GLOBAL ENVIRONMENTAL DATABASES FROM CEOS AGENCIES

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KEY WORDS: Global Environmental-Databases, Satellite, Remote Sensing, Atmosphere, Land, Oceans, Environment, International.

ABSTRACT:

The Committee on Earth Observation Satellites (CEOS) is an international organization charged with coordinating international civil spaceborne missions designed to observe and study planet Earth. Comprising 44 space agencies and other national and international organizations, CEOS is recognized as the major international forum for the coordination of Earth observation satellite programs and for the interaction of these programs with users of satellite data worldwide.

CEOS was created in 1984 in response to a recommendation from the Economic Summit of Industrialized Nations Working Group on Growth, Technology, and Employment's Panel of Experts on Satellite Remote Sensing. This group recognized the multidisciplinary nature of satellite Earth observation and the value of coordination across all proposed missions.

The CEOS members collect, maintain, apply, and make available data from space missions that encompass the atmospheric, terrestrial, and oceanographic fields. Collectively, these members possess petabytes of Earth observation data critical to understanding the Earth environment. Uses include monitoring oil slicks, evaluating human-induced changes to the atmosphere, determining mineral exploration areas, assessing the environmental effects of volcanic eruptions, measuring the growth of urban areas, determining where landscapes have changed because of urban growth trends, improving the efficiency of fishing as a world food stock, monitoring pest infestation, managing crop production, predicting climate and weather, and numerous other applications vital to industry, national infrastructures, and the world as a whole.

The vast amount of satellite obtained, environmental data the CEOS members possess represents a fertile resource for researchers worldwide to exploit.

1. INTRODUCTION

CEOS membership includes civil agencies and non-governmental organizations from around the world.[1] Several CEOS participants manage and provide Earth observation (EO) data products. A recent report commissioned by the CEOS Plenary directed the CEOS Working Group on Information Systems and Services (WGIS) to seek ways to improve the utilization of EO data managed by CEOS participants.[2] As a partial response to this guidance, the authors abstract and group within atmospheric, terrestrial and oceanographic scientific fields, the EO holdings offered by the CEOS participants. Within those fields we provide a description of the specific types of data in conjunction with data parameters such as temporal and spatial characteristics. We also describe access means for each data provider letting interested researchers seek further information or obtain data for their project use.

