



Current MODIS Data System: Processing, Archiving and Distribution

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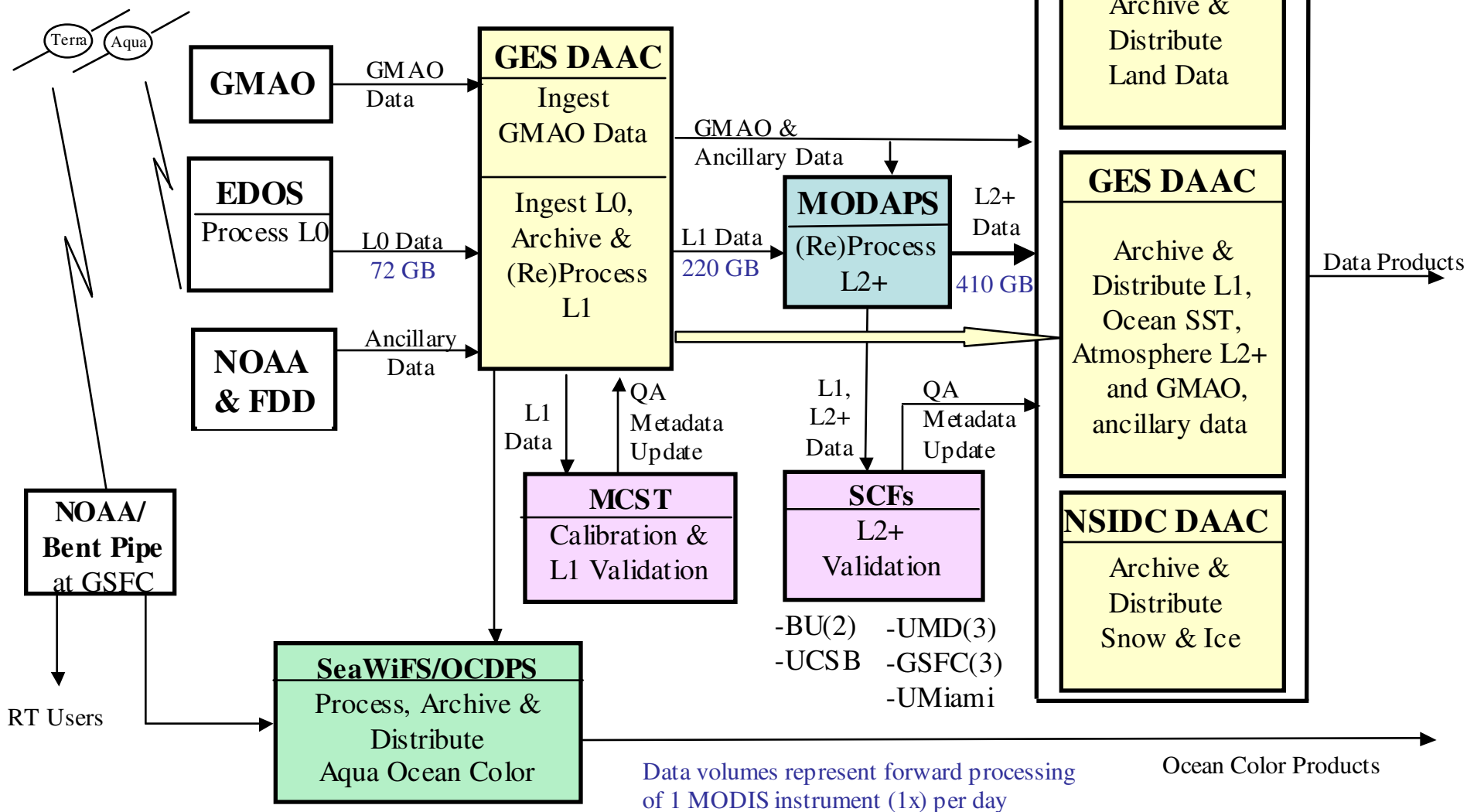
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MODIS Data Flow





Current Products - Level 1



Product	Product Designator	Temporal Resolution	Spatial Resolution
Level 1A - Radiance counts Terra→ Aqua→	MOD01 MYD01	5-min swath	Raw counts
Level 1A Subset – 20 Ocean bands	MOD01SS	5-min swath	Raw counts
Level 1B – calibrated, geolocated, at-aperture radiance – all bands	MOD021KM	5-min swath	1km
Level 1B – bands 1-7	MOD02HKM	5-min swath	500m
Level 1B – bands 1 & 2	MOD02QKM	5-min swath	250m
Level 1B Subsampled – all bands HDF –EOS format	MOD02SSH	5-min swath	5 km
Level 1B Subsampled - all bands Binary format	MOD02SSN	5-min swath	5 km
On-board calibrator (OBC) & eng. data	MOD02OBC	5-min swath	
Geolocation fields	MOD03	5-min swath	1 km



