4.4 Unexpected negative impact

- No negative impact was identified at the time of the evaluation. The Project needs to continue monitoring to see if there is any unexpected negative impacts exist.

5. Sustainability

- It is still early to predict the sustainability of the Project. Under the current economic circumstances, the following two issues need to be addressed:
- First, the current focus on the four case study areas is only the beginning of accumulating data products. MTA/RSC should discuss future roles, responsibility and direction of the organizations.
- Second, in the future plan, MTA/RSC should extend its services to a wider range of clientele and provide analytical data products meeting their needs in a timely manner. While the latter is a viable direction to improve the sustainability of the MTA/RSC financially, the proposed direction may affect the role of the private sector and development of remote sensing market in Turkey in the long-run.

5.1 Overall use and application of remote sensing technology in the Republic of Turkey

- It is still early to predict the sustainability of the Project. MTA/RSC is gradually recognized as a one-stop service center of remote sensing technology in Turkey. Though such vision is not supported by legislative arrangements or explicit demarcation with similar entities with similar technical capacity. Defining MTA/RSC's role in development of remote sensing technology as a whole, more rigorous capacity development meeting market's requirements, and promotion of acquired capacity are equally important and crucial for ensuring sustainability.

5.2 Cross Cutting Issues

5.2.1 Policy Aspects

- Although there have not seen serious obstacles for implement the Project caused by the current remote sensing related policy issue. No other institutions are as capable as MTA/RSC in utilizing advanced remote sensing technology in Turkey. Such capability may be maintained as long as the government of Turkey support financially and legally.

5.2.2 Technical Aspects

- Given wide application of advanced remote sensing technology, MTA/RSC need to develop and strengthen network of scientists and practitioners who could utilize remote sensing technology to their respective disciplines. To do this, MTA/RSC's understanding about its roles in applying remote sensing technology in disciplines other than mineral resources exploration should be much enhanced.

5.2.3 Environmental Aspects

- Adapting the technology for environmental aspects directly contributes to Turkey's capacity in monitoring environment, for advanced remote sensing technology provides a variety of methods to analyze and address environmental degradation. Therefore once it is adapted, sustainability of the technology is high.

5.2.4 Socio-cultural Aspects

- It is still early to predict how the outcomes of the Project contribute to socio-cultural aspect of the Turkish society.

5.2.5 Institutional Management Aspects

- Management of MTA/RSC demonstrates strong capacity to organize and implement TCTP inviting approximately 25 remote sensing technicians from neighboring countries. Such trouble-free

implementation of this type of training program is a concrete evidence of good management or the organization. In particular logistic support, coordination to many different organizations, and arrangements of the course contents are complex. When the TCTP is carried out at MTA/RSC, it was organized smoothly.

5.2.6 Economic and Financial Aspects

- Given that overall economic condition of Turkey is unpredictable, self-financing of training to external organizations need to be considered.

INPUTS OF EXPERTS

Long-term Experts

	Field	Name	Period
1	Chief Advisor	Mr. Minoru FUJITA	2002.09.25～2004.09.24
2	Geologic Remote Sensing	Mr. Jiro DATE	2002.08.04～2004.08.03
3	Image Processing	Mr. Kouichi ISOGAI	2002.08.04～2004.08.03
4	Coordinator	Mr. Kyo YOSHIDA	2002.08.04～2004.08.03

Short-term Experts

	Field	Name	Period
1	Photo Geology	Mr. Hirokazu HASE	2002.10.27～2002.12.25
2	Environmental and Natural Hazard	Mr. Masahiko TANIGUCHI	2003.01.18～2003.02.07
3	DEM processing with ASTER data	Mr. Daichi NAKAYAMA	2003.02.24～2003.03.22
4	Geographical Information System	Mr. Takashi Ooka	2003.05.26～2003.06.13
5	TIR Analysis	Mr. Hiroyasu MURAOKA	2003.06.14～2003.06.30
6	TIR Analysis	Mr. Yoshiki NINOMIYA	2003.08.17～2003.09.01
7	Geologic Remote Sensing	Mr. Yasushi YAMAGUCHI	2003.09.27～2003.10.05
8	Environmental and Natural Hazard	Mr. Hidekuni KIKUCHI	2004.03.08～2004.03.19

INPUTS OF EQUIPMENT

Geological Remote Sensing Project in Turkey as of May 1, 2004

Year	No.	Item (Type, Model)	QTY	Allocation	Usage	Condition	Remarks
JFY2002	01	Computer Dell Power EdgePrecision340	1	RSC	A	A	Purchased in Turkey
JFY2002	02	Software/Earth View APP (Atlantis Scientific Inc.)	1	RSC	A	A	Purchased in Turkey
JFY2002	03	Color Scanner OCE CS4036	1	RSC	A	A	Purchased in Turkey
JFY2002	04	Software/ESRI ArcView 8.2	1	RSC	A	A	Purchased in Turkey
JFY2002	05	Software/ Leica Geosystems Erdas Imagine 8.5	1	RSC	A	A	Purchased in Turkey
JFY2002	06	Software/ PCI Geomatics Geomatica Prime	2	RSC	A	A	Purchased in Turkey
JFY2002	07	Spectrometer/ ASD Inc. Fieldspec Pro FR	1	RSC	B	A	Purchased in Turkey
JFY2002	08	Digital Color Printer/Fujifilm Pictography 4000-II	1	RSC	A	A	Purchased in Turkey
JFY2002	09	Desktop Computer (Dual Monitor/Dell Precision340)	3	RSC	A	A	Purchased in Turkey
JFY2002	10	Desktop Computer (Single Monitor/Dell Precision340)	6	RSC	A	A	Purchased in Turkey
JFY2002	11	Desktop Computer (License server/Dell Precision340)	1	RSC	A	A	Purchased in Turkey
JFY2002	12	Notebook computer (Dell Latitude C840)	2	RSC	A	A	Purchased in Turkey
JFY2002	13	Software/ ENVI 3.5(Research System Inc.)	2	RSC	A	A	Purchased in Turkey
JFY2002	14	Software/ TNT Mips M-50 (Microimages)	3	RSC	A	A	Purchased in Turkey
JFY2002	15	Color Plotter HPDesignJet 800ps	1	RSC	A	A	Purchased in Turkey
JFY2002	16	Color Laser Printer/HP Color Laserjet 8550n	1	RSC	A	A	Purchased in Turkey
JFY2002	17	Laser Printer/HP Laserjet 4100n	1	RSC	A	A	Purchased in Turkey
JFY2002	18	Color Scanner/ EPSON GT-1000+	1	RSC	A	A	Purchased in Turkey
JFY2002	19	Projector/ CanonLV-X1	1	RSC	B	A	Purchased in Turkey
JFY2002	20	Digital Camera/Olympus Camedia C-4040Zoom	2	RSC	A	A	Purchased in Turkey
JFY2002	21	Software/ Surfer version 8	1	RSC	A	A	Purchased in Turkey
JFY2002	22	Software/ Adobe PhotoShop 7.0	11	RSC	A	A	Purchased in Turkey
JFY2002	23	Software/ Adobe Pagemaker 7.1	4	RSC	A	A	Purchased in Turkey
JFY2002	24	Computer Desk Top Dual Monitor (Dell Precision650)	1	RSC	A	A	Purchased in Turkey
JFY2002	25	Heavy duty Note Computer (Panasonic Toughbook CF-28)	1	RSC	B	A	Purchased in Turkey
JFY2002	26	RAM (1024MB)	4	RSC	A	A	Purchased in Turkey
JFY2003	27	Software/ PCI Geomatics Geomatica Prime	5	RSC	A	A	Purchased in Turkey
JFY2003	28	Software/ TNT Mips 6.80 M50, P15(microimagine)	3	RSC	A	A	Purchased in Turkey
JFY2003	29	Software/ TNT Mips (M50, P15) Upgrade&Support	3	RSC	A	A	Purchased in Turkey
JFY2003	30	Software/ ENVI+IDL Upgrade&Support	2	RSC	A	A	Purchased in Turkey
JFY2003	31	GIS Software/ ARC View Upgrade&Support	2	RSC	A	A	Purchased in Turkey
JFY2003	32	Computer Desk Top Dual Monitor (HP XW6000)	1	RSC	A	A	Purchased in Turkey
JFY2003	33	Computer Desk Top Dual Monitor (HP XW4000)	6	RSC	A	A	Purchased in Turkey
JFY2003	34	Note-type Computer (HP NW8000)	1	RSC	A	A	Purchased in Turkey

Usage : A/ Almost every day use B/ Weekly basis use C/ Concentrated use for certain times (In case of C, explain the reason in the remarks)
D/ 3-11 times per year (In case of D, explain the reason in the remarks) E/ Not in use at present (In case of E, explain the reason in the remarks)

Condition : A/ Good condition and well maintained B/ Good condition C/ Needs to be repaired D/ Malfunction (Needs to be replaced)

