MODIS AT-LAUNCH DATA PRODUCTS

These are products that it is conservatively believed can be provided shortly after launch, based on prelaunch experience with precursor airborne and spaceborne sensors. Many other products are expected to be developed as a result of postlaunch research.

I. OCEAN AT-LAUNCH DATA PRODUCT ANALYSES **Updated: 20 July, 1990**

PRODUCT/PARAMETER	MEASUREMENT	ABSOLUTE ACCURACY (std. error)	PRECISION (RELATIVE ACCURACY)	RESOLUTION (SPATIAL or VERTICAL)	PRODUCT TEMPORAL RESOLUTION	SPACE SCALE	RESPONSIBLE SCIENTIST	COMMENTS
A. Chlorophyll-A Concentration (Case I)	mg/m^3	±30%	±10%	1, 20 km	Daily/Week/Mo	Locl/Reg/Glob	Clark	Typical conditions; OWP
B. Chlorophyll-A Concentration (Case II)	mg/m^3	±50%	±10%	1, 20 km	Daily/Week/Mo	Locl/Reg/Glob	Carder	Typical; OWP (Clark,Parslow,Hoge)
C. Chlorophyll Fluorescence (Line Height)	mW/cm2/sr/µm	±.004	±.001%	1, 20 km	Daily/Week/Mo	Locl/Reg/Glob	Abbott	Chi>.5 accuracy dependant on NEDL;OWP
Chlorophyll Fluorescence (Curvature)	mW/cm2/sr/µm	±25%	±8%	1, 20 km	Daily/Weekly	Regionl/Globa	Hoge	Based on actual airborne active /passive data. OWP.
D. Pigment Concentration (CZCS)	mg/m^3	±30%	±10%	1, 20 km	Daily/Week/Mo	Locl/Reg/Glob	Gordon	OWP (Clark)
E. Ocean Prim. Productivity (Empirically)	mg/m^3	<±35%	<±20%	20 km	Week/Mon/Yr	Regionl/Globa	Esaias	Surface Observations Required, OWP
F. Regional Sea Surface Temperatures	°K	±0.3-0.4°K	±0.1-0.3°K	1,4,20 km	Daily/Week/Mo	Locl/Reg/Glob	Brown	AVHRR type,seas,year,location±4km.Require H2O vapor.
G. Global Sea Surface Temperatures	°K	±0.3-0.6°K	±0.1-0.3°K	1, 4, 20, 50 km	Da/Wk/Mo/Yr	Locl/Reg/Glob	Brown/Barton?	ATSR type; season also,location±4km.Require H2O vapor.
H. Water-Leaving Radiance (Visible)	mW/cm2/sr/µm	±10%	±5%	1, 20 km	Daily/Week/Mo	Locl/Reg/Glob	Gordon	Typical conditions; OWP (Evans, Tanre)
I. Attenuation (Kd) at 490nm, (Case I)	Per meter	±25%	±10%	1, 20 km	Daily/Week/Mo	Locl/Reg/Glob	Gordon	Typical conditions.(Clark)Based on Pigment concent. OWP.
J. Detached Coccolith Conc. (E. huxleyi)	mg CaCO3/m^3	±30%	±10%	1, 20 km	Daily/Week/Mo	Locl/Reg/Glob	Gordon	OWP (Clark)
K. Dissolved Organic Matter Case 1 Globl	mg/m^3	±150%	±30%	1, 20 km	Daily/Week/Mo	Locl/Reg/Glob	Carder	OWP (Parslow)
L. Dissolved Organic Matter, Southern	mg/m^3	±150%	±30%	1, 20 km	Daily/Week/Mo	Locl/Reg/Glob	Parslow	OWP. 30% error with model. (Clark,Hoge)
M. Sea Ice (Maximum Total Extent)	km^2	±5% or less	±5% or less	1, 10 km	Daily/Week/Mo	Regionl/Globa	Salomonson	Accuracy based on March Ice Northern Hemisphere
N. Phycoerythrin Concentration	mg/m^3	±200%	±50%	1, 20 km	Daily/Week/Mo	Locl/Reg/Glob	Hoge	OWP
O. Single Scattering Aerosol Rad., ta<0.6	mW/cm2/sr/µm	±10%	±5%	1, 20 km	Daily/Week/Mo	Locl/Reg/Glob	Gordon	Case I waters. Accuracy depends on SNR. Pixel Averaging.OWP
P. Aerosol Angstrom Exp., Optical Depth	Dimensionless	±15%	±5%	1, 20 km	Daily/Week/Mo	Locl/Reg/Glob	Gordon	Accuracy depends on SNR. Pixel Averaging OWP
Q. Total Suspended Solids	gm/m^3	±50%	±35%	1, 20 km	Daily/Week/Mo	Locl/Reg/Glob	Clark	OWP
R. Calibration Data Sets	varies	N.A.	N.A.	N.A.	Daily/Week/Mo	Locl/Reg/Glob	Evans	Screened in-situ, Satellite & cal. data, error flags. OWP.

II. LAND AT-LAUNCH DATA PRODUCT ANALYSES

PRODUCT/PARAMETER	MEASUREMENT UNITS	ABSOLUTE ACCURACY (std. error)	PRECISION (RELATIVE ACCURACY)	RESOLUTION (SPATIAL or VERTICAL)	PRODUCT TEMPORAL RESOLUTION	SPACE SCALE	RESPONSIBLE SCIENTIST	COMMENTS
A. Level 2 Land-Leaving Radiances	W/m^2/sr/µm	±10%	±5%	0.5, 1, 10 km	Daily	Regionl/Globa	Kaufman/Tanre	
B. Land Cover Type	km^2	5%-10%	±1-5%	0.5, 1, 10 km	Season/Yearly	Regionl/Globa	Strahlr/Huet/Just.	Need Land-Leaving+topographic+214m band cloud cor.
C. Vegetation Indices	Dimensionless	±0.01	±0.01	0.5, 1, 10 km	Daily/Wk/Mo.	Regionl/Globa	Justice/Huete/Tanr	Range: 0-1. Need Land-leaving+topo+214m cloud cor.
D. Surface Temperature	°C	±1-3°C	±1°C	1, 10 km	Daily/Weekly	Regionl/Globa	Wan	Range -20 to 50°C. AMSU necessary.
E. Snowcover	km^2	±5% or less	±5% or less	1, 10 km	Daily/Weekly	Regionl/Globa	Salomonson	(Hall) Accuracy based on avr. Jan. snowcover N. Hem.
F. Thermal Anomalies (volcanoes, fires)	°C	±10°C	±5°C	1, 10 km	Daily/Weekly	Regionl/Globa	Kaufman/Justice	Day & night data required.
G. Topographic Correction	m?			1,10 km	Daily	Regionl/Globa	Muller	Need info. on EOS database on topographic correction

OWP=Ancillary data: ozone, winds, sea surface pressure. Updated 20 July, 1990.