Current Products - Atmosphere



Product	Product Designator	Temporal Resolution	Spatial Resolution
Aerosols Terra → Aqua →	MOD04_L2 MYD04_L2	5-min swath	10 km
Precipitable Water Vapor			
Cloud Properties	MYD06_L2	5-min swath	1 km 5 km
Atmospheric Profiles (Temp. & Water Vapor)	MYD07_L2	5-min swath	5 km
Cloud Mask	MYD35_L2	5-min swath	250 m 1 km
Joint Cloud/Aerosol/Water Vapor & Profile	MYDATML2	5-min swath	5 km 10 km
Joint Aerosol/Water Vapor/Cloud/ Ozone – Global, gridded	MYD08	(L3) daily, 8- day, monthly	1° CMG



Current Products - Land



Product	Product Designator	Temporal Resolution	Spatial Res.	Projec
Surface Reflectance	MOD09	(L2G) daily (L3) 8-day (L3) daily	250m, 500m 250m, 500m .05°	SIN SIN CMG
Land Surface Temp. & Emissivity	MOD11	(L2) 5-min swath (L3) daily (L3) 8-day (L3) daily, 8-day, monthly	1 km 1 km, 5 km 1 km .05°	- SIN SIN CMG
Land Cover Change Land Cover Type	MOD12/MCD12 (no M YD12)	(L3) 96-day	1 km .05°	SIN CMG
Vegetation Indices	MOD13/MCD13	(L3) 16-day (L3) monthly (L3) 16-day, monthly	250m, 500m, 1km 1 km .05°	SIN SIN CMG
Thermal Anomalies /Fire Burn Scar	MOD14	(L2) 5-min swath (L3) daily, 8-day (L3) 32-day (L3) 16-day	1 km 1 km .05° 500m	- SIN CMG SIN
BRDF/Albedo (3)	MOD43/MCD43 (no M YD43)	(L3) 16-day	1 km .05°	SIN CMG
LAI/FPAR	MOD15	(L4) 8-day (L4) 32-day	1 km .05°	SIN CMG
Evapotranspiration/ Surface Resistance	MYD16 only	(L4) 8-day	1 km	SIN
Net Photosynthesis Net Primary Production	MOD17	(L4) 8-day (L4) 32-day (L4) yearly	1 km .05° 1 km/.05°	SIN CMG SIN/CMG
Veg. Cover Conversion Veg. Continuous Fields	MOD44 only	(L3) 32-day (L4) yearly	250m 500m	SIN SIN



Current Products - Cryosphere & Intermediate Land



Product	Product Designator	Temporal Resolution	Spatial Resolution	Projection
Snow Cover	MOD10/MYD10*	(L2) 5-min swath (L3) daily , 8-day (L3) daily , 8-day	500m 500m .05°	- SIN CMG
Sea Ice Sea Ice Extent and Surface Temperature	MOD29/MYD29*	(L2) 5-min swath (L3) daily (day/night) (L3) daily	1 km 1 km 4 km	- EASE-grid EASE-grid
Geolocation Angles	MODMGGAD	(L2G) daily (day)	1 km	SIN
Observation Pointers	MODPT	(L2G) daily (day) (L2G) daily	1 km 250m, 500m	SIN SIN

* Terra and Aqua products are not identically produced due to problems with Aqua Band 6