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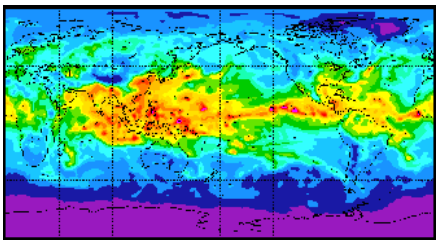
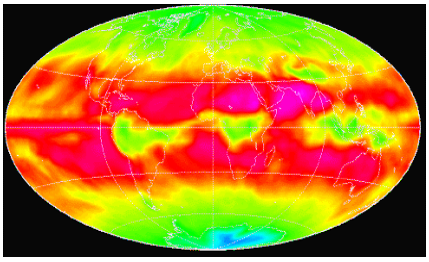
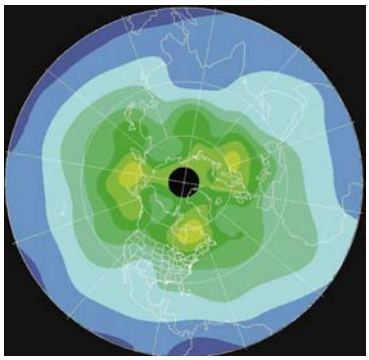
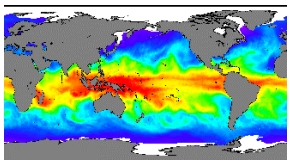
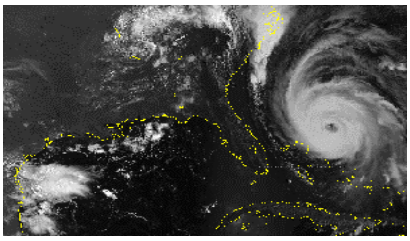
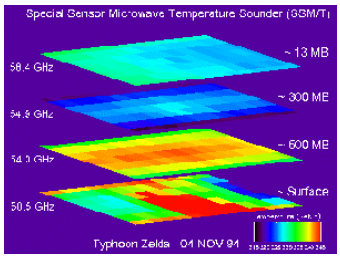
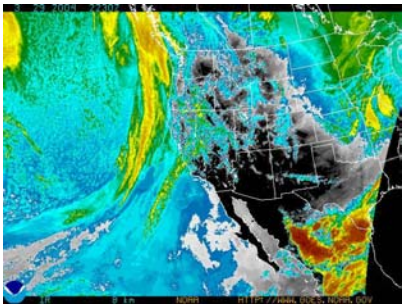
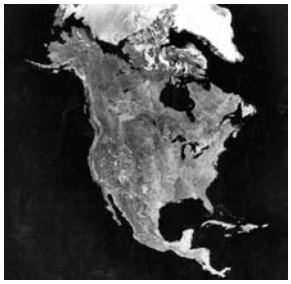
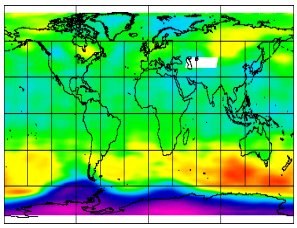
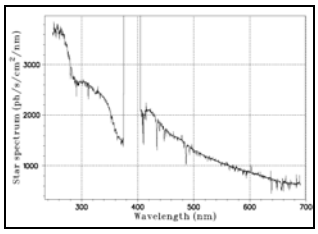
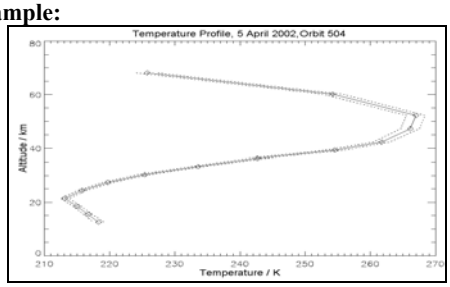
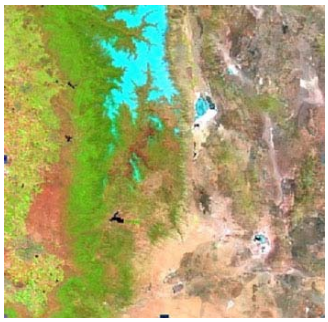
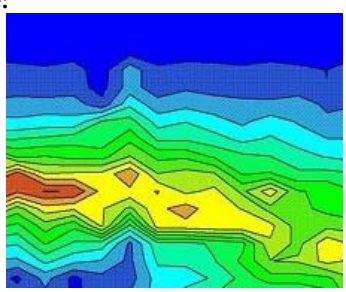
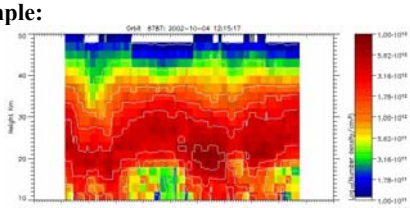
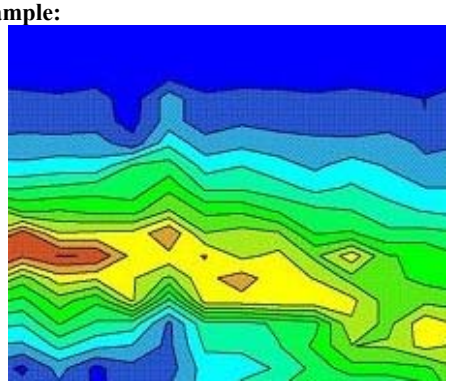
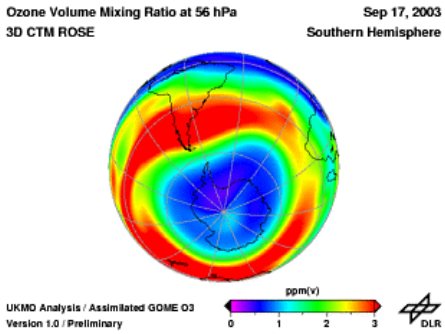
1.1. Atmospheric Data