III.ATMOSPHERE AT-LAUNCH DATA PRODUCT ANALYSIS

PRODUCT/PARAMETER	MEASUREMENT UNITS	ABSOLUTE ACCURACY (std. error)	PRECISION (RELATIVE ACCURACY)	RESOLUTION (SPATIAL or VERTICAL)	PRODUCT TEMPORAL RESOLUTION	SPACE SCALE	RESPONSIBLE SCIENTIST	COMMENTS
A. Cloud Optical Thickness (0.66µm)	Dimensionless	±20%	±10%	5 km	Daily	Global	King	Daytime. Requirs clear sky radiance (surf.reflctnc)
				1°	Daily/Monthly	Global	King	Daytime. Requirs clear sky radiance (surf. reflctnc)
B. Cloud Fractional Area	per cent.	±10%	±5%	5 km	Twice Day/Mo.	Global	King	Look at flags for cld test.w/CERES (Coakley,Wielicki).
				1°	Daily/Monthly	Global	King	Need clear sky radiance & surface temperature.
C. Cloud Effective Emissivity	Dimensionless	±0.10	±0.05	5 km	Twice Daily	Global	Menzel	Averaging of samples.
				1°	Daily/Monthly	Global	Menzel	CO2 algorithm. Requires "B" & temperature profile.
D. Cloud Top Pressure	mb	±50mb	±20mb	5 km	Twice Daily	Global	Menzel	CO2 algorithm.
				1°	Daily/Monthly	Global	Menzel	Requires temperature profile.
E. Cloud Top Temperature	°C	±2°C	±1°C	5 km	Twice Daily	Global	Menzel	CO2 slicing.
				1°	Daily/Monthly	Global	Menzel	
F. Cloud Particle Effective Radius	µm	±0-40%	±5%	5 km	Daily	Global	King/Menzel	Daytime. Menzel:Verification & Ancillary Data
				1°	Daily/Monthly	Global	King/Menzel	Requires clear sky radiance (surface reflectance).
G. Cloud Water Thermodynamic Phase	Ice or water	N/A	N/A	5 km	Daily	Global	King	Daytime. Requires clear sky radiance (surface reflectance).
				1°	Daily/Monthly	Global	King	
H.Spectral Aerosol Optical Thick.(Ocean)	Dimensionless	±0.05	±0.02	0.5°	Daily/Monthly	Global	Tanre/Kaufman	Daytime. W/Gordon. Bands 1-8. Level 3 only.
Spectral Aerosol Optical Thick.(Land)	Dimensionless	±0.1	±0.05	0.5°	Daily/Monthly	Global	Kaufman/Tanre	Separate algorithm from ocean. Daytime. Level 3 only.
I. Mean Radius and Dispersion of Aerosol	µm/dimensionle	±10-30%	±10%	0.5°	Daily/Monthly	Global	Tanre/Kaufman	For radii 1-5µm. Daytime. Speciallized level 3 Prod.
J. Aerosol Mass Loading (Dry)	gm/m^2	±30%	±10%	0.5°	Daily/Monthly	Regionl/Globa	Kaufman/Tanre	Daytime. Level 3 product. Requires temperature profile
K. Atmospheric Stability (lifted index)	°C	±2°C	±1°C	5 km	Twice Daily	Global	Menzel	Cloud free area. Requires "B", surface temperature,
				0.5°	Twice Day/Mo.	Global	Menzel	temperature & moisture profiles.
L. Total Precip. Water(H2O Vapor Profile)	mm	±10 mm	±5 mm	5 km	Twice Daily	Global	Menzel	Therm. bnd D&N. Cldfree areas. Reqs surf. temp.&temp. prof.
		±5 mm	±3 mm	5 km	Daily	Global	Kaufman/Tanre	NIR Daytime; cloudfree areas. (primarily land)
M. Total Ozone Content	Dobson Units(DU	15-20 DU	10 DU	5 km	Twice Daily	Global	Menzel	Needed for Chappius band correction by Oceans.
				5 km	Daily	Global	Menzel	
				0.5°	Daily/Monthly	Global	Menzel	Requires surface temperature & temperature profile.

IV. GENERAL: AT-LAUNCH DATA PRODUCT ANALYSIS

PRODUCT/PARAMETER	MEASUREMENT UNITS	ABSOLUTE ACCURACY (std. error)	PRECISION (RELATIVE ACCURACY)	RESOLUTION (SPATIAL or VERTICAL)	PRODUCT TEMPORAL RESOLUTION	SPACE SCALE	RESPONSIBLE SCIENTIST	COMMENTS
A. At-Satellite Radiances <3µm	W/m^2/sr/µm	5%	RMS<NEdL	856,428,214m	Daily	Global	Salomonson	(Barker).Reflectance calibration:2%(MODIS-N Aug 4,89 Specs)
At-Satellite Radiances >3µm	W/m^2/sr/µm	1%	RMS<NEdL	856,428,214m	Daily	Global	Salomonson	(Barker)
B. Surface Directional Reflectance	dimensionless			856,428,214m	Daily	Global	Kaufman	
C. Cloud Masking/ Shadowing (MODIS-N)	Dimensionless	30, 15, 5%	N/A	856,428,214m	Daily	Global	Salomonson	(Barker).Acc. fr. bin. cld mask.Selectd Lvl-3 products also.
Cloud Masking/Shadowing (MODIS-T)	Dimensionless	10%	N/A	1.1 km	Daily	Global	Salomonson	(Barker).Acc. fr. binary cld mask.Selectd Lvl-3 products also.
D. Radiomet. Spatl Hetrogneity(MODIS-N)	W/m^2/sr/µm	NA,50,20%	N/A	856,428,214m	Daily	Global	Justice/Strahler	(Barker).Var. meas. of hetrogneity used.2nd moment of rad.
Radiomet. Spatl Hetrogneity(MODIS-T)	W/m^2/sr/µm	30%	N/A	1.1 km	Daily	Global	Justice/Strahler	(Barker).Var. meas. of hetrogneity used.2nd moment of rad.

OWP=Ancillary data: ozone, winds, sea surface pressure. Updated 20 July, 1990.

MODIS POST-LAUNCH DATA PRODUCTS

These are products that it is conservatively believed can be provided after launch. Many other post launch products are expected to be developed as a result of post launch research.