Terra Ocean Products

Feb. 2000 - Jan. 2004



* Feb. 2004 - Present



Ocean (Standard) Product Parameters



1	nLw_412/Normalized water-leaving radiance at 412 nm	21	cocco_conc_detach/Detached coccolithophore concentration
2	nLw_443/Normalized water-leaving radiance at 443 nm	22	calcite_conc/Calcite concentration
3	nLw_488/Normalized water-leaving radiance at 488 nm	23	K_490/Diffuse attenuation coefficient at 490 nm
4	nLw_531/Normalized water-leaving radiance at 531 nm	24	phycoeryth_conc/Phycoerythrobilin concentration*
5	nLw_551/Normalized water-leaving radiance at 551 nm	25	phycou_conc/Phycourobilin concentration
6	nLw_667/Normalized water-leaving radiance at 667 nm	26	chlor_a_2/Chlorophyll-a concentration (SeaWiFS analog - OC3M)
7	nLw_678/Normalized water-leaving radiance at 678 nm	27	chlor_a_3/Chlorophyll-a concentration (semianalytic)
8	Tau_869/Aerosol optical thickness at 869 nm	28	Ipar/Instantaneous photosynthetically available radiation
9	Eps_78/Epsilon of aerosol correction at 748 and 869nm	29	Arp/Instantaneous absorbed radiation by phytoplankton for fluorescence
10	aer_model1/Aerosol model identification number 1	30	absorp_coef_gelb/Gelbstoff absorption coefficient at 400 nm
11	aer_model2/Aerosol model identification number 2	30	chlor_absorb/ Phytoplankton absorption coefficient at 675 nm
12	eps_clr_water/Epsilon of clear water aerosol correction at 531 and 667 nm	31	tot_absorb_412 /Total absorption coefficient at 412 nm
13	CZCS_pigment/Chlorophyll-a + pheopigment (fluorometric, empirical)	32	tot_absorb_443 /Total absorption coefficient at 443 nm
14	chlor_MODIS/Chlorophyll-a concentration (HPLC, empirical)	34	tot_absorb_488/Total absorption coefficient at 488 nm
13	pigment_c1_total/Total pigment concentration (HPLC, empirical)	35	tot_absorb_531/Total absorption coefficient at 531 nm
16	chlor_fluor_ht/Chlorophyll fluorescence line height	36	tot_absorb_551/Total absorption coefficient at 551 nm
17	chlor_fluor_base/Chlorophyll fluorescence baseline	37	SST (daytime), 11 μ m
18	chlor_fluor_effic/Chlorophyll fluorescence efficiency	38	SST (daytime), 4 μ m
19	susp_solids_conc/Total suspended matter concentration in ocean	39	SST (nighttime), 11 μ m
20	cocco_pigmnt_conc/Pigment concentration in coccolithophore blooms	40	SST (nighttime), 4 μ m
			Angstrom_531/ Angstrom coefficient, 531-869 nm

* Not maintained



MODIS Data Processing



	<i>GES DAAC</i>	<i>MODAPS</i>	<i>OCDPS</i>
Level 1	<ul style="list-style-type: none"> • Level 1A • Level 1A subset • Level 1B (1km, 500m, 250m) • Level 1B sub-sampled • Geolocation 		<ul style="list-style-type: none"> • Level 1A subset • Level 1B_OC (subset)
Ocean		<ul style="list-style-type: none"> • Terra SST • Aqua SST 	<ul style="list-style-type: none"> • Aqua Ocean Color • Aqua SST (quicklook)
Atmosphere	<ul style="list-style-type: none"> • CloudMask • Atmospheric Profiles 	<ul style="list-style-type: none"> • Aerosols • Precipitable Water Vapor • Cloud Properties • Joint Atmos. Products 	
Land		<ul style="list-style-type: none"> • Surf. Reflectance • Land Surf. Temp • Land Cover • Vegetation Indices • Thermal Anom./Fire • BRDF/Albedo • LAI/FPAR • Evapotranspiration • Net Primary Prod. • Veg. Cover Conv. 	
Cryosphere		<ul style="list-style-type: none"> • Snow Cover • Sea Ice 	