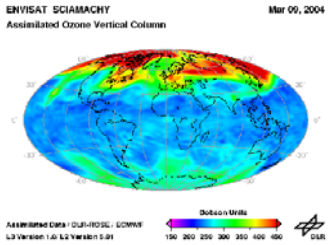
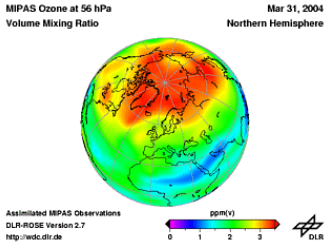
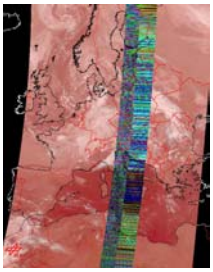
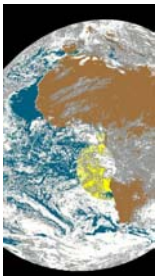
DATA DESCRIPTION	PARAMETERS	ACCESS MEANS
Abbreviation: TOVS **Long Name:** TIROS Operational Vertical Sounder **Common Uses:** measures vertical distribution of temperature and moisture in the atmosphere	**Temporal:** 1978 - present **Spatial:** global **Resolution:** 250km	**Agency:** NOAA/National Environmental Data and Information Service **URL:** http://www.saa.noaa.gov/ **Sample:**  Global Water Vapor
Abbreviation: Radiation Budget **Long Name: -** none **Common Uses:** • climate • climate change	**Temporal:** 1974 - present **Spatial:** global **Resolution:** 50 km	**Agency:** NOAA/National Environmental Data and Information Service **URL:** http://www.saa.noaa.gov/ **Sample:**  Global Longwave Radiation
Abbreviation: SUBV/2 **Long Name:** Solar Backscatter Ultraviolet Radiometer/2 **Common Uses:** monitors density and distribution of ozone in the Earth's atmosphere from 6 to 30 miles	**Temporal:** 1984 - present **Spatial:** global **Resolution:** 11 degrees	**Agency:** NOAA/National Environmental Data and Information Service **URL:** http://www.saa.noaa.gov/ **Sample:**  Total Atmospheric Ozone in the Northern Hemisphere

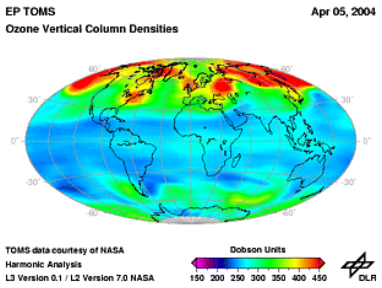
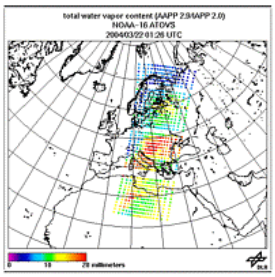
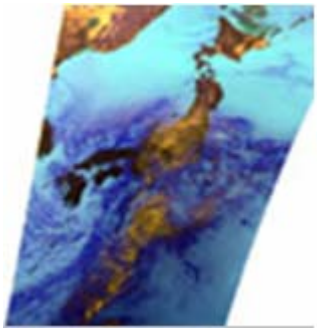
Abbreviation: DMSP-SSM/I **Long Name:** Defense Satellite Program - Special Sensor Microwave Imager **Common Uses:** • atmospheric precipitable water • ocean surface wind speed • sea ice concentration	**Temporal:** 1987 - present **Spatial:** global **Resolution:** 12.5 to 25km	**Agency:** NOAA/National Environmental Data and Information Service **URL:** http://dmsp.ngdc.noaa.gov/html/download.html **Sample:**  Atmospheric Water Vapor
Abbreviation: DMSP-OLS **Long Name:** Defense Satellite Program - Operational Linescan System **Common Uses:** monitors the global distribution of clouds and cloud top temperatures	**Temporal:** 1992 - present **Spatial:** global **Resolution:** 0.5 - 1.0 km	**Agency:** NOAA/National Environmental Data and Information Service **URL:** http://dmsp.ngdc.noaa.gov/html/download.html **Sample:**  Hurricane approaching U.S.
Abbreviation: DMSP-SSM/T **Long Name:** Defense Satellite Program - Atmospheric Temperature Profiler **Common Uses:** atmospheric and temperature profiler	**Temporal:** 1992 - present **Spatial:** global **Resolution:** 250 - 450 km	**Agency:** NOAA/National Environmental Data and Information Service **URL:** http://dmsp.ngdc.noaa.gov/html/download.html **Sample:**  SSM/T for Hurricane Zelda
Abbreviation GOES **Long Name:** Geostationary Operational Environmental Satellite **Common Uses:** • weather forecasting • prediction of thunderstorms • flash floods • hurricanes • other severe weather	**Temporal:** 1975 - present **Spatial:** Western Hemisphere **Resolution:** 1 - 8 km	**Agency:** NOAA/National Environmental Data and Information Service **URL:** http://www.saa.noaa.gov/ **Sample:**  Western US - Infrared Channel 4