I. OCEAN POST-LAUNCH DATA PRODUCT ANALYSES **Updated: 20 July, 1990**

PRODUCT/PARAMETER	MEASUREMENT	ABSOLUTE ACCURACY (std. error)	PRECISION (RELATIVE ACCURACY)	RESOLUTION (SPATIAL o VERTICAL)	PRODUCT TEMPORAL RESOLUTION	SPACE SCALE	RESPONSIBLE SCIENTIST	COMMENTS
A. Primary Productivity, Case I Waters	mg C/m^2/day		50-100%	1km, 50 km	Day/Wk/Year	Regionl/Globl	Abbott	OWP, MLD, CS (Esaias input). Need CERES surface incident fluxes.
B. Chlorophyll-A Conc. from Fluoresc.	mg/m^3	±50-100%	35%	1, 4, 20 km	Day/Wk/Mon	Loc/Reg/Glob	Abbott	>0.5mg/m^3; Accuracies will increase by spatial averaging. OWP.
C. Instant. Surf. Prim. Prod. from F.L.H.	mg C/m^2/day	TBD	TBD	1km, 20 km	Daily/Weekly	Loc/Reg/Glob	Abbott	>0.5mg/m^3; Errors unknown at present. OWP. FLH=Fluorescence Line Height.
D. Fluorescence Efficiency	dimensionless	±15%	±5%	1km, 20 km	Daily/Weekly	Local/Regionl	Abbott	OWP
E. Surface Incident PAR (h nu), Keb	Quanta/m^2/s	±10%	±5%	1km, 20 km	At overpass	Local/Global	Gordon	OWP. Needed for fluorescence. to chlorophyll relationship. Need AIRS, K@490nm.
F. Attenuation of PAR (K)	per meter	±35%	±10%	1km, 20 km	Daily/Weekly	Global	Clark	OWP
G. Pigment Concentration (Curvature)	mg/m^3	±35%	±15%	1km, 20 km	Daily/Weekly	Regional	Hoge	Coastal & Estuarine; OWP (Esaias)
H. Beam Attenuation Coeff. c,520nm	per meter		±35%	1km, 20 km	Daily/Weekly	Global	Clark	OWP
I. Particulate Scattering	per meter		±30%	1km, 20 km	Daily	Global	Parslow	Based on simulated lab data. OWP. (Gordon)
J. Organic Fraction	dimensionless	±15%	±10%	20 km	Daily/Weekly	Global	Clark	OWP
K. Daily PAR	Quanta/m^2/s		TBD		Daily	Global	Esaias	Adapted from other EOS data. OWP. (Tanre, King)
L. Currents, Fronts, Eddies	meter	214-856m		214-856m		Regional		Location implicit to most products. No further analysis by team. OWP.

II. LAND POST-LAUNCH DATA PRODUCT ANALYSES

PRODUCT/PARAMETER	MEASUREMENT UNITS	ABSOLUTE ACCURACY (std. error)	PRECISION (RELATIVE ACCURACY)	RESOLUTION (SPATIAL o VERTICAL)	PRODUCT TEMPORAL RESOLUTION	SPACE SCALE	RESPONSIBLE SCIENTIST	COMMENTS
A. Level-1 Topographic Corrections	meters	±100m	N/A(Towns	Pixel size	N/A	Regionl/Globl	Muller?	Input for Vegetation Indices. MODIS T Digital Terrain Model? Strahler help.
B. Incident PAR	MJ/m^2	±200	5 to 20%	1 km	Daily/Weekly	Regionl/Globl	Tanre	Townshend, Justice, Ardanuy inputs.
C. Bidirec.Reflect/Albedo/Surf. Rough.	dimensionless	±15%	5 - 8%	1, 10 km	Daily/Weekly	Regionl/Globl	Tanre/Muller	Strahlr&Huet too. Changble w/tim of dy. Hemis.& nadir refl. rqd. Atmos&topo cor. rqd.
D. Soil Brightness Index	dimensionless	±0.09	±10%	1 km	Weekly	Regional(arid	Huete	For vegetation index refinement.(Huete input)
E. Length of Growing Season	Days	±10 days		1, 10 km	Annual	Global	Justice	Need NDVI.
F. Surface Emissivity	dimensionless	±0.01	±0.01	1, 50 km	Daily/Weekly	Regionl/Globl	Barton	Accuracies optimistic? (Barton input)
G. Primary Production	Mg/km^2/yr	±100	±5-30%	1 km	Week/Mon/Yr	Regionl/Globl	Running	Huete:questionable.Need veg. indices&land cover type/biome area.Townshend input too.
H. Leaf Area Index	dimensionless	±0.1-0.25	±5-20%	Pixel size	Daily/Weekly	Loc/Reg/Glob	Running	Running:0.5 abs. acc.;Townshnd:±2% rel.0.04-.39SE ranges(Ardenuy).Huete:questionable
I. Vegetation Stress	sec/m	200-1000	±5-30%	Pixel size	Daily/Weekly	Loc/Reg/Glob	Runnng/Huete	Need MODIS-N, bands 1-7 MODIS-T.GIS/soils data
J. Day/Night Temperature Difference	°K	1°K	1°K	856 m	Daily	Regional	Huete	Under favorable conditions. Barton input.
K. Data Characteriz. (goemetry, litter)	Dimensionless	30,10, 5%	N/A	1,10,50 km	Daily	Global	Justc/Strahlr	(Barker)Strahler prefers pixel size res.To be used for Level-3 prods.Activ?Prod?
L. Spectral/Spatial mixture modeling	Dimensionless			Pixel size	Daily	Global	Huete	Barker wants 1,10,50km spatial resolution w/accuracies of 30,10,&5%,resdpectively
M. Mixture Modeling/Polarization enhanc	Dimensionless			Pixel size	Daily	Global	Vanderbilt	(Barker)

III. ATMOSPHERE POST-LAUNCH DATA PRODUCT ANALYSIS

PRODUCT/PARAMETER	MEASUREMENT UNITS	ABSOLUTE ACCURACY (std. error)	PRECISION (RELATIVE ACCURACY)	RESOLUTION (SPATIAL o VERTICAL)	PRODUCT TEMPORAL RESOLUTION	SPACE SCALE	RESPONSIBLE SCIENTIST	COMMENTS
A. Aerosol Single Scattering Albedo	Dimensionless	±0.06	±0.03	0.5°	Daily/Monthly	Regionl/Globa	Tanre/Kaufmr	Land only. Level 3 product. Daytime.
B. Cloud Area and Perimeter - Geometry	km^2 & km	N/A	N/A	1°	Monthly	Global	Kaufman	214m pixel count data needed. Level 3 statistics.
C. Cloud Joint Probability Density Funct	Dimensionless	N/A	N/A	1°	Daily/Monthly	Global	King/Menzel	Level 3 only.
D. Cloud Emissivity	Dimensionless						Menzel	