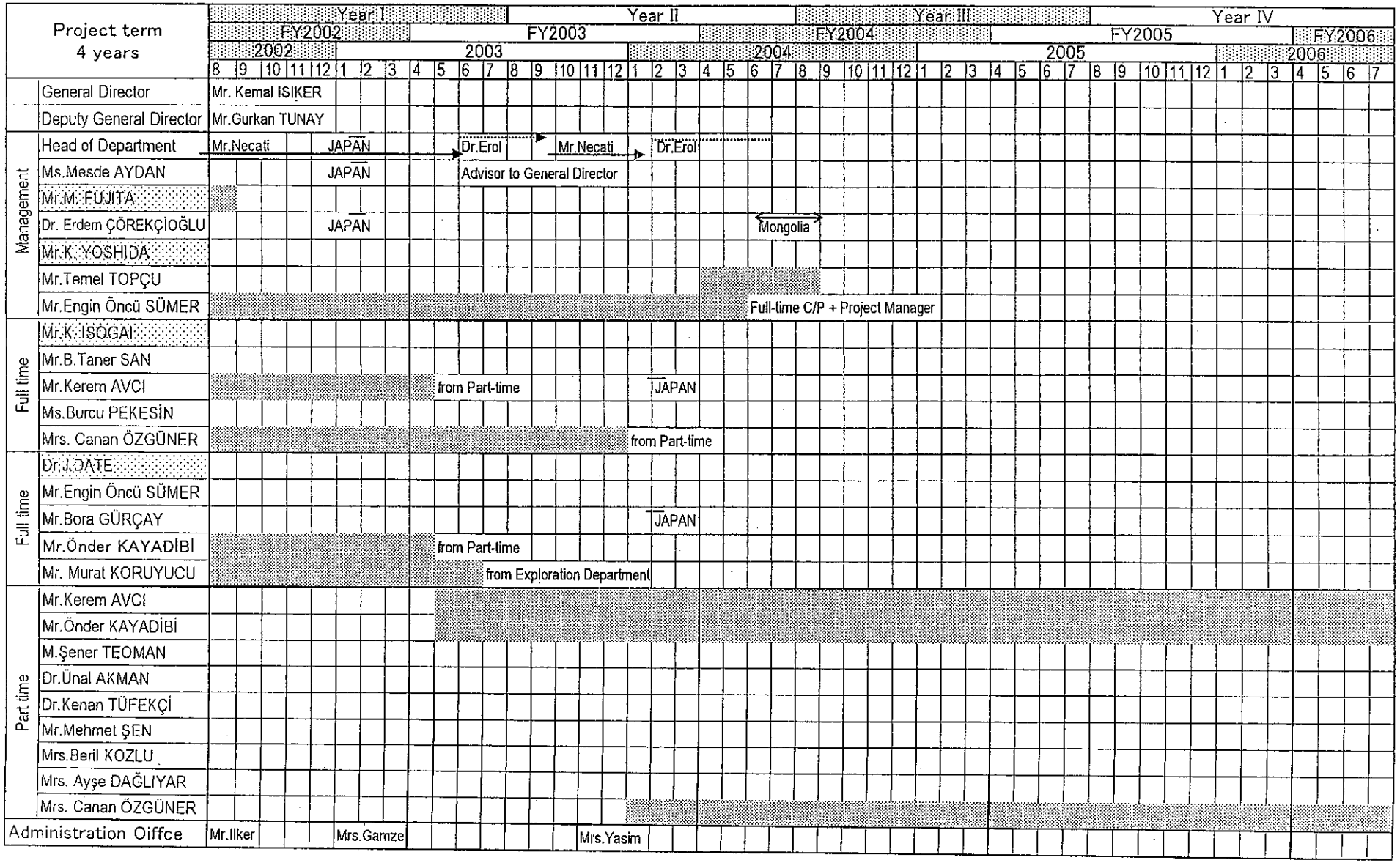
RECORD OF COUNTERPART TRAINING IN JAPAN

Geological Remote Sensing Project in Turkey as of May 1, 2004

	Training Period	Trainee's Name	Position	Name of Course
1	From 16 Jan. 2003 to 1 Feb. 2003	Mr. Necati TURHAN	Head of Geological Research Department	Utilization of Remote Sensing
2	From 16 Jan. 2003 to 1 Feb. 2003	Dr. Erdem COREKCIOGLU	Coordinator of International Projects and Foreign Affairs	Utilization of Remote Sensing
3	From 16 Jan. 2003 to 1 Feb. 2003	Ms. Mesude AYDAN	Coordinatorof the Division of Remote Sensing and GIS, Geological Research Department	Utilization of Remote Sensing
4	From 19 Jan. 2004 to 13 Feb. 2004	Mr. Osman Bora GURCAY	Unit Manager of the System Support Unit, Division of Remote Sensing and GIS, Geological Research Department	Geologic Remote Sensing and MultispectralAnalysis Using ENVI's Tools and Applied Lithological Discrimination
5	From 19 Jan. 2004 to 13 Feb. 2005	Mr.Kerem Mustafa AVCI	Division of Remote Sensing and GIS, Geological Research Department(Full-time C/P)	Environmental Variation Monitoring by Satellite Data

MEMBER OF THE PROJECT

Annex 7



DISBURSEMENT OF MAIN FUNCTIONAL SUBJECTS (SUMMARY)

Main Functional Subjects	2002	2003	2004 (Plan)	2004 Share (%)
Field (Study and Research) Projects	5,710,000.	7,000,000	9,290,000	7.66%
Numericalization Preparing Map & Printing	1,100,000	1,000,000	772,000	0.64%
Scientific an Technological Studies	2,100,000	2,040,000	3,880,000	3.20%
Machine-Equipment-Materials	5,985,000	6,530,000	5,301,000	4.37%
Construction	4,355,000	5,030,000	3,357,000	2.77%
Renovation	5,500,000	6,100,000	6,750,000	5.56%
Personnel Expenses	67,000,000	85,000,000	92,000,000	75.81%
Total	91,750,000	112,700,000	121.350,000	100.00%

(Unit: Million Turkish Lira)

LOCAL COST ALLOCATION

Geological Remote Sensing Project in Turkey as of May 1, 2004

	Currency	JFY-2002	JFY-2003	JFY-2004	JFY-2005	JFY-2006	Total
Local Cost	(YEN)	2,891,185	4,728,000				
	(USD)	22,304.34	41,571.06				

TOTAL OF OTHER INPUTS FROM TURKISH SIDE

Geological Remote Sensing Project in Turkey as of May 1, 2004

Input \ Fiscal Year	2002	2003	2004	2005	2006
Provision of Facilities: Remote Sensing Center Renovated prior to the start of the Project	Total Foor Area of 762㎡	Total Foor Area of 762㎡	Total Foor Area of 762㎡		
Local Cost: Purchase of ASTER Images, consumables, per diem, maintenance fee, misc. for workshops	2,900USD (Between Aug and Dec., 2002) Excluding salary for C/Ps	40,000USD (Between Jan. and Dec. 2003) Excluding Salary for C/Ps	180,000USD so far this year for s/w upgrading		
Other	Provision of transportation for commuting and driver	Provision of transportation for commuting and driver	Provision of transportation for commuting and driver		

ACHIEVEMENT OF OUTPUTS (3rd Monitoring / from September 2003 to January 2004)

Outputs	Indicator	Target in this term	Achievements in this term	Reason if planned targets wouldn't been satisfied
1 The project operation unit (RSC) is established. In common with the Sub-project A & B	1-1 Personnel, budgets and facilities of the MTA/RSC are secured. 1-2 Monitoring and meeting of the Joint Coordinating Committee (JCC) are working as planned.	In order to verify the indicator and measure the achievement of the Output 1, the following data is planned to be produced during this term. (Refer to the "Expected Products from Each Activity" attached, for all the products during the project term.) **P101 MTA Annual work plan** **P102 Reports of C/P training in Japan** **P103 APO 2004** **P108 Other PR materials** **P109 JICA MTA Seminar Record** **P112 Record of Monitoring**	P101 It has been made. P102 Reports were not made in this term. P103 APO 2004 has been made except the form of the bar chart. P108 Satellite miniature model was made. P109 The seminar was postponed until March 18, 2004. But the project held an extra seminar in September 4, 2003. P112 The 2nd monitoring record was made in Oct. 2003.	P102 The training was delayed for 3months. It started from the mid January and ended in the beginning of February. Therefore, reports will be made during early next term. P103 The bar chart form will be made in early next term. P109 Seminar record of September 4, 2003 was prepared while the other seminar record will be available in early next term.
2 Equipment and advanced satellite data are introduced and maintained properly. In common with the Sub-project A & B	Contents and condition of equipment are put in order.	In order to verify the indicator and measure the achievement of the Output 2, the following data is planned to be produced during this term. (Refer to the "Expected Products from Each Activity" attached, for all the products during the project term.) *NOTE : Underlined product numbers (ex. P203) are not the subjects of the monitoring in this term. These items were supposed to have been completed previous terms, but they were not completed as scheduled. Therefore, they are checked and listed again.* **P203 Operation manuals for application & file server** **P204 Maintenance manuals for software licenses** **P205 Version up records for software** **P206 Balance Record of Consumables** **P208 Purchase plan and Record for the 140 images of the proposed areas**	P203 Completed. P204 Completed. P205 Almost completed. P206 Completed. P208 Completed.	P205 It will be completed in early next ter m, as this record includes additional software which will be donated in March 2004.