Archives of MODIS Data

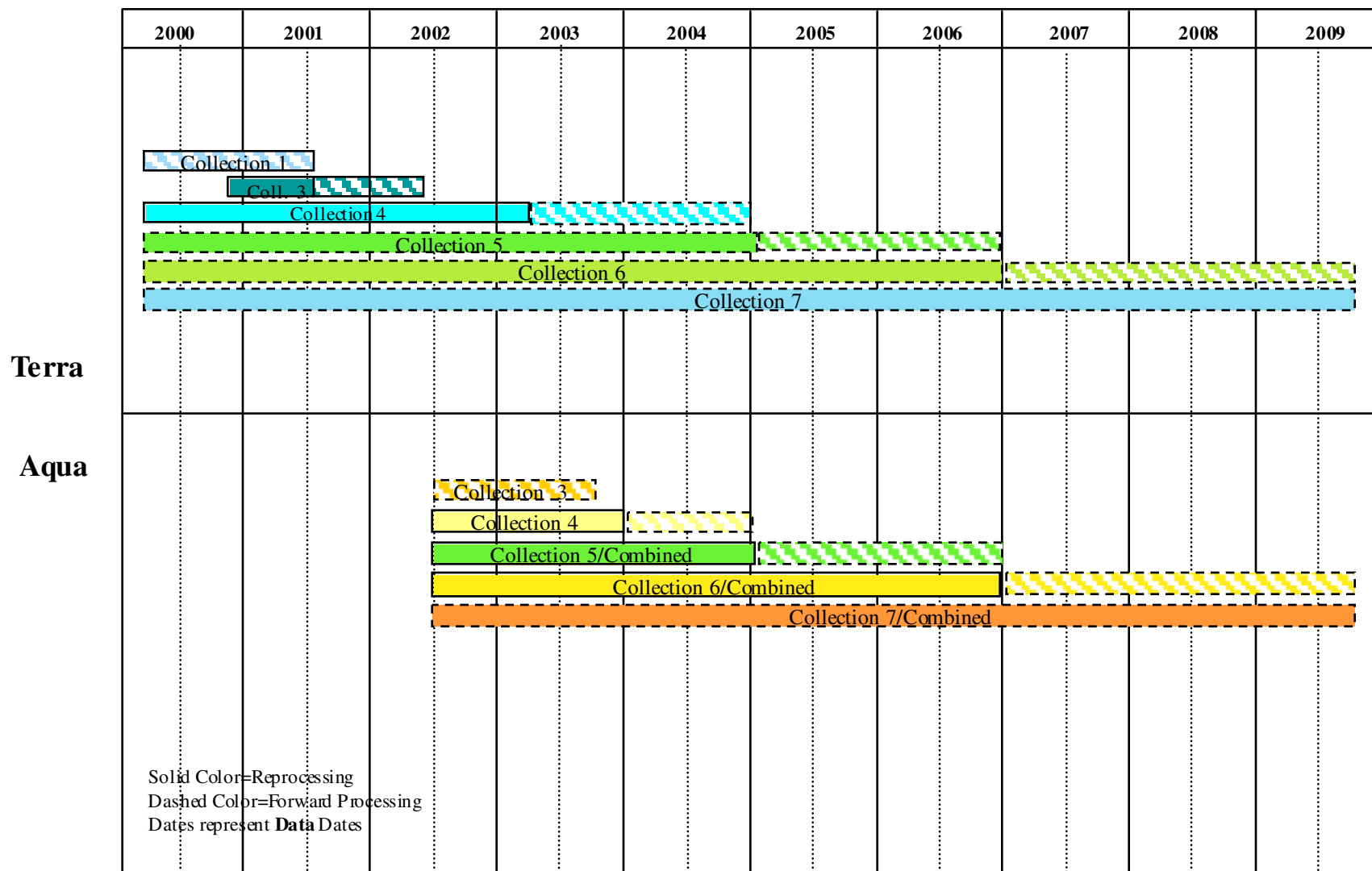


	<i>LP DAAC ~ .7 PB (Sioux Falls, SD)</i>	<i>NSIDC (Boulder, CO)</i>	<i>GES DAAC ~ 1.4 PB (Greenbelt, MD)</i>	<i>OC DPS (Greenbelt, MD)</i>
Level 1			<ul style="list-style-type: none"> • All Level 1 	<ul style="list-style-type: none"> • Level 1A subset - Aqua + Terra
Ocean			<ul style="list-style-type: none"> • Terra OC & SST (2/00 -2/04) • Aqua OC (6/02-2/04) • Aqua SST (6/02-7/04) 	<ul style="list-style-type: none"> • Aqua OC (6/02-7/04)
Atmosphere			<ul style="list-style-type: none"> • Cloud Mask • Aerosols • Precipitable Water • Cloud Properties • Atmos. Profiles • Joint global atmos. product 	
Data Pools*	<ul style="list-style-type: none"> * L3 Land Products (12 mos) * L2G Surf. Refl. (4 days) 	<ul style="list-style-type: none"> * Recently ingested granules 	<ul style="list-style-type: none"> * Geolocation (1 mo) * All L1B sub-sampled + L1B (10 days) * L2 SST (1 mo) * L3 Mapped (4/00-7/04) + A (1/03-7/04) * All Atmospheres L2 + L3 	
Land	<ul style="list-style-type: none"> • Surface Reflectance • Land Surface Temp • Land Cover • Veg. Indices + US time series mosaic • Thermal Anomalies/Fire • LAI/FPAR • Net Primary Production • BRDF/Albedo • Vegetation Cover Conversion 			
Cryosphere		<ul style="list-style-type: none"> • Snow Cover • Sea Ice 		

*Data Pools are 'rolling' archives of fresh or high-interest data on disk



Product Collections (Reprocessing Events)