OWP = Ancillary data: ozone, winds, sea surface pressure
MLD = Mixed Layer Depth Model
CS = Coupled Simulation Model
F.L.H. = Fluorescence Line Height
PAR = Photosynthetically Active Radiation
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I. REQUIRED ANCILLARY DATA:

ATMOSPHERE -- AT LAUNCH

Updated: 20, July, 1990

MODIS DATA PRODUCT	ANCILLARY PRODUCT/PARAMETER	MEASUREMENT UNITS	ABSOLUTE ACCURACY (std. error)	PRECISION (RELATIVE ACCURACY)	RESOLUTION (SPATIAL or VERTICAL)	PRODUCT TEMPORAL RESOLUTION	SPACE SCALE	RESPONSIBLE SCIENTIST	COMMENTS
A. Cloud Optical Thickness	Surface Directional Reflectance, or Land or Water Leaving Radiances	Dimensionless W/m^2/sr/µm	±10%	±5%	Pixel size 0.5,1,10 km	Daily Daily	Global Regional/Global		MODIS Near.clear neighbor 0.66,1.6,2.1,3.7µm MODIS.Either above/or. Lambertian
B. Cloud Fractional Area	Surface Temperatures								AMSU or NMC
C. Cloud Effective Emissivity	Cloud Flags Temperature Profiles				5 km	Twice Daily	Global	King	MODIS AIRS/AMSU or MODIS or NMC. Clear areas.
D. Cloud Top Pressure	Temperature Profiles								AIRS/AMSU or NMC
E. Cloud Top Temperature	Cloud Top Pressure Cloud Eff. Emissivity				5-50 km 5-50 km	Twice Daily Twice Daily	Global Global	Menzel Menzel	MODIS MODIS
F. Cloud Particle Effective Radius	Surface Reflectance (Albedo) or Land or Water Leaving Radiance	Dimensionless W/m^2/sr/µm	±10%	±5%					MODIS Near.clear neighbor 0.66,1.6,2.1,3.7µm MODIS. Either (above)/or. Lambertian
G. Cloud Water Thermodynamic Phase	Surface Reflectance (Albedo) or Land or Water Leaving Radiance	Dimensionless W/m^2/sr/µm	±10%						MODIS Near.clear neighbor 0.66,1.6,2.1,3.7µm MODIS. Either (above)/or. Lambertian
H. Spectral Aerosol Optical Thickness (Ocean)	Previous Level 1 Radiances Previous Aerosal Optical Thickness Surface Reflectance (Albedo) Optical Thickness				214/418 M	3/7/16 days			MODIS MODIS MODIS. 16 days previously. MISR
H. Spectral Aerosol Optical Thickness (Land)	Previous Level 1 Radieances Previous Aerosol Optical Thickness Surface Reflectance (Albedo) Optical Thickness				214/418 M	3/7/16 days			MODIS MODIS MODIS. 16 days previously. MISR
I. Mean Radius & Dispersion of Aerosol Size Distribution	Spectral Aerosol Optical Thickness Corrected Radiances								MODIS. MODIS.
J. Aerosol Mass Loading (Dry)	Spectral Aerosol Optical Thickness Aerosol Mean Radiance & Dispersion Total Precipitable Water Temperature Profile								MODIS MODIS MODIS AIRS/AMSU or NMC. Lower Troposphere
K. Atmospheric Stability (Lifted Index)	Forecast Cloud Flags Surface Temperatures	Degrees C			10 km	Twice Daily	Global		NMC MODIS utilities AIRS/AMSU, NMC or MODIS
L. Total Precipitable Water	Cloud Flags Temperature Profiles Surface temperature				1-50 km	Daily	Global		MODIS utilities AIRS/AMSU, NMC or MODIS AIRS/AMSU, NMC or MODIS
M. Total Ozone Content	Forecast Cloud Flags Temperature Profiles Surface Temperature	Degrees C			10 km	Twice Daily	Global		NMC MODIS utilities AIRS/AMSU, NMC or MODIS AIRS/AMSU, NMC or MODIS

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LAND -- AT LAUNCH

MODIS DATA PRODUCT	ANCILLARY PRODUCT/PARAMETER	MEASUREMENT UNITS	ABSOLUTE ACCURACY (std. error)	PRECISION (RELATIVE ACCURACY)	RESOLUTION (SPATIAL or VERTICAL)	PRODUCT TEMPORAL RESOLUTION	SPACE SCALE	RESPONSIBLE SCIENTIST	COMMENTS
D. Surface Temperature	AMSU				1-10 km	Daily/Weekly	Global/Region	Susskind?	King input.