ACHIEVEMENT OF OUTPUTS (3rd Monitoring / from September 2003 to January 2004

Outputs	Indicator	Target in this term	Achievements in this term	Reason if planned targets wouldn't been satisfied
3 Image processing of ASTER data for mineral resources exploration can be carried out by the C/P personnel. For the Sub-project A	Essential part of the technology of the image processing is transferred by 2004.	In order to verify the indicator and measure the achievement of the Output 3, the following data is planned to be produced during this term. (Refer to the "Expected Products from Each Activity" attached, for all the products during the project term.) *NOTE : Underlined product numbers (ex. P302) are not the subjects of the monitoring in this term. These items were supposed to have been completed previous terms, but they were not completed as scheduled. Therefore, they are checked and listed again.* 3-1 Introduce application of ASTER data. 3-1-1 Introduce characteristics of ASTER data **P301 Additional texts of ASTER data characteristics made by LE and SE** **① LE (Image processing)** **② Mr. NINOMIYA (TIR)** **③ Dr. YAMAGUCHI (VNIR, SWIR)** **P302 Additional reports of ASTER data characteristics made by MTA** **① Mr. NINOMIYA (TIR)** **② Dr. YAMAGUCHI(VNIR, SWIR)** **P302 Reports of ASTER data characteristics made by MTA** **① Dr. TANIGUCHI (Environmental and Hazard)** **② Dr. NAKAYAMA(DEM)** **③ Mr. MURAOKA(TIR)** **P302 Reports of ASTER data characteristics made by MTA** **① Dr. HASE (Photo Geology)** 3-1-2 Operate data search and DPR system of ASTER **P303 Operation Manual for ASTER data search** **P304 ASTER data quality database of Turkey**	P301 Completed. P302 Completed. P302 Completed. P302 Not completed. P303 Completed. P304 Only purchased scenes of the d ata were compiled. Other data of the same scenes are being prepared.	P302 As photogeology needs comprehensive understanding of geological principle and experienced skills to produce photogeological map, it is very difficult to compile the contents given by short-term expert into a collective report.

Continued from the previous page *3 Image processing of ASTER data for mineral resources exploration can be carried out by the C/P personnel.* *For the Sub-project A*	*Essential part of the technology of the image processing is transferred by 2004.*	3-1-3 Introduce effective use of ASTER data established by previous studies **P305 Additional texts of lectures made by SE** **① Mr. NINOMIYA** **② Dr. YAMAGUCHI** **P306 Additional reports of lectures made by MTA** **① Mr. NINOMIYA** **② Dr. YAMAGUCHI** 3-2 Introduce processing of VNIR and SWIR data. 3-2-1 Introduce operation of VNIR and SWIR bands data. **P307 Report of the acquired technical know-how(MTA)** **P308 Manual for the acquired technical know-how of the operation of ZNIR and SWIR bands data (MTA)** 3-2-2 Introduce methodology to discriminate alteration area **P309 Report of the acquired technical know-how (MTA)** **P310 Manuals of the methodology to discriminate alteration area (MTA)** 3-2-4 Produce stereoscopic image of ASTER data. **P312 Report of the acquired technical know-how (MTA)** **P313 Manual for production of stereoscopic image of ASTER data (MTA)** 3-3 Analyze TIR data. 3-3-2 Carry out image processing of TIR data **P315 Manuals for special techniques of TIR data image processing transferred by SE (Mr. NINOMIYA) and LE (MTA)** **P315 Manuals of TIR data image processing including special techniques transferred by SE(Mr.MURAOKA) and LE (MTA)** 3-3-3 Carry out lithological mapping by silica content **P316 Manual for special techniques of transferred by SE(Mr. NINOMIYA) and LE (MTA)**	**P305** Refer to P301. **P306** Refer to P302. **P307** Completed. **P308** Completed. **P309** Completed. **P310** Completed. **P312** Completed. **P313** Completed. **P315** Completed. **P315** Completed. **P316** Completed. (Included in P315)	

Continued from the previous page *3 Image processing of ASTER data for mineral resources exploration can be carried out by the C/P personnel.* *For the Sub-project A*	*Essential part of the technology of the image processing is transferred by 2004.*	3-3-4 Carry out ground truth **P317 Report of ground truth (when it is carried out)** 3-4 Generate regional DEM processing ASTER stereo mode data. 3-4-1 Produce DEM 3-4-2 Utilize DEM **P318 Manual for special techniques transferred by SE(Dr. NAKAYAMA) and LE. (MTA)** 3-5 Transfer technology of effective application of ASTER data. 3-5-1 Analyze stereo image by stereo viewing method. **P320 Report for special techniques transferred by SE and LE (MTA)** **P321 Manual for analysis of stereo image (MTA)** **P322 Lineament maps from stereo image by stereo-viewing method, if possible (MTA)** 3-5-2 Produce alteration mineral maps by multi-spectral analysis **P323 Report for special techniques transferred by SE and LE (MTA)** **P324 Manuals for alteration mineral maps by multi-spectral analysis including special techniques transferred by SE and LE (MTA)** 3-6 Carry out data acquisition of spectrometer and construction of spectral database. 3-6-2 Carry out data acquisition. **P326 Reports on comparison between spectrometer measurement and XRD analysis results(MTA)** 3-6-3 Construct database of spectral response of minerals and rocks **P327 Database for the 3 proposed case study areas including digital maps which show location and coordinates of samples (GPS) (MTA)**	P317 Completed P318 Not completed yet. P320 Not completed yet. P321 Not completed yet. P322 Not completed yet. P323 Not completed yet. P324 Not completed yet. P326 There was no activity in this term. P327 It is going on.	P318 Manual will be compiled through actual image processing experience with feeling of reality of special techniques. P320, P321, P322 As photogeology utilizing stereo image also needs comprehensive understanding of geological principle and experienced skills to produce photogeological map, it is very difficult to compile the contents given by the short-term expert into collective report. (Sama with P302) P323 Manual will be compiled through actual image processing work with feeling of reality of special techniques. (Same with P318) P324 Additional technical transfer from JICA expert is necessary to make manuals. P326 It will be performed in next term, because most of XRD data were not obtained yet. P327 It takes one year to complete, then it will be completed in 4th(next) or 5th monitoring term.

ACHIEVEMENT OF OUTPUTS (3rd Monitoring / from September 2003 to January 2004

Outputs	Indicator	Target in this term	Achievements in this term	Reason if planned targets wouldn't been satisfied
4 Case studies of mineral resources exploration utilizing ASTER data are accumulated. For the Sub-project A	120 frames of ASTER data coverage over three (3) proposed case study areas are processed and interpreted by 2006.	In order to verify the indicator and measure the achievement of the Output 4, the following data is planned to be produced during this term. (Refer to the "Expected Products from Each Activity" attached, for all the products during the project term.) *NOTE : Underlined product numbers (ex. P402) are not the subjects of the monitoring in this term. These items were supposed to have been completed previous terms, but they were not completed as scheduled. Therefore, they are checked and listed again.* 4-1 Collect data of the proposed areas and input data. 4-1-1 Collect and check the existing data **P401 Addition to collected data list (1 set)** **P402 Checked data list with comments 30 articles for this term (Approx. 180 articles from 60 places in total during the project term)** P402 **(Result of the previous term)** CSA-1; 5 reports and 10 articles were checked. CSA-2; 18 reports and 14 articles were checked. CSA-3; 3 reports and 10 articles were checked. Then totally 60 papers were checked, but not printed. 4-1-2 Convert the collected analog data into digital **P403 Digitized data list 10 places for this term (Approx. 60 places in total during the project term)** P403 **(Result of the previous term)** CSA 1; Some data of 2 places were digitized. CSA 2; Some data of 3 places were digitized. CSA 3; Some data of 2 places were digitized. Then totally 7 places were digitized.	P401 No addition in this term. P402, P402 In total, 60 articles will be checked during the 2nd and 3rd monitoring period. 12 reports and articles were checked in this term. CSA 1; 3 reports and articles CSA2; 7 reports and articles CSA 3; 2 reports and articles In total, 72 reports and articles, including the previous results, have been checked and all data has been filed. P403, P403 The target number of the digitized list is 20 places during 2nd and 3rd monitoring period. The result is as follows; CSA1: Work of the previous period (2 places) has being carried out continuously. CSA2: Work of the previous period (3 places) has being carried out continuously. CSA3: Work of the previous period (2 places) has being carried out continuously. In total, 7 places are under digitizing process continuously.	P403, P403 There are some delay appeared in this product. The delay resulted from the following reasons; (1) Different geological maps are found in the area of one ASTER scene because of the different views made by different geologists. Therefore, it takes more time to harmonize these maps or to find out the way to digitize. (2) Alteration maps are not always available. (3) Existing geochemical data is not always available. In previous monitoring, the project team mentioned that the target number should be

