



United States Department of the Interior

GEOLOGICAL SURVEY

In Reply Refer To:
WGS-Mail Stop 590

August 16, 1989

Memorandum

To: Members, DOI Task Force for Coordination of Remote Sensing
From: Recording Secretary
Subject: Request for Input to Landsat Implementation Study

The Landsat Implementation Study has been in progress this summer, developing options for continuation of a U.S. Landsat-type capability to follow Landsat 6. DOI comments on the second draft of the Study Report were recently sent to the Study Team, which is composed of Department of Commerce and Department of Defense staff. These comments and the second draft report are attached for your review prior to the August 24 Task Force meeting. This memo requests your input on certain technical aspects of the Study Report. We also would like your comments on the impact of each Landsat follow-on option on your Bureau's use of Landsat-type data.

The report presents five options for follow-on systems, three of which are judged as viable alternatives to follow Landsat 6:

<u>Option</u>	<u>Description</u>
Core Performance System	Repeat of Landsat 5
Baseline Performance System	Repeat of Landsat 6
Enhanced Capability System	Landsat 6 Enhanced Thematic Mapper plus wide field of view sensor and 5-m resolution stereo sensor

As you can see, the Baseline Performance System option would continue the Landsat 6 capability. The Core Performance System option would be a step backward to the current Landsat 4 capability. The Enhanced Capability System option would add a 5-m stereo sensor and a wide field of view (AVHRR-like) sensor. We need to develop a DOI position on the impact of each of these options on DOI uses of this type of technology. To organize your comments, we have prepared a table (attached) and we ask you to identify specific new or expanded applications that Landsat 6, with its 15-m panchromatic band, will offer. Then comment on the impact of each of the three Landsat-6 follow-on options. These could be along the lines of the following: 1) Core Performance System; revert back to 1980's uses, eliminating any new uses

TABLE 1. LAND REMOTE SENSING APPLICATIONS AND SYSTEM PERFORMANCE

APPLICATION	CONTINUITY		SPECTRAL CHARACTERISTICS			ORBIT		SPATIAL RESOLUTION (m)					STEREO	ACQUISITION FREQUENCY	TIMELINESS	AVERAGE VOLUME ³
	1996+	1996-	V/NIR	SWIR	MIR	TIR	AM/PM	51	30	100	500+	SWATH (km)				
<u>NATIONAL SECURITY</u>																
--"Core"	X ¹		V/NIR	X	X	X	AM	--	X	--	--	95-185	NO	16-70 days	7-10 days	LOW
--High Priority	X		BOTH	X	X	X	AM	--	X	--	--	185	NO	16 days	1-2 days	HIGH
<u>AGRICULTURE</u>																
--Inventory	X		V/NIR	X	--	--	AM	--	X	X	X	185	NO	2-4 wks ²	7-10 days	LOW
--Statistical Sampling	X		V/NIR	X	X	X	AM	--	X	X	X	185	NO	2-4 wks ²	7-10 days	HIGH
--Forecasting	X		V/NIR	--	--	--	AM	X	X	X	X	185 - 2200	NO	5-7 days ²	1-2 days 5 days/max	LOW
--Planning and Management	X		BOTH	X	X	--	AM	--	X	X	X	60-185	YES	annual ²	18-30 days	LOW
<u>FORESTRY</u>																
--Inventory and Management	X		BOTH	X	X	--	AM	--	X	X	--	185	NO	annual	14-30 days	LOW
--Monitoring	X		BOTH	X	X	X	AM	--	X	X	--	60-100	NO	5-7 days	1 day	LOW-MOD
<u>CARTOGRAPHY</u>	X		BOTH	--	--	--	AM	--	X	--	--	60	YES	annual	30 days	LOW-MOD
<u>GEOLOGY</u>																
--Rock Types	X		V/NIR	X	X	X	EITHER	--	X	X	--	60-185	NO	annual	14-30 days	LOW
--Structure	X		BOTH	X	X	--	AM	--	X	X	--	30-185	YES	2-4 months	14-30 days	LOW
<u>MEDIA</u>	--		BOTH	--	--	--	EITHER	X	--	--	--	30	NO	as needed	1 day	LOW

¹ Limited continuity (i.e., Landsat 4/5-type Thematic Mapper data only)

² During growing season(s) only

³ Volume of data required or "through put": HIGH = ≥10 scenes/day; MOD = 5-10 scenes/day; LOW = ≤5 scenes/day