OCEANS -- AT LAUNCH

MODIS DATA PRODUCT	ANCILLARY PRODUCT/PARAMETER	MEASUREMENT UNITS	ABSOLUTE ACCURACY (std. error)	PRECISION (RELATIVE ACCURACY)	RESOLUTION (SPATIAL or VERTICAL)	PRODUCT TEMPORAL RESOLUTION	SPACE SCALE	RESPONSIBLE SCIENTIST	COMMENTS
A. Chlorophyll-A Concentration-Case I	Surface Winds	m/sec	±2-4	±2	50 km	Daily*	Global		HIMSS, SCATT, ALT, NMC
	Total Ozone	Dobson	±5-10	±5	20-50 km	Daily*	Global		MODIS, AIRS/AMSU, TOMS
	Surface Pressure	mb	±2-4	±2-4	20-50 km	Daily*	Global		NMC, AIRS/AMSU
B. Chlorophyll-A Concentration-Case II	Surface Winds	m/sec	±2-4	±2	50 km	Daily*	Global		HIMSS, SCATT, ALT, NMC
	Total Ozone	Dobson	±5-10	±5	20-50 km	Daily*	Global		MODIS, AIRS/AMSU, TOMS
	Surface Pressure	mb	±2-4	±2-4	20-50 km	Daily*	Global		NMC, AIRS/AMSU
	Airborne Laser-Induced Chlorophyll Phycoerythrin and DOM Fluorescence	mg/m^3 ("after truth")	±15%	± 8%	0.001 km	Each Pass	Regional	Hoge	Curvature Algorithm Derivation/Validation Overflight of Cruise.
	Airborne Water-Leaving Spectral Radiance	W/m^2/Sr/nm	±5%	±4%	0.001 km	Each Pass	Regional	Hoge	Curvature Algorithm Derivation/Validation
C. Chlorophyll Flour.(Line Height)	Surface Winds	m/sec	±2-4	±2	50 km	Daily*	Global		HIMSS, SCATT, ALT, NMC
	Total Ozone	Dobson	±5-10	±5	20-50 km	Daily*	Global		MODIS, AIRS/AMSU, TOMS
	Surface Pressure	mb	±2-4	±2-4	20-50 km	Daily*	Global		NMC, AIRS/AMSU
C1.Clorophyll Fluor. (Curvature)									
D. Pigment Concentration (CZCS)	Surface Winds	m/sec	±2-4	±2	50 km	Daily*	Global		HIMSS, SCATT, ALT, NMC
	Total Ozone	Dobson	±5-10	±5	20-50 km	Daily*	Global		MODIS, AIRS/AMSU, TOMS
	Surface Pressure	mb	±2-4	±2-4	20-50 km	Daily*	Global		NMC, AIRS/AMSU
E. Primary Productivity (visible)	Surface Winds	m/sec	±2-4	±2	50 km	Daily*	Global		HIMSS, SCATT, ALT, NMC
	Total Ozone	Dobson	±5-10	±5	20-50 km	Daily*	Global		MODIS, AIRS/AMSU, TOMS
	Surface Pressure	mb	±2-4	±2-4	20-50 km	Daily*	Global		NMC, AIRS/AMSU
F. Regional Sea Surface Temp.	Total Water Vapor	cm	5%	5%	10 km	Each Pass		Susskind	AIRS/AMSU
	SFC Wind Speed	m/sec	±2m/s	±2	1.5°	Each Pass		Spencer	HIMSS, ALT, SCATT
	SFC Winds	m/sec	±2m/s	±2	2.5°	Daily	Global	?	NMC, FNOC, EMC
	Total Water Vapor	cm	10%	5%	1 km	Each Pass		Susskind	MODIS
G. Global Sea Surface Temp	Total Water Vapor	cm	5%	5%	10 km	Each Pass		Susskind	AIRS/AMSU
	SFC Wind Speed	m/sec	±2m/s	±2	1.5°	Each Pass		Spencer	HIMSS, ALT, SCATT
	SFC Winds	m/sec	±2m/s	±2	2.5°	Daily	Global	?	NMC, FNOC, EMC
	Total Water Vapor	cm	10%	5%	1 km	Each Pass		Susskind	MODIS
H. Water-Leav Radiance (Visible)	Surface Winds	m/sec	±2-4	±2	50 km	Daily*	Global		HIMSS, SCATT, ALT, NMC
	Total Ozone	Dobson	±5-10	±5	20-50 km	Daily*	Global		MODIS, AIRS/AMSU, TOMS
	Surface Pressure	mb	±2-4	±2-4	20-50 km	Daily*	Global		NMC, AIRS/AMSU
I. Attenuation (Kd) @490, Case 1	Surface Winds	m/sec	±2-4	±2	50 km	Daily*	Global		HIMSS, SCATT, ALT, NMC
	Total Ozone	Dobson	±5-10	±5	20-50 km	Daily*	Global		MODIS, AIRS/AMSU, TOMS
	Surface Pressure	mb	±2-4	±2-4	20-50 km	Daily*	Global		NMC, AIRS/AMSU

I. REQUIRED ANCILLARY DATA (continued):

OCEANS -- AT LAUNCH (cont.)

MODIS DATA PRODUCT	ANCILLARY PRODUCT/PARAMETER	MEASUREMENT UNITS	ABSOLUTE ACCURACY (std. error)	PRECISION (RELATIVE ACCURACY)	RESOLUTION (SPATIAL or VERTICAL)	PRODUCT TEMPORAL RESOLUTION	SPACE SCALE	RESPONSIBLE SCIENTIST	COMMENTS
J. Detach Coccolith Concent. E.huxleyi	Surface Winds	m/sec	±2-4	±2	50 km	Daily*	Global		HIMSS, SCATT, ALT, NMC
	Total Ozone	Dobson	±5-10	±5	20-50 km	Daily*	Global		MODIS, AIRS/AMSU, TOMS
	Surface Pressure	mb	±2-4	±2-4	20-50 km	Daily*	Global		NMC, AIRS/AMSU
K. Dissolved Organic Matter, Case 1, Gilbl	Surface Winds	m/sec	±2-4	±2	50 km	Daily*	Global		HIMSS, SCATT, ALT, NMC
	Total Ozone	Dobson	±5-10	±5	20-50 km	Daily*	Global		MODIS, AIRS/AMSU, TOMS
	Surface Pressure	mb	±2-4	±2-4	20-50 km	Daily*	Global		NMC, AIRS/AMSU
	Airborne Laser-Induced Dissolved Organic Matter, Chlorophyll Phyco. Fluorescence	µg, Mol - or - mg/m^3	±15%	± 8%	0.001 km	Each Pass	Regional	Hoge	Algorithm Derivation/Validation Overflight of cruise
L. Diss Organic Matter, Southern	Surface Winds	m/sec	±2-4	±2	50 km	Daily*	Global		HIMSS, SCATT, ALT, NMC
	Total Ozone	Dobson	±5-10	±5	20-50 km	Daily*	Global		MODIS, AIRS/AMSU, TOMS
	Surface Pressure	mb	±2-4	±2-4	20-50 km	Daily*	Global		NMC, AIRS/AMSU
M. Sea Ice (Max. Total Extent)									
N. Phycoerythrin Concentration	Airborne Laser-Induced Phycoerythrin Fluo	mg/m^3	±15%	± 8%	0.001 km	Overflight	Regional	Hoge	NASA P-3 Airborne Oceanographic LIDAR.
	Shipboard Laser-Induced Phycoerythrn Fluo	mg/m^3	±15%	±5%	0.001 km	Ship Cruises	Regional	Hoge	NASA Shipboard Laser on other ships.
	Surface Winds	m/sec	±2-4	±2	50 km	Daily*	Global		HIMSS, SCATT, ALT, NMC
	Total Ozone	Dobson	±5-10	±5	20-50 km	Daily*	Global		MODIS, AIRS/AMSU, TOMS
	Surface Pressure	mb	±2-4	±2-4	20-50 km	Daily*	Global		NMC, AIRS/AMSU
O. Single Scattering Aerosol Radiance	Surface Winds	m/sec	±2-4	±2	50 km	Daily*	Global		HIMSS, SCATT, ALT, NMC
	Total Ozone	Dobson	±5-10	±5	20-50 km	Daily*	Global		MODIS, AIRS/AMSU, TOMS
	Surface Pressure	mb	±2-4	±2-4	20-50 km	Daily*	Global		NMC, AIRS/AMSU
P. Aerosol Angstr. Exp.,Opt Depth	Surface Winds	m/sec	±2-4	±2	50 km	Daily*	Global		HIMSS, SCATT, ALT, NMC
	Total Ozone	Dobson	±5-10	±5	20-50 km	Daily*	Global		MODIS, AIRS/AMSU, TOMS
	Surface Pressure	mb	±2-4	±2-4	20-50 km	Daily*	Global		NMC, AIRS/AMSU
Q. Total Suspended Solids	Surface Winds	m/sec	±2-4	±2	50 km	Daily*	Global		HIMSS, SCATT, ALT, NMC
	Total Ozone	Dobson	±5-10	±5	20-50 km	Daily*	Global		MODIS, AIRS/AMSU, TOMS
	Surface Pressure	mb	±2-4	±2-4	20-50 km	Daily*	Global		NMC, AIRS/AMSU
R. Calibration Data Sets	Surface Winds	m/sec	±2-4	±2	50 km	Daily*	Global		HIMSS, SCATT, ALT, NMC
	Total Ozone	Dobson	±5-10	±5	20-50 km	Daily*	Global		MODIS, AIRS/AMSU, TOMS
	Surface Pressure	mb	±2-4	±2-4	20-50 km	Daily*	Global		NMC, AIRS/AMSU