Continued from the previous page 4 *Case studies of mineral resources exploration utilizing ASTER data are accumulated.* *For the Sub-project A*	*120 frames of ASTER data coverage over three (3) proposed case study areas are processed and interpreted by 2006.*	but not printed. 4-2 Analyze data of the proposed areas. 4-2-1 Analyze VNIR and SWIR data. 4-2-2 Analyze TIR data 4-2-3 Analyze DEM data **P404 Analyzed data sets of ASTER 20 scenes for this term(Approx.120 sets in total during the project term.)** One set including the followings; ①Geo-referenced false color imagery ②Geologic interpretation maps of ASTER data (Scale 1/100,000), if necessary ③Geo-referenced stereo scope imagery ④Ratioing imagery of effective combination (8 combinations) ⑤Alteration mineral distribution maps (5 minerals) ⑥Lineament maps which were produced from ASTER false color, stereo-view and shade images ⑦Silica contents map from ASTER-TIR data ⑧DEM from ASTER, if necessary ⑨Geomorphologic maps which were produced from ASTER DEM (1 for each proposed areas), if necessary ⑩Drainage maps from photo interpretation, if necessary ⑪Maps for thermal emissivity separation (MTA) P404 **(Result of the previous term)** CSA 1; 3 scenes were analyzed. CSA 2; 4 scenes were analyzed. CSA 3; 3 scenes were analyzed.	P404, P404 40 scenes are targeted to be completed during 2nd and 3rd monitoring periods. The result by the end of January 2004 is as follows; CSA 1: (0) scenes were completed. (6) scenes are under processing and analyzing. CSA 2: (0) scenes were completed. (12) scenes are under processing and analyzing. CSA 3: (0) scenes were completed. (6) scenes are under processing and analyzing. In total, 24 scenes are under processing.	reconsidered for this product. P404, P404 The project decided to add some more work described below in order to control the progress of the processing and to make user-oriented products. These additional works have also resulted in the delay of the production. **Additional work** 1. Outline of the area and summary of the image processing and analyzing (with in an A4 paper) (1)General Information on ASTER Scene ・Climate, condition of vegetation ・Geology, ore showing (2)Results of image processing and analyzing 2. Printed geologic map for ASTER scene with a scale of 1 to 100,000(A0) and folded into A4 size and put into each folders 3.Printed ASTER imagery and analyzed maps with a scale of 1 to 500,000 (A4 size) (1) False color image (2) 3D image (3) Ratioing imagery with colored anomary (4) Extracted geologic structure map ・lineament ・circle structure ・others (5) Spectral indices imagery (6) Results of TIR analysis (7) Others 4.Printed ASTER imagery and analyzed maps with a scale of 1 to 100,000 (A0 size) (1) False color image(High gross roll-paper) (2) 3D image(High gross roll-paper) (3) Extracted geologic structure map lineament (Transparent roll-paper)

Continued from the previous page 4 *Case studies of mineral resources* - *exploration utilizing ASTER data are accumulated.* *For the Sub-project A*	*120 frames of ASTER data coverage over three (3) proposed case study areas are processed and interpreted by 2006.*	4-3 Select the promising areas. 4-3-1 Analyze the proposed areas using GIS **P405 Integrated maps Approx.10 places of analyzed data set for this term (Approx.60 places in total during the project term)** **<u>P405</u> (Result of the previous term)** CSA 1; Integrated maps of 3 places (South-east of Can, South-west of Can, North-east of Can) were obtained. CSA 2; No integrated maps was obtained. CSA 3; Integrated maps of 1 places (Attepe) were obtained. Then totally integrated maps from 4 places were obtained, but not printed. 4-3-2 Extract promising areas **P406 10 places of maps of promising areas for this term (Approx.60 places in total during the project term)** **<u>P406</u> (Result of the previous term)** CSA 1; Extracted map of 1 place (South-east of Can) was drawn. CSA 2; No extracted map was drawn. CSA 3; Extracted map of 1 place(Attepe) was drawn.	**P405, <u>P405</u>** 20 places of integrated maps are targeted to be produced during 2nd and 3rd monitoring periods. In this term, 5 places mentioned below were drawn and redrawn. CSA 1; 2 places(South-west of Can, North-east of Can) were redrawn. CSA 2; 2 places(Cayeli, Mastra-Torul) were drawn. CSA 3; 1 place(Attepe) were redrawn. By the end of this term, the number of the produced Integrated maps are 2 as follows; CSA 1; 1 CSA 2; 0 CSA 3; 1 **P406, <u>P406</u>** 20 places of maps of promising areas (Extracted map) are targeted to be produced during 2nd and 3rd monitoring periods. In this term, 5 places were drawn and redrawn as follows; CSA 1; 2 places (South-west of Can, North-east of Can) were drawn. CSA2; 2 places(Cayeli, Mastra-Torul) were drawn. CSA 3; 1 place(Attepe) was redrawn. By the end of this term, the number of the produced Extracted maps is 1 as follows; CSA 1; 1 CSA 2; 0 CSA 3; 0	This product is related to the development of the product P403 There are some delay appeared in this product. The delay resulted from the following reasons; (4) Different geological maps are found in the area of one ASTER scene because of the different views made by different geologists. Therefore, it takes more time to harmonize these maps or to find out the way to digitize. (5) Alteration maps are not always available. (6) Existing geochemical data is not alw ays available. In previous monitoring, the project team mentioned that the target number should be reconsidered for this product. This product is also related the development of the product P403 and P405. Reason of the delay is same as the product 405.

Continued from the previous page 4 *Case studies of mineral resources exploration utilizing ASTER data are accumulated.*	*120 frames of ASTER data coverage over three (3) proposed case study areas are processed and interpreted by 2006.*	4-4 Carry out ground truth. 4-4-1 Make plan of ground truth **P407 Plan of survey of most preferable 6 localities for this term (Approx.36 localities in total during the project term)** **P407 (Result of the previous term)** 3 places(Trabzon, Murgul, Pozanti) were planned to survey. 4-4-2 Carry out field survey **P408 Comprehensive reports of survey on 6 localities for this term (Approx.36 localities in total during the project term)** **P408 (Result of the previous term)** Reports on 3 places' survey(Trabzon, Murgul, Pozanti) were completed.	**P407, P407** 12 localities are targeted to be planned during 2nd and 3rd monitoring periods. 3 localities (Can, Ordu, Gumushane) were planned to survey in this term. 3 localities (Trabzon, Murgul and Pozanti) were planned during previous term. In total, 6 localities were planned and the documents were filed. **P408, P408** 12 reports of the field surveys were made and filed. Reports of Pozanti,Can, Ordu and Gumushane were made in this term. Reports of Trabzon and Murgul were made during previous term. In total, 6 reports were made and filed.	**P407, P407, P408, P408** A half of the target number was achieved. The achievement is rather behind the schedule, because counterparts could not have enough time to carry out the ground surveys.

ACHIEVEMENT OF OUTPUTS (3rd Monitoring / from September 2003 to January 2004

Outputs	Indicator	Target in this term	Achievements in this term	Reason if planned targets wouldn't been satisfied
5 Spatial analysis by GIS can be carried out by the C/P personnel. For the Sub-project A	Essential part of the technology of the spatial analysis by GIS is completed by 2003.	In order to verify the indicator and measure the achievement of the Output 5, the following data is planned to be produced during this term. (Refer to the "Expected Products from Each Activity" attached, for all the products during the project term.) *NOTE : Underlined product numbers (ex. P502) are not the subjects of the monitoring in this term. These items were supposed to have been completed previous terms, but they were not completed as scheduled. Therefore, they are checked and listed again.* 5-1 Transfer technology of integrated spatial analysis integrating various geologic data. 5-1-1 Introduce guideline how to extract promising areas 5-1-2 Study basics and concept of GIS through case study 5-1-3 Apply basic methods of extract promising areas utilizing GIS 5-2 Transfer technology how to select exploration area utilizing GIS. 5-2-1 Extract promising area utilizing GIS		

Continued from the previous page *5 Spatial analysis by GIS can be carried out by the C/P personnel.* *For the Sub-project A*	*Essential part of the technology of the spatial analysis by GIS is completed by 2003.*	5-2-2 Apply advanced techniques of GIS to extract promising areas **P502 Report including manual on GIS lecture (MTA)** **P503 A sample data set from analyzed map to evaluation map**	P502 Completed. P503 Completed (Document with CD).	

