Ancillary Data and Assimilation

1. Timeliness Issues:
   - Needed? Level 2 Products, Level 3 Products, or Quality Assurance?
   - Needed in near-real time (e.g. EOS-1 derived? or NMC model) or could last-pass/available field (e.g. MODIS SST), or climatology serve as surrogate?
   - What fields will be used prior to validation of needed parameters from MODIS (e.g. we need O_3 and water vapor data for atmos. correction – MODIS products will be unavailable/inaccurate early in the check-out period)
   - others, such as cal/val campaigns

2. Spatial Issues:
   - What spatial resolutions are required? Standard NMC products OK?
   - Does proximity to coast or other constraint increase spatial requirements?
   -

3. Pooling ancillary data requests
   - Oceans are largely making joint requests through the MOCEAN processing center in Miami
     - Provides streamlining of data flow
     - Reduces redundancy of requests to EOS/DIS
   - Can land & atmospheres each combine common ancillary data requirements within the discipline?

Non-EOS Data Sets Required for ECS Release B Standard Product Generation (EOS-AM1 Launch, July 1998; SAGE III, 1998; ADEOS-2, February 1999)

Data Sets with Known Sources

data set name	source (reference)	required by	toolkit access
1. NMC gridded, layered atmospheric temperature, pressure and winds(GDAS 0-hour Forecast)	NOAA/NMC (2)	MODIS (email)	YES
2. NMC gridded, layered atmospheric temperature and pressure (Medium Range Forecast System 0-hour Forecast)	NOAA/NMC (2)	(MISR/DW), MODIS (email) MOPITT(email)	YES
3. NMC gridded land surface temperature, pressure, wind speed; layered temperature and pressure (Eta Analysis and Forecast System 0-hour Forecast)	NOAA/NMC (2)	(MISR/DW), SeaWinds (email), MODIS (email)	YES
4. NMC hourly ship observations	NOAA/NMC	MODIS (email)	YES
5. NMC Blended SST	NMC (oiupdate)	MODIS (email)	YES
6. NMC Final Analysis and Forecast system, Global Analyses at 00 hours	NOAA/NMC (2)	ASTER (email), MOPITT (fax)	YES
7. NMC buoy observations	NMC	MODIS (email)	YES
8. TOMS column ozone	GSFC DAAC (1)	ASTER (SPSO), (MISR/DW), MODIS (SPSO)	YES
9. SAGE thin stratospheric aerosol optical depth*	LARC DAAC (1)	(C-IRD #3), (MISR/DW)	YES
10. Snow and Ice Cover	NSIDC DAAC (1)	(MISR/DW), SeaWinds (email)	YES
11. Provisional Land Cover (IGBP/Loveland analysis)**	EDC (CD-ROM)	(MISR/DW), MODIS (email)	YES
12. Digital Chart of the World**	PDPS toolkit	MODIS (email)	YES
13. SBUV/2 stratospheric ozone profiles	NOAA/NESDIS	(C-IRD #4)	YES
14. HIRS/2 column ozone	NOAA/NESDIS	(C-IRD #5)	YES

Prospective Data Sets or Data Sets with Sources TBD

15. TRMM/VIRS aerosol global analyzed field (optical depth units)	*GSFC DAAC (TBD)*	*(C-IRD #2)*	*TBD*
16. TRMM/VIRS cloud imager data	*GSFC DAAC (TBD)*	*(C-IRD #11)*	*TBD*
17. TRMM/TMI microwave water path over oceans	*MSFC DAAC (TBD)*	*(C-IRD #1)*	*TBD*
18. TRMM/TMI microwave humidity (total precipitable water)	*MSFC DAAC (TBD)*	*(C-IRD #6)*	*TBD*
19. TRMM/TMI sea surface temperature	*MSFC DAAC (TBD)*	*(C-IRD #9)*	*TBD*
20. OOAM thin stratospheric optical depth	*NRL (TBD)*	*(C-IRD #3)*	*TBD*
21. ADEOS-1/ILAS thin stratospheric optical depth	*NASDA/EOIS (TBD)*	*(C-IRD #3)*	*TBD*
22. ADEOS-2/AMSR level 2 data	*NASDA/EOIS (TBD)*	*SeaWinds (email)*	*TBD*