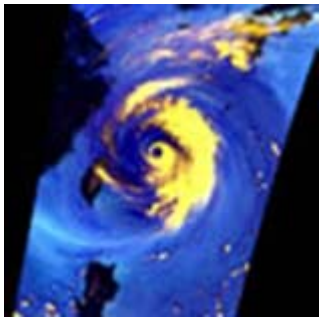
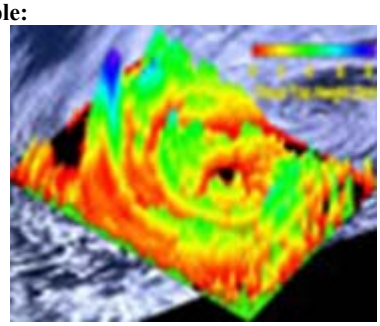
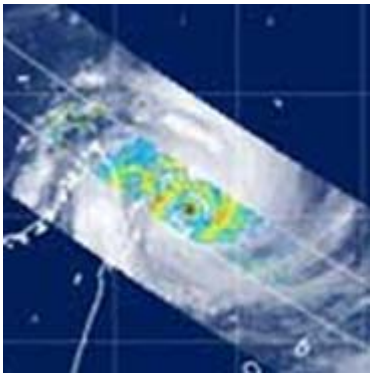
Abbreviation: NOAA AVHRR **Long Name:** NOAA Advanced Very High Resolution Radiometer **Common Uses:** • investigation of clouds • land-water boundaries • snow and ice extent • ice or snow melt inception • day and night cloud distribution • temperatures of radiating surfaces • sea surface temperature	**Temporal:** 1983 - present **Spatial:** Canada **Resolution:** 0.5km – 1km	**Agency:** CCRS **URL:** http://ceocat.ccrs.nrcan.gc.ca/ **Sample:** 
Abbreviation: ERS GOME **Long Name:** ERS-2 Global Ozone Monitoring Experiment **Common Uses:** • atmosphere's content of ozone • nitrogen dioxide • water vapor • oxygen/oxygen dimmer • bromine oxide and other trace gases	**Temporal:** 1995 - present **Spatial:** global **Resolution:** 5-10km vertical and 320-960km horizontal	**Agency:** European Space Agency **URL:** http://earth.esa.int/services/catalogues.html **URL:** http://earth.esa.int/helpandmail/help_order.html/ **Sample:**  DLR L3 Ozone Total column
Abbreviation: ENVISAT GOMOS **Long Name:** ENVISAT Global Ozone Monitoring by Occultation of Stars **Common Uses:** • monitoring of ozone and other trace gases • aerosol and temperature distributions in the stratosphere	**Temporal:** 2002 - present **Spatial:** global **Resolution:** 1.7km vertical resolution	**Agency:** European Space Agency **URL:** http://earth.esa.int/services/catalogues.html **URL:** http://earth.esa.int/helpandmail/help_order.html/ **Sample:**  GOMOS occultation, May 2002
Abbreviation: ENVISAT MIPAS **Long Name:** ENVISAT Michelson Interferometer for Passive Atmospheric Sounding **Common Uses:** • stratospheric chemistry • global climatology • atmospheric dynamics • upper tropospheric chemistry	**Temporal:** 2002 - present **Spatial:** global **Resolution:** 3km vertical resolution	**Agency:** European Space Agency **URL:** http://earth.esa.int/services/catalogues.html **URL:** http://earth.esa.int/helpandmail/help_order.html/ **Sample:**  MIPAS temperature profile, April 2002