ATMOSPHERE -- POST LAUNCH:

MODIS DATA PRODUCT	ANCILLARY PRODUCT/PARAMETER	MEASUREMENT UNITS	ABSOLUTE ACCURACY (std. error)	PRECISION (RELATIVE ACCURACY)	RESOLUTION (SPATIAL or VERTICAL)	PRODUCT TEMPORAL RESOLUTION	SPACE SCALE	RESPONSIBLE SCIENTIST	COMMENTS
A. Aerosol Single Scat. Albedo	At-Launch Aerosol Prod.								MODIS
C. Cloud Jnt.Prob.Dens.Funct	All level 2 Cloud Products								MODIS
	Radiances								MODIS Level 1.
D. Cloud Emissivity	Cloud Effective Emissivity							Menzel	MODIS
	Cloud Fractional Area							Menzel	MODIS

I. REQUIRED ANCILLARY DATA (continued):

Ancillary/Validation/Interim/Derivative Data Products (MODIS)

OCEANS -- POST LAUNCH

MODIS DATA PRODUCT	ANCILLARY PRODUCT/PARAMETER	MEASUREMENT UNITS	ABSOLUTE ACCURACY (std. error)	PRECISION (RELATIVE ACCURACY)	RESOLUTION (SPATIAL or VERTICAL)	PRODUCT TEMPORAL RESOLUTION	SPACE SCALE	RESPONSIBLE SCIENTIST	COMMENTS
A. Primary Prod,Case I	chla				20 km	daily	Global		MODIS
	incident PAR	quanta/cm^2 sec	±15%	±5%	20-100 km	daily	Global	Esaias/Guenth	?MODIS, CERES, Guenther/Tanre
	KPAR	per m	±15%	±5%	20-100 km	daily	Global	Gordon	
	Winds. Sea Surface Pressure	m^2/sec	±2 m/s	±2 ms	20-100 km	daily		?	HIMSS, SCATT, NMC
	SST	K	1°	±0.5%	20 km	daily		Brown/Barton	
	in-situ (primary productivity/chla)	gC/m^2/day	±25%	±15%		Week/Month	Regional		
B. Chlorophyll Conc. From Fluorescence	Incident irradoamce, motor					Each Pass			MODIS
	Winds, Sea Surface Pressure	m/sec, mb			1-20 km	Daily/Weekly	Global/Region	Esaias?	Esaias input.
E. Surface Incident PAR (h nu) Keb	Winds, Sea Surface Pressure	m/sec, mb			1-100 km	Daily	Global	Esaias?	Esaias input.
	AVHRR (NOAA)				1-100 km	Daily	Global	Esaias?	Esaias input.
	GOES (NOAA)				1-100 km	Daily	Global	Esaias?	Esaias input.
F. Attenuation of PAR	Winds. Sea Surface Pressure	m/sec, mb			1-20 km	Daily/Weekly	Global	Esaias?	Esaias input.
G. Pigment Concentration (Curvature)	Winds, Sea Surface Pressure	m/sec, mb			1-20 km	Daily/Weekly	Regional	Esaias?	Esaias input.
H. Beam Attenuat. Coeff	Winds, Sea Surface Pressure	m/sec, mb			1-20 km	Daily/Weekly	Global	Esaias?	Esaias input.
J. Organic Fraction	Winds, Sea Surface Pressure	m/sec, mb			1-20 km	Daily/Weekly	Global	Esaias?	Esaias input.
L. Currents, Fronts, Eddies									

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II. MODIS VALIDATION DATA PRODUCTS:

Ancillary/Validation/Interim/Derivative Data Products (MODIS)

ATMOSPHERE - VALIDATION

MODIS DATA PRODUCT	VALIDATION PRODUCT/PARAMETER	MEASUREMENT UNITS	ABSOLUTE ACCURACY (std. error)	PRECISION (RELATIVE ACCURACY)	RESOLUTION (SPATIAL or VERTICAL)	PRODUCT TEMPORAL RESOLUTION	SPACE SCALE	RESPONSIBLE SCIENTIST	COMMENTS
A. Cloud Optical Thickness	a/c in-situ measurements						local	King	MODIS
C. Cloud Effective Emissivity	Temperature Profiles							Menzel/King	MODIS. 2-3 km Vertical Resolution.
	Liquid/ice water content from a/c						local	Menzel/King	MODIS