ACHIEVEMENT OF OUTPUTS (3rd Monitoring / from September 2003 to January 2004

Outputs	Indicator	Target in this term	Achievements in this term	Reason if planned targets wouldn't been satisfied
6 Analysis for natural hazard area using Japanese SAR and ASTER data can be carried out by the C/P personnel. For the Sub-project B	Essential part of the technical transfer for the natural hazard area analysis is completed by 2005.	In order to verify the indicator and measure the achievement of the Output 6, the following data is planned to be produced during this term. (Refer to the "Expected Products from Each Activity" attached, for all the products during the project term.) *NOTE : Underlined product numbers (ex. P602) are not the subjects of the monitoring in this term. These items were supposed to have been completed previous terms, but they were not completed as scheduled. Therefore, they are checked and listed again.* 6-1 Introduce basic knowledge of utilization of satellite data for disaster monitoring **P601 Additional texts of lectures (JICA)** (Text of the new short-term will be added to the P301.) **P602 Additional reports of lectures (MTA)** (The report will be added to the P302) **P602 Reports of lectures (MTA)** (Refer to the report, P302 concerning to the Dr. TANIGUCHI's lecture.) 6-2 Transfer technology how to extract possible hazard areas utilizing ASTER and/or SAR image. 6-2-1 Process and generate ASTER images of the proposed areas **P604 Reports of lectures (MTA)** (Refer to the report, P302	P601 None. Dispatch of the short-term expert in this field is delayed. P602 None. Dispatch of the short-term expert in this field is delayed. P602 Refer to P302. P604 Refer to P302.	**P601 and P602** Because of delay of dispatch of the short-term expert (Mr. Kikuchi).

Continued from the previous page *6 Analysis for natural hazard area using Japanese SAR and ASTER data can be carried out by the C/P personnel.* *For the Sub-project B*	*Essential part of the technical transfer for the natural hazard area analysis is completed by 2005.*	concerning to the Dr. TANIGUCHI and Dr. NAKAYAMA's lecture.) **P605 Analyzed maps (approx. 2 scenes in this term)** 6-2-2 Process and generate SAR images of the proposed areas. **P606 Texts of lectures made by SE** **P607 Reports of lectures (MTA)** 6-2-3 Carry out photo-geological interpretation. **P609 Texts of lectures made by SE** **P610 Texts of lectures (JICA)**	**P605** None **P606** None **P607** None **P609** None **P610** None	**P605** This activity was postpone to be performed in 5th monitoring term. **P606, P607, P609 and P610** Because of delay of dispatch of the short-term expert (Mr. Kikuchi).

ACHIEVEMENT OF OUTPUTS (3rd Monitoring / from September 2003 to January 2004

Outputs	Indicator	Target in this term	Achievements in this term	Reason if planned targets wouldn't been satisfied
7 Environmental analysis using remote sensor data can be carried out by the C/P personnel. For the Sub-project B	Essential part of the technical transfer for the environmental analysis is completed by 2004.	In order to verify the indicator and measure the achievement of the Output 7, the following data is planned to be produced during this term. (Refer to the "Expected Products from Each Activity" attached, for all the products during the project term.) *NOTE : Underlined product numbers (ex. P701) are not the subjects of the monitoring in this term. These items were supposed to have been completed previous terms, but they were not completed as scheduled. Therefore, they are checked and listed again.* 7-1 Transfer technique how to select environmental indicator such as vegetatio n index. **P701 Manuals of how to select environmental indicator including special techniques transferred by SE(Dr. Taniguchi and Mr. Muraoka) and LE (MTA)**	**P701** Ongoing	**P701** Manual will be compiled through actual image processing work with feeling of reality of special techniques.

Continued from the previous page *7 Environmental analysis using remote sensor data can be carried out by the C/P personnel.* *For the Sub-project B*	*Essential part of the technical transfer for the environmental analysis is completed by 2004.*	7-2 Introduce remote sensing technology applicable to environmental problem in Turkey. **P702 Additional texts of lectures made by SE** **P703 Additional reports of lectures (MTA)** **P704 Manuals of analysis method for environmental problems including special techniques transferred by SE(Dr. Taniguchi and Mr. Muraoka) and LE (MTA)**	P702 None P703 None P704 Ongoing .	**P702 and P703** Because of delay of dispatch of the short-term expert (Mr. Kikuchi) who will be dispatched in early next term. P704 Manual will be compiled through actual image processing work with feeling of reality of special techniques.

ACHIEVEMENT OF OUTPUTS (3rd Monitoring / from September 2003 to January 2004

Outputs	Indicator	Target in this term	Achievements in this term	Reason if planned targets wouldn't been satisfied
8 MTA/RSC can provide necessary technical support to implement training courses. (In common with the Sub-project A & B)	Technical support program and materials for the Third Country Training Program (TCTP) are produced by 2004.	In order to verify the indicator and measure the achievement of the Output 8, the following data is planned to be produced during this term. (Refer to the "Expected Products from Each Activity" attached, for all the products during the project term.) 8-1 Make technical program for TCTP. **P801 Training Program for TCTP** 8-2 Carry out training courses (other than TCTP).	**P801** The Training program has been made before end of December 2003.	

PROGRESS OF ACTIVITIES FOR EACH OUTPUT (3rdMonitoring: from September 2003 to January 2004)

Output No.1 and its description; The project operation units (RSC) is established. (In common with the Sub-project A & B)

Activities	Progress of Activities		Problems in this term	Target and activities in the next term
	Plan	Actual		
1-1 Allocate staff as planned 1-1-1 Allocate staff for FY 2003	1-1-1 7 full-time counterparts and 7 part-time counterparts are planned to be allocated.	1-1-1 The number of full-time counterparts was increased. 1 was shifted from part-time counterparts. In total, 8 full-time counterparts and 6 part-time counterparts have been allocated.	1-1-1 None	1-1-1 The numbers of full-time and part-time counterparts will be kept.
1-1-2 Make plan and follow the procedure of C/P training in Japan	1-1-2 For training FY2003, the training schedule will be decided and the train will be carried out. For the training FY2004, the trainees will be selected and the frame work of the training will be decided.	1-1-2 2 full-time counterpart trainees, Mr. Bora Gurcay (Sub-project A) and Mr. Kerem AVCI (Sub-project B) were dispatched to Japan Their training duration is as follows; Jan 17, 2004 to Feb 13, 2004 For the training FY2004, 2 trainees (Mr. Engin SUMER and Ms. Brucu PEKESIN) were selected and basic frame work of the training were made.	1-1-2 It was a quite tough work to settle their training schedule, because their topics for training were very specific and organizations which can afford to accept such training are very rare.	1-1-2 For FY2004 training, the detailed training contents and its schedule will be realized.
1-2 Make plan of operation 1-2-1 Make annual plan of operation for FY2004	1-2-1 Annual plan of operation will be made during September to October.	1-2-1 The plan of the inputs for FY2004 was made in November, but it was not finalized during this term. Therefore, APO 2004 could not finalized in this term. MTA work plan FY 2004 was also made in December 2003.	1-2-1 None	1-2-1 APO for FY2004 will be made before end of March 2004.
1-2-2 Establish and manage booth of the project inside the MTA Museum.	1-2-2 The minimum necessary items such as flames for the satellite images and the satellite miniature model will be made.	1-2-2 12 frames (1x1.4m approx.) were made. Satellite model was also made.	1-2-2 New museum has not opened yet. Therefore, the opening of PR booth may also delay.	1-2-2 A task committee will be established in order to exchange ideas and prepare panels and other decorations.

	1-2-3 Hold seminar for beneficiaries of mining sector in Turkey	1-2-3 A half day seminar will be held in September.	1-2-3 It was held on September 04, 2003.	1-2-3 None	1-2-3 Seminar focusing on mining will be held in March 2004.
1-3	**Make budgetary plan** Make budgetary plan for FY2004	The plan will be made during September to December2003.	The plan (both MTA and Japanese side) was made according to the schedule.	None	Budgetary plan for FY 2004 will be made.
1-4	**Make and implement monitoring plan**				
	1-4-1 Make monitoring plan	1-4-1 No activity planned.	1-4-1 None	1-4-1 None	1-4-1 None
	1-4-2 Carry out the 2nd and the 3rd monitoring	1-4-2 The 2nd monitoring will be carried out in August 2003 and the 3rd monitoring will be in February 2004.	1-4-2 The second monitoring was carried out during September and October.	1-4-2 None	1-4-2 The 3rd monitoring will be carried out in February.
1-5	**Operate the Joint Coordinating Committee** Carry out the 2nd Joint Coordinating Committee Meeting	No activity planned for this term. It will be carried out 3rd monitoring period (From September 2003 to January 2004).	The 2nd JCC was held in September 5, 2003 according to the schedule of the consultation mission.	None	The 3rd JCC will be held in March 2004.