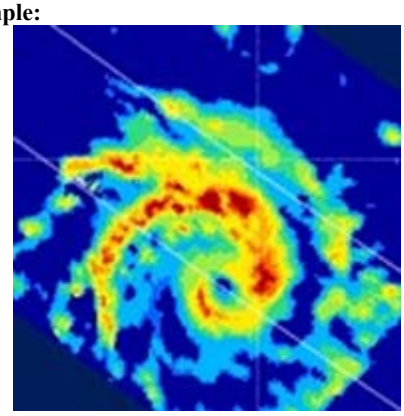
Abbreviation: NOAA AVHRR **Long Name:** NOAA Advanced Very High Resolution Radiometer **Common Uses:** • investigation of clouds • land-water boundaries • snow and ice extent • ice or snow melt inception • day and night cloud distribution • temperatures of radiating surfaces • sea surface temperature	**Temporal:** 1996 - present **Spatial:** South America **Resolution:** 0.5km – 1km	**Agency:** National Institute for Space Research - INPE **URL:** http://www.cptec.inpe.br/ **Sample:** Brazil
Abbreviation: MODIS **Long Name**: Moderate Resolution Imaging Spectroradiometer **Common Uses:** terrestrial, atmospheric, and ocean phenomenology for a wide and diverse community of users throughout the world	**Temporal:** 2002 - present **Spatial:** South America **Resolution:** 250, 500 & 1000 meters	**Agency:** National Institute for Space Research - INPE **URL:** http://www.cptec.inpe.br/ **Sample:** 
Abbreviation: Odin SMR **Long Name:** Odin Sub-mm radiometer **Common Uses:** • stratospheric chemistry • global climatology • atmospheric dynamics	**Temporal:** 2001 - present **Spatial:** global Resolution**:** 1.5 - 3km vertical resolution	**Agency:** Swedish National Space Board (SNSB), CSA, CNES, TEKES **URL:** http://www.ssc.se/ssd/ssat/odin.html **Sample:** 
Abbreviation: Odin OSIRIS **Long Name:** Odin Optical Spectrograph and Infra-Red Imaging System **Common Uses:** • stratospheric chemistry • global climatology • atmospheric dynamics	**Temporal:** 2001 - present **Spatial:** global Resolution**:** 1.5 - 3km vertical resolution	**Agency: :** Swedish National Space Board (SNSB), CSA, CNES, TEKES **URL:** http://osirus.usask.ca/ **Sample:**  Ozone Height Profile

Abbreviation: POLDER **Long Name:** POLarization and Directionality of the Earth's Reflectances **Common Uses:** • Aerosols • Earth Radiation Budget • Water vapor • Clouds • Land surfaces • Ocean Color	**Temporal:** 1996-2003 **Spatial:** global **Resolution:** 6x7 km at nadir (swath: 2400 km)	**Agency:** CNES **URL:** http://smsc.cnes.fr/POLDER/index.htm **Sample:** Madagascar
Abbreviation: ODIN **Long Name:** ODIN **Common Uses:** • Atmospheric chemistry • observation of O_3, ClO, N_2O, HNO_3, H_2O, H_2O_2 molecules spectral lines	**Temporal:** 1991 - 2002 **Spatial:** global **Resolution:** 1.5 – 3km vertical resolution	**Agency:** IPSL / CNES **URL:** http://ether.ipsl.jussieu.fr **Sample:** 
Abbreviation: ERS GOME **Long Name:** ERS-2 Global Ozone Monitoring Experiment **Common Uses:** value-added global products from GOME, covering ozone, nitrogen, halogen, sulfur, hydrogen and carbon-containing compounds	**Temporal:** 1995 - present **Spatial:** global **Resolution:** vertical: 1,3 km; horizontal 2,7 by 2,3 deg	**Agency:** German Aerospace Center (DLR), World Data Center **URL:** http://wdc.dlr.de/index.html **Sample:** 