* = assuming SAGE is available in 1998

** = static data set

References: 1. EOSDIS Science Data Plan, 2. ESDIS/NMC documentation, C-IRD = CERES Interface Requirements Document, MISR/DW = viewgraphs presented by Dan Wenkert, SPSO = SPSO Database

Land needs

1. Precipitation, more available
2. Soil moisture Not "
3. PAR (daily) , avail "
4. Max-min temp. calibrating

Maybe weather precips.
Weather radar data ??
4. Sfc. Pressure

Ocean: needs not now available

1. PAR (daily)
2.

Atmosphere: needs

- Surface emissivity map needed over land (Short & Long wave IR) ⇒ MODIS Prod. in part
- aerosols ??

Table 3. List of Parameters (by Instrument)

Version 1.2 (Prepared 7/22/94)

Changes based on the ATBDs and recent input from instrument teams are indicated by

Prod #	Parameter Name	Parm #	Input Data Required for Product Generation	Data Needed for Product Validation	Network Communications Requirements for QC	Comments
MOD11	Land_sfc Emissivity	3323	2338, 3660, 3726, 3727	N0013, N0023, Emissivity database	QC 0.15 GB/day (0.002 MB/sec)	
MOD12	Land_Cover Type	2669	2015, 2338, 2484, 4334A, 3660, 3665, 4333, DEM, Global Climate Database	MODIS Test site data	QC 66.95 GB/day (0.77 MB/sec)	
MOD12	Land_Cover Change	2761	2471, 2484, 2669, 2749, 4334, 3660, Global Climate Database		QC 0.06 GB/day (0.000 MB/sec)	
MOD13	Vegetation Indices, NDVI	2749	2338, 3660, 2015, 2293, N0032	MODIS Test Site Data, N0023, 3805	QC 14.55 GB/day (0.170 MB/sec)	
MOD13	Vegetation Indices, MVI	4334	2338, 3660, 2015, 2293, N0032	MODIS Test Site Data, N0023, 3805	QC 14.55 GB/day (0.170 MB/sec)	
MOD14	Fire Occurance	2471	2015, 2338, 2484, 2669, 2749, 3660, 3727	AVHRR fire data, N0013, SCAR	QC 2.56 GB/day (0.030 MB/sec)	
MOD14	Emitted Energy from Fire	5363	2015, 2338, 2484, 2669, 2749, 3660, 3727	AVHRR fire data, N0013, SCAR		
MOD14	Smoldering/Flaming Ratio	5364	2015, 2338, 2484, 2669, 2749, 3660, 3727	AVHRR fire data, N0013, SCAR		
MOD14	Fire Size	5365	2015, 2338, 2484, 2669, 2749, 3660, 3727	AVHRR fire data, N0013, SCAR		
MOD14	Fire Temperature	5366	2015, 2338, 2484, 2669, 2749, 3660, 3727	AVHRR fire data, N0013, SCAR		
MOD15	Leaf Area (LAI)	2680	2669; 2749, lookup table	Terrestrial monitoring site network data, LTER network data for validation	QC 1.86 GB/day (0.022 MB/sec)	Processing requirements for this product represents th number of integer operations per second, not floating point operations per second.
MOD15	FPAR	5367	2669; 2749, lookup table	Terrestrial monitoring site network data, LTER network data for validation	QC 1.86 GB/day (0.022 MB/sec)	
MOD16	Evapotranspiration	3722	2484, 2680, diurnal changes in near_sfc H2O	FIRE (BOREAS) for validation	QC 0.93 GB/day (0.011 MB/sec)	
MOD16	Surface Resistance	4335	2484, 2680		QC 0.93 GB/day (0.011 MB/sec)	