PROGRESS OF ACTIVITIES FOR EACH OUTPUT (3rd Monitoring: from September 2003 to January 2004)

Output No.2 and its description; Equipment and advanced satellite data are introduced and maintained properly.
(In common with the Sub-project A & B)

Activities	Progress of Activities		Problems in this term	Target and activities in the next term
	Plan	Actual		
2-1 **Procure and install necessary equipment** 2-1-1 Prepare plan for procurement of equipment in FY2004	2-1-1 No activity planned for this term. There will be no procurement in FY2004.	2-1-1 None	2-1-1 None	2-1-1 None
2-1-2	2-1-2	2-1-2	2-1-2	2-1-2

	Follow the necessary procedures for procurement of equipment in FY2003	It was planned to procure the following items; Computers and software for training purpose	Necessary procedure of the procurement of the said equipment was done and the purchase contract was also made.	None	Installation and inspection will be carried out in the beginning of next term.
2-2	**Operate and maintain equipment properly**				
	2-2-1 Make guidance for operation of equipment	2-2-1 This activity was completed in FY2002.	2-2-1 None	2-2-1 None	2-2-1 None
	2-2-2 Make guidance for maintenance of equipment	2-2-2 Completed in FY2002	2-2-2 None	2-2-2 None	2-2-2 None
	2-2-3 Make manual for operation of equipment	2-2-3 This activity refers to a operation manual for the spectrometer and the manual will be completed in this term.	2-2-3 The manual was completed in August.	2-2-3 None	2-2-3 None
	2-2-4 Make lists of consumables for FY2004	2-2-4 No activity planned for this term. It will start from 3rd monitoring period (From September 2003 to January 2004).	2-2-4 None	2-2-4 None	2-2-4 This activity should be changed as follows; "Keep balance of consumables"
	2-2-5 Carry out maintenance of equipment	2-2-5 Any specific plan has not been made.	2-2-5 Counterparts have been taking care of equipment, as equipment has been utilized every day basis.	2-2-5 None	2-2-5 Start procedures of purchasing the annual upgrade of satellite image analysis and GIS software.
	2-2-6 Carry out periodical calibration for spectrometer	2-2-6 No activity planned for this term. It is planed to be carried out in FY2004.	2-2-6 None	2-2-6 None	2-2-6 Planned to be carried out in March 2005
2-3	**Purchase ASTER image according to the schedule**	Approximately 140 scenes will be purchased during the project term.	In total, 35 scenes were purchased by the end of January 2004.	None	There is no purchase plan during the next term.

PROGRESS OF ACTIVITIES FOR EACH OUTPUT (3rd Monitoring: from September 2003 to January 2004)

Output No.3 and its description; Image processing of ASTER data for mineral resources exploration can be carried out by the C/P personnel.
For the Sub-project A

Activities	Progress of Activities		Problems in this term	Target and activities in the next term
	Plan	Actual		
3-1 Introduce application of ASTER data				
3-1-1 Introduce characteristics of ASTER data	3-1-1 The activity in this term focuses on introduction of the characteristics on VNIR and SWIR of ASTER data analysis and mainly will be introduced by one short-term expert.	3-1-1 One short-term expert (Prof. Dr. YAMAGUCHI) was dispatched form 27 Sep. to 5 Oct. 2003 and made technical transfer to full-time and part-time counterparts as planned.	3-1-1 None	3-1-1 A further characteristic will be introduced by the short-term expert during the 7th monitoring period (August 2005 to January 2006).
3-1-2 Operate data search and DPR system of ASTER	3-1-2 Operation of data search and DPR system of ASTER will be carried out every two months.	3-1-2 The project has received services from Nik Insaat Ticaret Ltd., a Turkish agency of ERSDAC, for the searching of ASTER data.	3-1-2 Counterparts can carry out necessary data search at MTA, but it is time consuming due to limited internet performance of MTA.	3-1-2 The result provided by Nik will be compiled and selected for purchase order.
3-1-3 Introduce effective use of ASTER data established by previous studies	3-1-3 This activity will be carried out by 1 short-term expert.	3-1-3 One short-term expert, Prof. Dr. YAMAGUCHI, carried out this activity and he gave example to full-time and part-time counterparts by lecturing the following topics; "Development of a lithologic discrimination method for ASTER SWIR data"	3-1-3 None	3-1-3 It is planned to be carried out by newly dispatched short-term experts in 5th and 7th monitoring terms.
3-2 Introduce processing of VNIR and SWIR data				
3-2-1 Introduce operation of VNIR and SWIR bands data	3-2-1 This activity was completed during the 1st monitoring period.	3-2-1 None	3-2-1 None	3-2-1 None
3-2-2 Introduce methodology to discriminate alteration area	3-2-2 This activity was completed during the 2nd monitoring period.	3-2-2 None	3-2-2 None	3-2-2 None

3-2-3 Introduce photo-geological interpretation	3-2-3 This activity was completed during the 1st monitoring period (December, 2002).	3-2-3 None	3-2-3 None	3-2-3 None
3-2-4 Produce stereoscopic image of ASTER data	3-2-4 This activity was completed during the 1st monitoring period (January, 2003).	3-2-4 None	3-2-4 None	3-2-4 None
3-2-5 Carry out groundtruth	3-2-5 Groundtruth was completed in the 5th week of March, 2003.	3-2-5 None	3-2-5 None	3-2-5 None
3-3 Analyze TIR data 3-3-1 Introduce fundamental concept of thermal-infrared analysis	3-3-1 Fundamental concept of thermal-infrared analysis will be introduced by 2 short-term experts in March (Mr. MURAOKA) and in August (Mr. NINOMIYA), 2003. And the text of latter short-term expert(Mr. Ninomiya) will be provided.	3-3-1 This activity was performed as planned.	3-3-1 None.	3-3-1 None
3-3-2 Carry out image processing of TIR data	3-3-2 Report and manual of short-term expert(Mr. Ninomiya) dispatched in August, 2003 will be provided.	3-3-2 This activity was carried out as planned.	3-3-2 None.	3-3-2 This activity was completed. Thus, the technique learned from this activity will be fully applied to the activity 4-2-2.
3-3-3 Carry out lithological mapping by silica content	3-3-3 Report and manual of short-term expert(Mr. Ninomiya) dispatched in August, 2003 will be provided.	3-3-3 This activity was carried out as planned.	3-3-3 None.	3-3-3 This activity was completed. Thus, the technique learned from this activity will be fully applied to the activity 4-2-2.
3-3-4 Carry out groundtruth	3-3-4 Report of groundtruth performed in the previous monitoring term(Aug., 2003) will be provided.	3-3-4 This activity was carried out as planned.	3-3-4 None.	3-3-4 This activity was completed.

3-4	Generate regional DEM processing ASTER stereo mode data				
	3-4-1 Produce DEM	3-4-1 Additional basic DEM processing training by using PCI software will be continued during the 3rd monitoring period.	3-4-1 This activity was carried out by full-time counterparts using two scenes of ASTER L1A data (Canakkare and Duzce) .	3-4-1 Two default DEMs were produced and full-time counterparts are finding a best processing steps for generating DEM. It is taking a little bit of time because of trial and error.	3-4-1 After producing DEM by the best processing steps, this activity will be continued to the activity 4-2-3.
	3-4-2 Utilize DEM	3-4-2 This activity was completed. But the practice will continue as this activity 3-4-2 will be applied to the activity 4-2-3.	3-4-2 None	3-4-2 None	3-4-2 None
3-5	Transfer technology of effective application of ASTER data				
	3-5-1 Analyze stereo image by stereo-viewing method	3-5-1 This activity was completed during the 1st monitoring period.	3-5-1 None	3-5-1 None	3-5-1 None
	3-5-2 Produce alteration mineral maps by hyperspectral analysis	3-5-2 This activity was completed during the 1st monitoring period, but additional training will be planned during this monitoring period.	3-5-2 One short-term expert, Prof. Dr. YAMAGUCHI, dispatched from 27 Sep. to 5 Oct. 2003, carried out this activity and he explained some methods to full-time and part-time counterparts such as SAM or SHL.	3-5-2 None	3-5-2 One counterpart trainee of the training program for FY2004 will learn about hyperspectral analysis using ENVI.
3-6	Carry out data acquisition of spectrometer and construction of spectral database				
	3-6-1 Operate spectrometer (Introduction of spectrum data and training)	3-6-1 This activity was completed during the 1st monitoring period.	3-6-1 None	3-6-1 None	3-6-1 None
	3-6-2 Carry out data acquisition	3-6-2 Basic data acquisition will be completed for 3 case study areas.	3-6-2 (1)Sampling works for basic samples were completed as planned. (2)X-ray diffraction data for samples of No. 1 area taken in the previous term was obtained, but not yet for those of No. 1 area taken in this term nor No. 2 and 3 areas.	3-6-2 It seems to take much time to obtain X-ray diffraction data. As the project puts this data analysis into the hand of other department (Mineral Analysis and Technology Department) in MTA, this problem isn't under the project's control.	3-6-2 Basic data acquisition except XRD data was completed, but additional data acquisition for all case study areas will be continued until the end of this project.