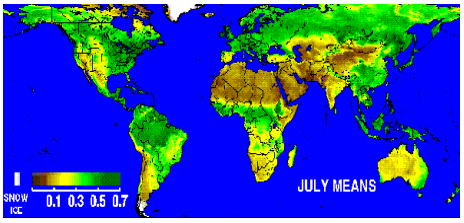
Abbreviation: ENVISAT SCIAMACHY **Long Name:** Scanning Imaging Absorption Spectrometer for Atmospheric Chemistry **Common Uses:** extracting composition, dynamics and radiation balance of the atmosphere, specifically O_3 and NO_2, aerosols, HNO_3, N_2O, CH_4	**Temporal:** 2002 - present **Spatial:** global **Resolution:** vertical: 1,3 km; horizontal 2,7 by 2,3 deg	**Agency:** German Aerospace Center (DLR), World Data Center **URL:** http://wdc.dlr.de/index.html **Sample:** 
Abbreviation: ENVISAT MIPAS **Long Name:** Michelson Interferometer for Passive Atmospheric Sounding **Common Uses:** global composites of O_3, N_2O, HNO_3, CH_4, NO_2	**Temporal:** 2002 - present **Spatial:** global **Resolution:** vertical: 1,3 km; horizontal 2,7 by 2,3 deg	**Agency:** German Aerospace Center (DLR), World Data Center **URL:** http://wdc.dlr.de/index.html **Sample:** 
Abbreviation: NOAA - AVHRR **Long Name:** Advanced Very High Resolution Radiometer **Common Uses:** cloud physical parameters	**Temporal:** 1986 - present **Spatial:** Europe **Resolution:** 1km	**Agency:** German Aerospace Center (DLR), World Data Center **URL:** http://eoweb.dlr.de **Sample:** 
Abbreviation: MSG SEVIRI **Long Name:** Spinning Enhanced Visible and Infrared Imager **Common Uses:** cloud physical parameters	**Temporal:** 2004 - present **Spatial:** Europe & Africa **Resolution:** 4km	**Agency:** German Aerospace Center (DLR), World Data Center **URL:** http://wdc.dlr.de/index.html **Sample:** 

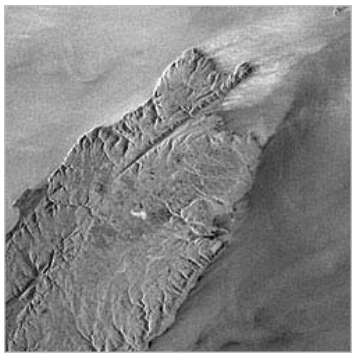
Abbreviation: NOAA - TOMS **Long Name:** Total Ozone Mapping Spectrometer **Common Uses:** assimilated global 3D ozone fields	**Temporal:** 1978 - present **Spatial:** global **Resolution:** vertical: 1,3 km; horizontal 2,7 by 2,3 deg	**Agency:** German Aerospace Center (DLR), World Data Center **URL:** http://wdc.dlr.de/index.html **Sample:** 
Abbreviation: NOAA ATOVS **Long Name:** Advanced TIROS Operational Vertical Sounder **Common Uses:** H_2O and temperature vertical profile	**Temporal:** 2001 - present **Spatial:** Europe **Resolution:** vertical: 3-6-km; horizontal: 50 by 50 km	**Agency:** German Aerospace Center (DLR), World Data Center **URL:** http://wdc.dlr.de/index.html **Sample:** 
Abbreviation: ADEOS-II AMSR **Long Name:** Advanced Earth Observing Satellite – II Advanced Microwave Scanning Radiometer **Common Uses:** water-related parameters such as water vapor, precipitation, soil moisture, and snow depth retrieved	**Temporal:** 2002 - 2003 **Spatial:** global **Resolution:** 5 to 25km	**Agency:** JAXA Earth Observation Research and Application Center (EORC) **URL:** http://www.eorc.jaxa.jp/TRMM **Sample:**  Rainfall region associated with a developing cyclone