TABLE 1. Continued

APPLICATION	CONTINUITY 1996+		SPECTRAL CHARACTERISTICS				ORBIT		SPATIAL RESOLUTION(m)					STEREO	ACQUISITION FREQUENCY	TIMELINESS	AVERAGE VOLUME
	V/NIR	SWIR	MIR	TIR	AM/PM	AM/PM	≤ 5	30	100	500+	500+	SWATH (km)					
<u>HYDROLOGY</u>																	
--Surface Water	X	V/NIR	X	X	AM	AM	--	X	--	--	185	NO	7-30 days	7 days	LOW		
--Watersheds	X	V/NIR	X	--	AM	AM	X	X	--	--	60-185	YES	annual	30 days	LOW		
--Snow Pack	X	V/NIR	X	--	AM	AM	--	X	--	--	60-185	YES	7 days	3 days	LOW		
<u>PLANNING</u>																	
--Urban-type uses	X	BOTH	--	--	AM	AM	X	X	--	--	30-60	YES	annual	30 days	LOW		
--Networks	X	BOTH	--	--	AM	AM	X	--	--	--	30	YES	annual	30 days	LOW		
<u>OCEANOGRAPHY</u>																	
--Ocean features	X	V/NIR	X	X	EITHER	EITHER	--	X	X	X	185-2200	NO	≤ 7 days	1 day	MOD		
--coastal bathymetry	X	V/NIR	--	--	AM	AM	--	X	--	--	185	NO	annual	30 days	LOW		
--ice boundaries	X	V/NIR	X	--	AM	AM	X	X	--	--	185	NO	≤ 7 days	1 day	LOW-MOD		
<u>ENVIRONMENT</u>																	
--Water Quality	X	BOTH	X	X	AM	AM	--	X	--	--	185	NO	30 days	30 days	LOW		
--Monitoring	X	BOTH	X	X	AM	AM	--	X	X	X	185-2200	NO	30 days - annual	30 days	LOW		
--Assess damages	X	BOTH	X	X	AM	AM	X	X	X	--	30-185	NO	as needed	1-7 days	LOW		
<u>GLOBAL CHANGE</u>																	
--Sea Levels	X	V/NIR	X	--	AM	AM	X	X	--	--	60-185	YES	annual	30 days	LOW		
--Continental Environments ⁴	X	V/NIR	X	X	AM	AM	X	X	X	X	185-2200	NO	30 days - annual ²	30 days	HIGH		

⁴ Desertification, deforestation, etc.

TABLE 2. LAND REMOTE SENSING APPLICATIONS AND OPTIONS FOR SENSOR CAPABILITIES

<u>APPLICATION</u>	<u>OPTION 1:</u> Core Performance System	<u>OPTION 2:</u> Baseline Performance System	<u>OPTION 3:</u> Enhanced Capability System	<u>OPTION 4:</u> Polar Platform System	<u>OPTION 5:</u> Low Mass System
<u>NATIONAL SECURITY</u>					
--"Core"	X	X	X	--	--
--High Priority	--	X	X	--	--
<u>AGRICULTURE</u>					
--Inventory	X	X	X	X	--
--Statistical Sampling	X	X	X	X	X
--Forecasting	X	X	X	--	--
--Planning and Management	--	X	X	--	--
<u>FORESTRY</u>					
--Inventory & Management	X	X	X	X	--
--Monitoring	--	X	X	--	--
<u>CARTOGRAPHY</u>					
--	--	--	X	--	--
<u>GEOLOGY</u>					
--Rock Types	X	X	X	--	--
--Structure	--	X	X	--	--
<u>MEDIA</u>					
--	--	--	X	--	--

Table 2. Continued

<u>APPLICATION</u>	<u>OPTION 1:</u>	<u>OPTION 2:</u>	<u>OPTION 3:</u>	<u>OPTION 4:</u>	<u>OPTION 5:</u>
<u>HYDROLOGY</u>					
--Surface Water	X	X	X	X	--
--Watershed	--	X	X	--	--
--Snow Pack	X	X	X	X	--
<u>PLANNING</u>					
--Urban	--	X	X	--	--
--Networks	--	X	X	--	--
<u>OCEANOGRAPHY</u>					
--Ocean Features	X	X	X	X	X
--Coastal Bathymetry	X	X	X	X	--
--Ice Boundaries	--	X	X	--	--
<u>ENVIRONMENT</u>					
--Water Quality	--	X	X	--	--
---Monitoring	--	X	X	--	--
---Assess damages	--	X	X	--	--
<u>GLOBAL CHANGE</u>					
---Sea Levels	X	X	X	X	--
---Continental Environments (Desertification, deforestation, etc.)	X	X	X	X	X