OCEANS - VALIDATION

MODIS DATA PRODUCT	VALIDATION PRODUCT/PARAMETER	MEASUREMENT UNITS	ABSOLUTE ACCURACY (std. error)	PRECISION (RELATIVE ACCURACY)	RESOLUTION (SPATIAL or VERTICAL)	PRODUCT TEMPORAL RESOLUTION	SPACE SCALE	RESPONSIBLE SCIENTIST	COMMENTS
A. Chlorophyll-A Concentration (Case I)	Incident Spectral Irradiance-Ed,Z(0,+)	µW/cm^2/nm	5%	1-2%	sealevel		local	Clark	Buoy and ship measurements
	Downwelled Spectral Irradiance-Ed,Z	µW/cm^2/nm	5%	1-2%	dZ=1m,0<Z<150m		local	Clark	Buoy and ship measurements
	Upward Spectral Radiance-Lu	µW/cm^2/nm/sr	5%	1-2%	dZ=1m,0<Z<150m		local	Clark	Buoy and ship measurements
	Water-Leaving Spectral Radiances-Lw	µW/cm^2/nm/sr	8%	3%	1 m		local	Clark	Buoy and ship meas., act. + normalized
	Spectral Beam Attenuation Coeff.-c	per meter	5%	1-2%	1 m		local	Clark	Buoy and ship measurements
	Diffus.Atten.Coef.Downwel.Irrad.-KEd	per meter	5%	2%	1 m		local	Clark	Buoy and ship measurements
	Diffus. Atten. Coef. Upwel. Rad.-KLu	per meter	5%	2%	1 m		local	Clark	Buoy and ship measurements
	Phycobilipigments (mg/m^3)	mg/m^3	TBD	TBD	5m		loc.,along trak	TBD	Ship meas.
	Spectral Reflec.(or Radiance)Factor-RL	percent	5%	2%	dZ=1m,0<Z<150m		local	Clark	Ship measurements, at depth and in air
	Phyt.Pig(Fluor.Tech)Chlor.a+Phaeopig.a	mg/m^3	15%	10%	dZ=5m		loc.,along trak	Clark	Ship measurements
	Phytoplankton Pigm.(HPLC Technique)	nanomoles/liter	5%	1-2%	dZ=5m		loc.,along trak	Clark	Ship measurements
	Humic and Fulvic acids	g/m^3	±10%	±3%			local	Carder	Ship measurements
	Particle absorption coefficient	per m	±10%	±4%	dZ=1m		local	Carder	Ship measurements
	Detritus absorption coefficient		±15%	±6%	dZ=1m		local		Ship measurements
	Backscattering coefficient bbl	per m	±7%	±4%	dZ=1m		local		Ship measurements
	Total Dissolved Organic Carbon	mg/m^3	TBD	TBD			loc.,along trak		Ship measurements
	Spectral Solar Atmos. transmission (Ta)	percent	NA	1%			local	TBD	Ship ,Shore stations
	AOL fluoresensor(DOM,Chl a, Phycoerythrin	mg/m^3	±15%	±8%	near sfc.		0.01 km av	Hoge	Overflights of cruises, moorings
	Airborne Radiances (Lw 410-750 nm)	µW/cm^2/nm/sr	±10%	±5%	near sfc.		0.01 km av	Hoge	Overflights of cruises, moorings
	In-Situ Validation Observations	µg/liter	±10%	±2%	Test Site	TBD	Test Site	Hoge?	Hoge input. Mid-Atlantic Bight
B. Chlorophyll-A Concentration (Case II)	see A.								
C. Chlorophyll Fluorescence (Line Height) Chlorophyll Fluorescence (Curvature)	In-Situ Validation Observations	µg/liter	±10%	±2%	Test Site	TBD	Test Site	Hoge?	Hoge input. Mid-Atlantic Bight.
	Incident Spectral Irradiance-Ed,Z(0,+)	µW/cm^2/nm	5%	1-2%	sealevel		local	Clark	Buoy and ship measurements
	Downwelled Spectral Irradiance-Ed,Z	µW/cm^2/nm	5%	1-2%	dZ=1m,0<Z<150m		local	Clark	Buoy and ship measurements
	Upward Spectral Radiance-Lu	µW/cm^2/nm/sr	5%	1-2%	dZ=1m,0<Z<150m		local	Clark	Buoy and ship measurements
	Water-Leaving Spectral Radiances-Lw	µW/cm^2/nm/sr	8%	3%			local	Clark	Buoy and ship meas., act. + normalized
	Spectral Beam Attenuation Coeff.-c	per meter	5%	1-2%	dZ=1m,0<Z<150m		local	Clark	Buoy and ship measurements
	Diffus.Atten.Coef.Downwel.Irrad.-KEd	per meter	5%	2%	dZ=1m,0<Z<150m		local	Clark	Buoy and ship measurements
	Diffus. Atten. Coef. Upwel. Rad.-KLu	per meter	5%	2%	dZ=1m,0<Z<150m		local	Clark	Buoy and ship measurements
	Fluoresc. Line Magnit. @685 nm- FLM(z)	1m	10%	4%	dZ=1m,0<Z<150m		local	Clark	Buoy and ship measurements
	Spectral Reflec.(or Radiance)Factor-RL	percent	5%	2%	dZ=1m,0<Z<150m		local	Clark	Ship measurements, at depth and in air
	Phyt.Pig(Fluor.Tech)Chlor.a+Phaeopig.a	mg/m^3	15%	10%	dZ=5m		loc.,along trak	Clark	Ship measurements
	Phytoplankton Pigm.(HPLC Technique)	nanomoles/liter	5%	1-2%			loc.,along trak	Clark	Ship measurements
	Phycobilipigments (mg/m^3)	mg/m^3	TBD	TBD	dZ=5m		loc.,along trak	TBD	Ship measurements
	Spectral Solar Atmos. transmission (Ta)	percent	NA	1%			local	TBD	Ship Shore stations
	AOL fluoresensor(DOM,Chl a, Phycoerythrin	mg/m^3	±15%	±8%	near sfc.		0.01 km av	Hoge	Overflights of cruises, moorings
	Airborne Radiances (Lw 410-750 nm)	µW/cm^2/nm/sr	±10%	±5%	near sfc.		0.01 km av	Hoge	Overflights of cruises, moorings

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OCEANS - VALIDATION (cont.)