3-6-3 Construct database of spectral response of minerals and rocks	3-6-3 Design of data base will be completed. Then the construction of data base will start during this monitoring period. But the construction will be completed in one year period.	(3)Data arrangement was completed as planned except XRD data. 3-6-3 (1)Design of Data base The designing was completed. (2)Construction of data base Construction means programming using "Visual Basic". This activity has started, but under construction.	3-6-3 As the estimation of the construction of data base is about one year, considerable amount of data will be accumulated. After the construction of data base, only data input is the main task and this task will become a routine work. So, the important issue is to monitor the development of construction.	3-6-3 The construction of data base will be completed in one year period.

PROGRESS OF ACTIVITIES FOR EACH OUTPUT (3rd Monitoring: from September 2003 to January 2004)

Output No.4 and its description; Case studies of mineral resources exploration utilizing ASTER data are accumulated.
For the Sub-project A

Activities	Progress of Activities		Problems in this term	Target and activities in the next term
	Plan	Actual		
4-1 Collect data of the proposed areas and input data 4-1-1 Collect and check the existing data	4-1-1 Existing data of the case study areas (No.1, 2 and 3) will be collected and checked. In this term, more than 30 reports in total will be checked.	4-1-1 12 reports from 3 case study areas were checked and totally 73 reports were checked by the end of this monitoring term.	4-1-1 None.	4-1-1 30 reports from 3 case study areas will be checked in next term.
4-1-2 Convert the collected analog data into digital	4-1-2 Data conversion from analogue will be performed and ground-truth will also be carried out as a result of evaluation of the collected data. (NOTE) **It has been proposed that the target number (10 places) is a standard for the time being.**	4-1-2 Data conversion started on 7 places in the previous term, but it was focused to 5 places in this term.	4-1-2 Some of existing data is lacking compatibility and making contradiction.	4-1-2 Data conversion from analogue will be continued in other section of MTA and ground-truth will also be carried out as a result of evaluation of the collected data. Therefore, **The numerical target (10) places will be revised as whole part of the case study area is not necessarily subject for analysis by GIS judging from both the availability of data and existing analog data.**
4-2 Analyze data of the proposed areas 4-2-1 Analyze VNIR and SWIR data. 4-2-2 Analyze TIR data 4-2-3 Analyze DEM data	4-2-1, 4-2-2, 4-2-3 Analyzing of ASTER data (VNIR , SWIR, TIR and DEM) will be carried out 20 scenes in this term.	4-2-1, 4-2-2, 4-2-3 Analyzing of ASTER data were carried out for 3 case study areas. Progress (on going) of the analysis for each case study area is as follows; CSA 1: (0) scenes are completed (6) scenes are under processing CSA 2: (0)scenes are completed	4-2-1, 4-2-2, 4-2-3 This activity is a little delayed from the plan and it will be not recovered until June 2004 because of preparation and performance for two seminars and TCTP. Some printouts of results of ASTER image analysis cold not be checked easily because of such reasons as	4-2-1, 4-2-2, 4-2-3 We put the annual (FY2003) target of ASTER Analyzing as 20scenes, but we extend the time limit from the end of March to the end of next term (end of July 2004). From the view of technical transfer, quality of processing is also important and quality is more

		(12) scenes are under processing CSA 3: (0) scenes are completed (6) scenes are under processing	following. (1)Alteration zone maps by ratioing were not colored. (2)A4-size (1:500,000scale) printout is too small to check geology and geologic structure. (3)Geologic map was not attached.	important than quantity in this case. ***Suggestion for a work process*** (1) Complete all processing for one ASTER scene. (2) After complete one scene, let Long-term expert check it. (3) After checking above mentioned items, then move to 2nd scene and complete it. Accumulate experience by repeating (1), (2) and (3).
4-3 Select the promising areas 4-3-1 Analyze the proposed areas using GIS 4-3-2 Extract promising areas	4-3-1 Integrated maps drawn on 3 places(No. 1 area; South-west of Can, North-east of Can. No. 3 area; Attepe) will be revised and will be drawn on 2 places(No.2 area; Cayeli, Mastra-Torul). 4-3-2 Extracting map drawn on 1 place (No. 3 area; Attepe) will be revised and will be drawn on 4 places(No. 1 area; South-west of Can, North-east of Can. No. 2 area; Cayeli, Mastra-Torul).	4-3-1, 4-3-2 The maps planned are still under preparation.	4-3-1, 4-3-2 This activity is a little delayed from plan, because of other activities. Such as 4-1-2 where; (1) Different geological maps are found in the area of one ASTER scene because of the different views made by different geologists. Therefore, it takes more time to harmonize these maps or to find out the way to digitize. (2) Alteration maps are not always available. (3) Existing geochemical data is not always available.	4-3-1, 4-3-2 **The numerical target (10) places will be revised as whole part of the case study area is not necessarily subject for analysis by GIS judging from both the availability of data and existing analog data.**
4-4 Carry out groundtruth 4-4-1 Make plan of groundtruth 4-4-2 Carry out field survey (NOTE)	4-4-1 Make plan for 6 places. 4-4-2 Carry out groundtruth for 6 places.	4-4-1 Plan was made for 2 places as follows; Case study area 1:Can and its surrounding area Case study area 2:Trabzon and Torul 4-4-2 2 places were surveyed in Sep., 2003 (Can and its surrounding area, Trabzon and Torul area). Analysis of each field data combining with ASTER data was carried out and field survey reports were produced.	4-4-1 This activity is a little delayed from plan, because of other activities. 4-4-2 This activity is a little delayed from plan, because of other activities.	4-4-1, 4-4-2 **The numerical target (6) places will be revised as whole part of the case study area is not necessarily subject for groundtruth judging from both the availability of data and existing analog data.**

PROGRESS OF ACTIVITIES FOR EACH OUTPUT (3rd Monitoring: from September 2003 to January 2004)

Output No.5 and its description; Spatial analysis by GIS can be carried out by the C/P personnel. For the Sub-project A

Activities	Progress of Activities		Problems in this term	Target and activities in the next term
	Plan	Actual		
5-1 **Transfer technology of integrated spatial analysis integrating various geologic data**				
5-1-1 Introduce guideline how to extract promising areas	5-1-1 None	5-1-1 None	5-1-1 None.	5-1-1 Techniques learned from this activity will be fully applied to the activity 4-3. Additional technical information (the most up-to-date topics) will be introduced by long-term and short-term expert in the 5th and 7th monitoring term.
5-1-2 Study basics and concept of GIS through case study	5-1-2 None	5-1-2 None	5-1-2 None	5-1-2 This activity was completed. Thus, the techniques learned from this activity will be fully applied to the activity 4-3. Additional technical information (the most up-to-date topics) will be introduced by long-term and short-term expert in the 5th and 7th monitoring term.
5-1-3 Apply basic methods of extract promising areas utilizing GIS	5-1-3 None	5-1-3 None	5-1-3 None	5-1-3 This activity was completed. Thus, the techniques learned from this activity will be fully applied to the activity 4-3. Additional technical information (the most up-to-date topics) will be introduced by long-term and short-term expert in the 5th and 7th monitoring term.

5-2 **Transfer technology how to select exploration area utilizing GIS** 5-2-1 Extract promising area utilizing GIS 5-2-2 Apply advanced techniques of GIS to extract promising areas	5-2-1, 5-2-2 The groundtruth will be carried out early stage of this term.	5-2-1, 5-2-2 The groundtruth in Canakkale(=Can area) was carried out.	5-2-1, 5-2-2 None	5-2-1, 5-2-2 This activities was completed. Then, the technique learned from this activity will be fully applied to the activity 4-3.
5-3 **Carry out resource area evaluation utilizing GIS** 5-3-1 Review case studies focusing on data processing in order to extract promising area 5-3-2 Carry out case study of groundtruth in order to extract promising area utilising GIS	5-3-1, 5-3-2 These activities are connected to the activity 4-3 (Select the promising area) and 4-4 (Carry out groundtruth). Activities 4-3 and 4-4 are actual activities in order to extract promising area, so the activity 5-3 is a case study of the technical transfer for carrying out the activities 4-3 and 4-4. For this reason, activity 5-3 will be carried out simultaneously in the occasion of the actual activities (4-3 and 4-4).	5-3-1, 5-3-2 Refer to the activities 4-3 and 4-4.	5-3-1, 5-3-2 None	5-3-1, 5-3-2 This activity were completed. Thus, the techniques learned from this activity will be fully applied to the activity 4-3.