MOD17	Vegetation Production, Net Primary (NPP)	2703	2484, 2680, 2669; 3716, 5367; PAR from geostationery satellites, Climate zone, daily meterological data (temperature, precipitation), Soil ancillary data (water content)	LTER network data for validation	QC 0.03 GB/day (0.000 MB/sec)	
MOD17	Photosynthesis-Respiration	3716	2484, 2669, 2680, 5367; PAR from geostationery satellites, Climate zone, daily meterological data (temperature, precipitation), Soil ancillary data (water content)	diurnal changes in near_sfc H2O FIRE (BOREAS), global atmospheric CO2 conc. monitoring network for CO2 balance (NASA) for validation	QC 1.86 GB/day (0.022 MB/sec)	Photosyntheses-Respiration (old MOD17) merged wi Vegetation Production, Net Primary (MOD16) as separate parameter within MOD16.
MOD18	Level-2 Radiance, Water-leaving	2416	1333, 2338, 2527, 3660; Extraterrestrial Solar Irradiance (Neckel and Labs 1984), Ozone Optical Thickness (MODIS or NOAA), Surface Pressure, Surface Relative Humidity, Surface Wind Speed, Air-Sea Temperature Difference (Model/NMC/NOAA)		QC 35.07 GB/day	
MOD19	Pigment Conc	2591	3303, 2416	854, 855	QC 4.38 GB/day (0.051 MB/sec)	
MOD20	Chlorophyll Fluorescence Line Height	2575	2338, 2416, 3303, 2571		QC 4.53 GB/day (0.052 MB/sec)	
MOD20	Chlorophyll Fluorescence Line Curv	2573	2338, 2416, 3303, 2571		QC 4.23 GB/day (0.050 MB/sec)	MADE BY HOGE IN SEPARATE ATBD - not rece by M. King
MOD20	Chlorophyll Fluorescence Efficiency	3211	2338, 2416, 3303, 2571		QC 4.23 GB/day (0.05 MB/sec)	
MOD21	Chlorophyll_a Pigment Conc, Case I	2571	3303, 2416	854, 855 2571 3303, 2416, 5354	QC 4.38 GB/day (0.051 MB/sec)	
→ MOD21	Chlorophyll_a Pigment Conc, Case II	2569	3303, 2416, 5354	854, 855, 3707, 2344	QC 4.38 GB/day (0.051 MB/sec)	
MOD22	PAR, Sfc (IPAR) and Incident (IPAR)	2266	2416; 2293; 1874; 1333; 2295, 250; 252; 856; 857; 858; 853		QC 3.57 GB/day (0.041 MB/day)	
MOD22	PAR, Daily	2330	2416; 2293; 1874; 1333; 2295, 250; 252; 856; 857; 858; 853		QC 3.57 GB/day (0.041 MB/sec)	
MOD22	Downwelling Irradiance, Sea_sfc	5354	2416; 2293; 1874; 1333; 2295, 250; 252; 856; 857; 858; 853			

Resolution

1.25° x 1.25° Model data interp. in time

Each discipline interpolates in space as needed!?

- What QC is needed for ancillary data sets?
- What "surrogates" are to be used for missing data?
  - Climatologies?
  - Last observed field?
  - Model fields?

3. QA ancillary data sets

- Independent testing of algorithms
- Need to be sent to Team Member Computing Facilities along with MODIS data sets for QA — Data links and pathways

NMC Grids

Other Models

~ 1° x 1.25° EOS grid

~ 2° x 2° first

- O_3, Winds, Pres., H_2O
+ MODIS/EOS products
+ GOES imagery
+ Mixed-layer depth (FNOC)

? How well is the boundary layer represented ?

Time-space interpolation w.th/by Custom models. ~ tests this fall

Iterates:

1. No EOS fields (24 hr. delay)
2. EOS data assimilated for later (1 mo.) model runs. (Sfc. winds, Water Vapor, press., Temp.)