MODIS DATA PRODUCT	VALIDATION PRODUCT/PARAMETER	MEASUREMENT UNITS	ABSOLUTE ACCURACY (std. error)	PRECISION (RELATIVE ACCURACY)	RESOLUTION (SPATIAL or VERTICAL)	PRODUCT TEMPORAL RESOLUTION	SPACE SCALE	RESPONSIBLE SCIENTIST	COMMENTS
D. Pigment Concentration (CZCS)	See C, Except for Fluor. Line Magn(@685nm-FLM(Z) Except for, In-Situ Validation Observations								
E. Ocean Prim. Productivity (Empirically)	See A, Except for Humic and Fulvic Acids Except for In-Situ Validation Observ. Also, Photosynth. Active Radiat.(400-700n Also, Primary Productivity (14-C)	 #quanta/s/m^2 mg C/m^3/hr	 5% ±20-100%	 2% ±5-10%	 1m 5m		 local loc.,along trac	 Clark Clark	 Buoy and ship measurements Ship measurement
F. Regional Sea Surface Temperatures	Temperature IR Surface Brightness Temperature In-Situ Validation Observations	°C °K °K	0.04°C 0.5K 0.5K	0.001°C ±0.1°K ±0.1°K	1m 1m	 Daily	loc.,along track loc.,along track local	 Barton?	Clark. Ship meas., Buoys ±0.2 Acc Ship Measurements Barton input. Ship & Bouy measurements
G. Global Sea Surface Temperatures	Temperature IR Surface Brightness Temperature In-Situ Validation Observations	°C °K °K	 0.5K 0.5K	 ±0.1°K ±0.15°K	 1km 2km	 Pass ±15 min	 loc.,along trac	 TBD Brown?	 Brown input. ±1km Position on Earth Grid
H. Water-Leaving Radiance (Visible)	See A. Except for In-Situ Validation Observ.								
I. Attenuation (Kd) at 490nm, (Case I)	See A. Also Photosynth. Active Radiat.(400-700nr Except for In-Situ Validation Observ.	 #quanta/s/m^2	 5%	 2%	 1m		 local	 Clark	 Buoy and ship measurements
J. Detached Coccolith Conc. (E. huxleyi)	See A., Also Detach Coccolith Conc.(E.huxleyi) Except for In-Situ Validation Observ. Except for Humic and Fulvic Acids	 mg CaCO3,#/m^3					 local		 Ship measurements
K. Dissolved Organic Matter Case 1 Global	See A, Except for In-Situ Validation Observ.								
L. Dissolved Organic Matter, Southern	See A, Except for In-Situ Validation Observ.								
M. Sea Ice (Maximum Total Extent)	Spectral Solar Atmospheric Transmission	percent	NA	1%			local	TBD	Ship, Shore Stations
N. Phycoerythrin Concentration	See A, Except for Humic and Fulvic Acids Except for In-Situ Validation Observ.								
O. Single Scattering Aerosol Rad., ta < 0.6	See D.								
P. Aerosol Angstrom Exp., Optical Depth	See D.								
Q. Total Suspended Solids	See A, Except for Humic & Fulvic Acids Except for In-Situ Validation Observ. Also, Total Suspend Matter (TSM) Conc. Also, Organic Total Suspend Matter Conc. Also, Inorganic Total Suspend Matter Conc.	 g/m^3 g/m^3 g/m^3	 10% 10% 10%	 5% 5% 5%	 5m 5m		 loc.,along trac loc.,along trac loc.,along trac	 Clark Clark Clark	 Ship measurements Ship measurements Ship measurements
R. Calibration Data Sets	See A, Except for In-Situ Validat. Observ.								

III. MODIS INTERIM DATA PRODUCTS:

The products given below will be available in the process of producing the at- or post-launch data products.

ATMOSPHERE -- AT LAUNCH

MODIS DATA PRODUCT	INTERIM PRODUCT/PARAMETER	MEASUREMENT UNITS	ABSOLUTE ACCURACY (std. error)	PRECISION (RELATIVE ACCURACY)	RESOLUTION (SPATIAL or VERTICAL)	PRODUCT TEMPORAL RESOLUTION	SPACE SCALE	RESPONSIBLE SCIENTIST	COMMENTS
H. Spec.Aerosol Opt.Thk.ocean	Aerosol Optical Thickness				214/428 m	Daily			
Spec.Aerosol Opt.Thk.land	Aerosol Optical Thickness				214/428 m	Daily			
K. Atmosph. Stabil.(lift. ind.)	Temperature Profile								3 levels. archivable
	Dew-point Temperature								2 levels. archivable

OCEANS -- AT LAUNCH:

MODIS DATA PRODUCT	INTERIM PRODUCT/PARAMETER	MEASUREMENT UNITS	ABSOLUTE ACCURACY (std. error)	PRECISION (RELATIVE ACCURACY)	RESOLUTION (SPATIAL or VERTICAL)	PRODUCT TEMPORAL RESOLUTION	SPACE SCALE	RESPONSIBLE SCIENTIST	COMMENTS
H. Water Leaving Radiance	Raleigh Radiance	µw/am^2 sr.m	±5%						Esaias input. Several bands.
	Sea Surface Winds from Glitter	m/s	TBD	TBD	1, 20 km	Daily	Regional/Globa	Gordon	Uses MODIS-N vis. land bands looking into glit
J. Detached Coccolith Conc. (E. huxleyi)	Total Backscattering Coefficient (bb)	per meter	±25%	±10%	1, 20 km	Day/Wk/Mon	Regional/Globa	Gordon	Computed in E. huxleyi blooms w/model.
	Coccolith Backscattering Coefficient (bb*)	per meter	±25%	±10%	1, 20 km	Day/Wk/Mon	Regional/Globa	Gordon	Intermediate to Coccolith concentration.
	Total Backscattering - Phytoplankton	soft, med., hard	TBD	TBD	1, 20 km	Day/Wk/Mon	Regional/Globa	Gordon	Classif. of scattrers in Coc.-free wtrs. Spcul.
L. Sea Ice (Maximum Total Extent)	Cloud Identification	Km^2	TBD		1-10 km	Daily/Weekly	Global/Regionl		Differentiation&subtraction importnt. Ardanu
N. Phycoerythrin Concentration	Along-Track Laser-Induced Phycoerythrin and Chlorophyll Fluorescence; SST and DOM	counts	±15%	± 8%	0.001 km	Each Pass	A/c overflight of Cruise Site	Hoge	Produced from airborne ancillary products. Esaias input. Several bands.
	Total Scattering Coefficient b	per meter	TBD	±15%	1, 20 km	Daily/Weekly	Global	Gordon	(Carder)
	Phytoplankton Scattering Coefficient b*	per meter	TBD	±20%	1, 20 km	Daily/Weekly	Global	Gordon	(Carder)
	b - b*	per meter	TBD	±20%	1, 20 km	Daily/Weekly	Global	Carder	Esaias input. Several bands.
	Total Absorptance	per meter	TBD	±115%	1, 20 km	Daily/Weekly	Global	Carder	
	Phytoplankton Absorptance (a/p)	per meter	TBD	±20%	1, 20 km	Daily/Weekly	Global	Carder	
	Non-phytoplankton Absorp.(a/other)	per meter		±20%	1-20 km	Daily/Weekly	Global	Carder	
	Glint Field	Dimensionless	N/A	N/A	1, 20 km	Daily	Global	Evans/Gordon	

ATMOSPHERE -- POST LAUNCH:

MODIS DATA PRODUCT	INTERIM PRODUCT/PARAMETER	MEASUREMENT UNITS	ABSOLUTE ACCURACY (std. error)	PRECISION (RELATIVE ACCURACY)	RESOLUTION (SPATIAL or VERTICAL)	PRODUCT TEMPORAL RESOLUTION	SPACE SCALE	RESPONSIBLE SCIENTIST	COMMENTS
B. Cloud Area & Perimeter Geometry	Cloud Area & Perimeter- Geometry	km^2 & km	N/A	N/A	Pixel	Monthly	Global	Kaufman	