Distribution Mechanisms



User Interface/Features	LP DAAC		GES DAAC		NSIDC		OCDPS
	Archive	Data Pool	Archive	Data Pool	Archive	Data Pool	
EOS Data Gateway (EDG)							
Media & FTP delivery	X		X		X		
Subscription	X		X		X		
Browse (visualization)	9/04		some		X		
Search by data attributes	X		X		X		
Access to all DAACs	X		X		X		
On-line access note		X		X		X	
MTMGW (for large volume transfers)	X		X		X		
Spatial subsets (HEW)					X		
Web Hierarchical Ordering Mechanism							
Browse (visualization)			X	X			
Spatial Subscriptions			X	X			
On-demand subsetting (Oceans L1B/L2)			X	X			
On-the-fly subsetting (19 ocean basins-L3)				X			
LP DAAC Client/MODIS-specific Client							
Subsetting, Reformatting, Reprojection		X					
Data Compression		X					
NSIDC Data Pool							
Browse						X	
Subsetting, Reformatting, Reprojection						X	
SNOWI/ MODIS SNOWI					X		
SeaWiFS Web Interface							
FTP Delivery							X
Subscription							X
Browse (visualization)							X
Regional subsets							X



In the Works



- EOSDIS Clearing HOuse ECHO
 - MODIS granules to populate by 8/04 at LP DAAC
- Open Data Access Protocol (Open DAP, formerly DODS)
 - L3 & L4 gridded data accessible
 - <http://daac.gsfc.nasa.gov/services/dods/DODS.html>
 - Supports subsetting
 - Matlab and IDL Clients
- MODIS On-line Visualization and Analysis System (MOVAS)
 - On-line atmospheres data
 - Emphasis on time series
 - Subsetting capability
- Near-Archive Data Mining (Experimental)



Data Tools Available for Users



- » <http://edcdaac.usgs.gov/datatools.asp>
- » <http://nsidc.org/data/tools/>

- MODIS Reprojection Tool (MRT)
- MODIS Land Data Operational Evaluation (LDOPE)
- MODIS Swath Reprojection Tool (MRT Swath)
- MODIS Atmospheres Tools
- MODIS Swath-to-Grid Toolbox (MS2GT)
- HDF-EOS to GeoTIFF Conversion Tool (HEG)
- HEW Subsetting Appliance (HSA)



Data Access



EOS Data Gateway (EDG) - <http://redhook.gsfc.nasa.gov/~imswww/pub/imswelcome/>

NSIDC EDG: <http://www.nsidc.org/~imswww/pub/imswelcome/>

WHOM (for GES DAAC) - <http://daac.gsfc.nasa.gov/data/>

GES DAAC MODIS Data Support - <http://daac.gsfc.nasa.gov/MODIS/>

LP DAAC - <http://edcdaac.usgs.gov/main.asp>

Mosaic of MOIDS Veg. Indices - <http://seamless.usgs.gov>

NSIDC - <http://nsidc.org/data/modis/>

NSIDC data pool: http://www.nsidc.org/data/data_pool/

SNOWI: <http://www.nsidc.org/data/snowi/>

MODIS SNOWI: http://www.nsidc.org/data/modis_snowi/

Ocean Color - <http://oceancolor.gsfc.nasa.gov>



Contacts



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Acronyms



BRDF - Bidirectional Reflectance Distribution Function	LDOPE - Land Data Operational Evaluation
BU - Boston University	LP DAAC - Land Processes DAAC
DAAC - Distributed Active Archive Center	MCST - MODIS Characterization Support Team
ECHO - EOSDIS Clearing HOuse	MODAPS - MODIS Adaptive Processing System
ECS - EOSDIS Core System	MODIS - Moderate Resolution Imaging Spectroradiometer
EDG - EOS Data Gateway	MTMGW - Machine-to-Machine Gateway
EDOS - EOS Data Operations System	NOAA - National Oceanographic and Atmospheric Administration
EOS - Earth Observing System	NSIDC - National Snow and Ice Data Center
EOSDIS - Earth Observing System Data Information System	OBC- On-board Calibrator
ESDIS - Earth Science Data and Information System (Project)	OC - Ocean Color
FDD - Flight Dynamics Division	OCDPS - Ocean Color Data Processing System
FPAR - Fraction of absorbed Photosynthetically Active Radiation	QA - Quality Assurance
FTP - File Transfer Protocol	SCF - Science Computing Facility
GES DAAC - Goddard Earth Science DAAC	SDST - Science Data Support Team
GMAO - Global Modeling and Assimilation Office	SST - Sea Surface Temperature
GSFC - Goddard Space Flight Center	UCSB - University of California, Santa Barbara
HDF - Hierarchical Data Format	UMD - University of Maryland
HEW - HDF-EOS Web-based subsetter	USGS - United States Geological Survey
L0, L1, L2, L3, L4 - Level 0,1, 2, 3, 4 (processing levels)	WHOM - Web Hierarchical Ordering Mechanism
LAI - Leaf Area Index	