PROGRESS OF ACTIVITIES FOR EACH OUTPUT (3rd Monitoring: from September 2003 to January 2004)

Output No.6 and its description; Analysis for natural hazard area using Japanese SAR and ASTER data can be carried out by the C/P personnel. For the Sub-project B

Activities	Progress of Activities		Problems in this term	Target and activities in the next term
	Plan	Actual		
6-1 Introduce basic knowledge of utilization of satellite data for disaster monitoring	In this term, the activity will be carried out mainly by two short-term experts in October 2003 and in January 2004 with new topics.	Dr. Yamaguchi, one of these 2 S.E. who was invited in late Sep. to beginning of Oct., 2003 was requested to focus only on geology and mineral exploration. Another S.E. whose specialties were active fault and land-slide was planned to be invited in Jan., 2004, but this plan was changed because such kinds of specialists were existed here in MTA.	None	Applications of SAR data to natural hazard will be introduced in 4th term (Mar., 2004) and those of ASTER data will be done in 5th term(Dec., 2004).
6-2 Transfer technology how to extract possible hazard areas utilizing ASTER and/or SAR image 6-2-1 Process and generate ASTER images of the proposed areas	6-2-1 In this term, the activity will be carried out mainly by two short-term expert s in October 2003 and in January 2004 with new topics	6-2-1 In this item, land-slide areas in N0.4 case study area are planned to be interpreted by 2 short-term experts using ASTER data, but they were allotted to other items because MTA already has started the project of drawing land-slide maps by aero photography.	6-2-1 None	6-2-1 This activity will continue to be carried out by other short-term expert with new topics, and various kinds of analyzed maps will be drawn by C/P after the 5th monitoring period (From August 2004 to January 2005). On land-slide, general analysis will be carried out by combining the existing land-slide maps in MTA and geomorphologic analysis using DEM from ASTER data (for ex.; slopeness).
6-2-2 Process and generate SAR images of the proposed areas	6-2-2 In this term, the activity will be carried out mainly by one short-term expert in October 2003 and in January 2004 with new topics	6-2-2 Theme of Dr. Yamaguchi was changed to the technical transfer of ASTER. The other short-term expert of land-slide was planned to be invited, but the plan was changed to	6-2-2 None	6-2-2 Short-term expert specialized in SAR is planned to introduce outline of SAR, application of SAR to natural hazard and environment in March. Extraction of surface

		invite the short-term expert specialized in SAR technology in Mar., 2004. Then, long-term expert started to instruct how to search JERS-1 and SAR data, as preparation before the SAR S.E. will arrive		movement by InSAR using JERS-1SAR data in No. 4 case study area is planned to start after a short-term expert specialized InSAR will be dispatched.
6-2-3 Carry out photo-geological interpretation	6-2-3 No activity planned for this term. It will start from 3rd monitoring period (From September 2003 to January 2004).	6-2-3 Main theme of this item is interpretation of land-slide using ASTER data was cancelled, because MTA has already land-slide maps drawn from aero photography.	6-2-3 It is necessary to be decided whether interpretation of ASTER image except land-slide should be performed or not.	6-2-3 If interpretation of ASTER image except land-slide is decided to be necessary, then it should be planned.
6-2-4 Collect and check the existing data	6-2-4 No activity planned for this term. It will start from 4th monitoring period (From February to July 2004).	6-2-4 Land-slide maps and others of Duzce area were obtained from Natural Hazard Department.	6-2-4 C/P can not publish the result of this item, because land-slide maps of Duzce area had not been published yet to outside of MTA.	6-2-4 Data of Bartin Basin(east of Zonguldak) will be also obtained, in next term.
6-2-5 Extract possible hazard area utilizing GIS	6-2-5 No activity planned for this term. It will start from 6th monitoring period (From February to July 2005).	6-2-5 GIS analysis was started using data from Natural Hazard Department.	6-2-5 None	6-2-5 In next term, morphological analysis using DEM derived from ASTER will be carried out, and furthermore land-slide data will be overlayed on it for general analysis.
6-2-6 Evaluate hazard study	6-2-6 Hazard map will be drawn in 4th term.	6-2-6 None	6-2-6 None	6-2-6 Hazard maps will be drawn inthe 4th monitoring period (From February to July 2004) and be continuous to be revised by the end of project.
6-2-7 Carry out groundtruth	6-2-7 No activity planned for this term. It will start from 4th monitoring period (From February to July 2004).	6-2-7 None	6-2-7 None	6-2-7 None
6-3 **Transfer technology how to extract area of ground surface movement utilizing InSAR data**				
6-3-1 Transfer technology how to process InSAR data	6-3-1 No activities planned for this term. It will start from 7th monitoring	6-3-1 None	6-3-1 None PO should be modified because we	6-3-1 This item will be started after the invitation of a short-term expert

	period (From August 2005 to January 2006).		will start this activity one year earlier than that of described in PO version 1.	specialized in InSAR in 2004.
6-3-2 Extract area of ground surface movement by InSAR processing	6-3-2 No activities planned for this term. It will start from 7th monitoring period (From August 2005 to January 2006).	6-3-2 None	6-3-2 None	6-3-2 This item will be started after the invitation of a short-term expert specialized in InSAR in 2004.
6-4 Verify InSAR results by ASTER image and groundtruth	No activities planned for this term. It will start from 7th monitoring period (From August 2005 to January 2006).	None	None	None

PROGRESS OF ACTIVITIES FOR EACH OUTPUT (3rd Monitoring: September 2003 to January 2004)

Output No.7 and its description; Environmental analysis using remote sensor data can be carried out by the C/P personnel.
For the Sub-project B

Activities	Progress of Activities		Problems in this term	Target and activities in the next term
	Plan	Actual		
7-1 Transfer technique how to select environmental indicator such as vegetation index	In this term, the activity will be carried out mainly by short-term expert and scheduled in February and in August.	There was no activity carried out by the short-term expert (Dr. YAMAGUCHI), as the topics of technical transfer were changed to focus on mineral exploration. Mr. Kerem AVCI, one of counterparts, was trained on this item during the counterpart training in Japan.	None	For this activity, application of SAR data will be introduced in Mar., 2004 (4th term) and application of ASTER data also will be introduced in Dec., 2004(5th term).
7-2 Introduce remote sensing technology applicable to environmental problem in Turkey	The subject of this activity will be carried out mainly by short-term expert and focused on environmental problems in Turkey and scheduled in February and in August.	There was no activity carried out by the short-term expert (Dr. YAMAGUCHI), as the topics of technical transfer were changed to focus on mineral exploration	None	For this activity, the technical transference will be carried out in Dec., 2004(5th term).
7-3 Strengthen capability of designing environmental survey plan	This activity was planned to be started from FY2004. (NOTE) **The project team, both Turkish and Japanese, has been reviewing this activity whether it should be taken as one of the activities or it should be deleted from the activities because the purpose of this activity does not meet the project purpose described in the PDM.** **"Strengthen capability of designing environmental survey plan" is out of scope of the project purpose.** **The project purpose of "Sub-project B" is as follows;** **"MTA/RSC is able to utilize the advanced remote sensor data such as ASTER and/or PALSAR data for environment and natural hazard analysis."** **Utilization of the advanced remote sensor data and designing environmental survey plan are two different things.**			

PROGRESS OF ACTIVITIES FOR EACH OUTPUT (3rd Monitoring: from September 2003 to January 2004)

Output No.8 and its description; MTA/RSC can provide necessary technical support to implement training courses.
In common with the Sub-project A & B

Activities	Progress of Activities		Problems in this term	Target and activities in the next term
	Plan	Actual		
8-1 Make technical support program for TCTP				
8-1-1 Make plan of course/lecture for TCTP	8-1-1 Making plan of the course/lecture will be carried out from Nov. 2003 to Dec. 2003.	8-1-1, 8-1-2 TCTP organizing committee was formed in early October and GI form was prepared.	8-1-1 None	8-1-1 8-1-2 None
8-1-2 Prepare course/lecture materials for TCTP	8-1-2 Preparation of course/lecture materials will be made during January to April 2004.	8-1-2 This activity has been progressed by following the schedule.	8-1-2 None	8-1-2 Preparation will be completed before May 2004.
8-1-3 Support course/lecture for TCTP	8-1-3 To be carried out in May, 2004	8-1-3 Chief adviser and Project coordinator were selected as observers of the TCTP organizing committee and they are supporting on the dispatch of Overseas Technical Trainer.	8-1-3 None	8-1-3 Project experts will contribute to carry out the training such as giving lectures and advice in the field excursion.
8-2 Carry out training (other than TCTP)				
8-2-1 Make plan of course/lecture for training courses 8-2-2 Prepare course/lecture materials for training courses 8-2-3 Carry out training	8-2-1, 8-2-2, 8-2-3 No activity planned for this term. It will be carried out in 5th monitoring period (from August 2004 to January 2005).	8-2-1, 8-2-2, 8-2-3 Staff training for other departments in MTA will be carried out during Mar. 2 to Mar.4, 2004. For this reason, the plan was made in September and full-time counterparts have made preparation for their presentation.	8-2-1, 8-2-2, 8-2-3 None	8-2-1, 8-2-2, 8-2-3 None

ORGANIZATION CHART OF MTA