Abbreviation: Aqua AMSR-E **Long Name:** Advanced Microwave Scanning Radiometer for EOS **Common Uses:** various geophysical parameters, including; • water vapor • cloud liquid water • precipitation • sea surface temperature • sea surface wind speed • sea ice concentration • snow water equivalent • soil moisture	**Temporal:** 2002 - present **Spatial:** global **Resolution:** 5 to 25km	**Agency:** JAXA Earth Observation Research and Application Center (EORC) **URL:** http://www.eorc.jaxa.jp/TRMM **Sample:**  Observation of Typhoon No.5 by AMSR-E aboard the Aqua satellite
Abbreviation: ADEOS-II GLI **Long Name:** Advanced Earth Observing Satellite – II Global Imager **Common Uses:** an optical sensor to observe globally and frequently the reflected solar radiation from the earth's surface including land, ocean, and cloud or the infrared radiation for measuring the physical content such as chlorophyll, dissolved organic substance, surface temperature, vegetation distribution, vegetation biomass, distribution of snow and ice, and albedo of snow and ice, etc.	**Temporal:** 2002 - 2003 **Spatial:** Global **Resolution:** 250m and 1km	**Agency:** JAXA Earth Observation Research and Application Center (EORC) **URL:** http://www.eorc.jaxa.jp/TRMM **Sample:**  3D structure of a cloud system from GLI data analysis
Abbreviation: TRMM PR **Long Name:** Tropical Rainfall Measuring Mission, Precipitation Radar **Common Uses:** provides 3-dimensional rainfall structure, quantitative rainfall measurement over land as well as the oceans, improves the accuracy of TRMM Microwave Imager (TMI) measurement by providing the rain structure information	**Temporal:** 1997 - present **Spatial:** tropical region 0 – 33 degree latitude north and south **Resolution:** 250km	**Agency:** JAXA Earth Observation Research and Application Center (EORC) **URL:** http://www.eorc.jaxa.jp/TRMM/typhoon/index_e.htm **Sample:**  Tropical Cyclone GAFILO

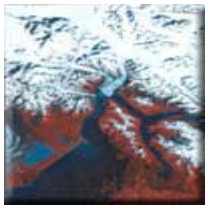
Abbreviation: TRMM TMI **Long Name:** Tropical Rainfall Measuring Mission, TRMM Microwave Imager **Common Uses:** data related to rainfall rates over the oceans combined with PR	**Temporal:** 1997 - present **Spatial:** tropical region (0 – 33 degree latitude north and south) **Resolution:** 6-50km	**Agency:** JAXA Earth Observation Research and Application Center (EORC) **URL:** http://www.eorc.jaxa.jp/TRMM/typhoon/index_e.htm **Sample:**  Tropical Cyclone GAFILO

1.2. Terrestrial Data

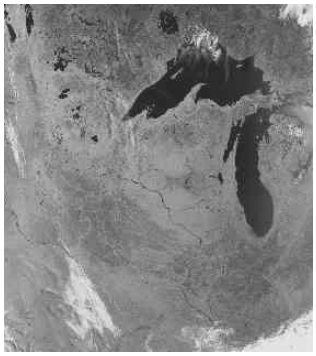
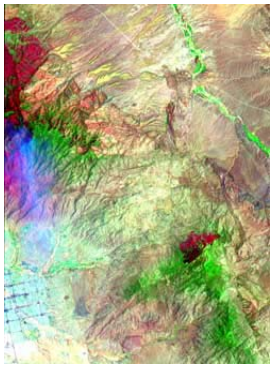
DATA DESCRIPTION	PARAMETERS	ACCESS MEANS
Abbreviation: GVI **Long Name:** Global Vegetation Index **Common Uses:** • global change research • agriculture • forestry • resource management	**Temporal**: 1982 - present **Spatial:** global **Resolution:** 1 - 16 km	**Agency:** NOAA/National Environmental Data and Information Service **URL:** http://www.saa.noaa.gov/ **Sample:**  Global NDVI 5-Year Climatology
Abbreviation: DMSP/OLS Night Time lights **Long Name**: Defense Satellite Program - Operational Linescan System Night Time Lights **Common Uses:** Monitors lights from cities, towns, industrial sites, gas flares, and ephemeral events such as fires and lightning-illuminated clouds. Used for change detection	**Temporal:** 1992 - present **Spatial:** global **Resolution:** 0.5 - 1.0 km	**Agency:** NOAA/National Environmental Data and Information Service **URL: http:** //dmsp.ngdc.noaa.gov/html/download.html **Sample :** Nighttime lights of the U.S.

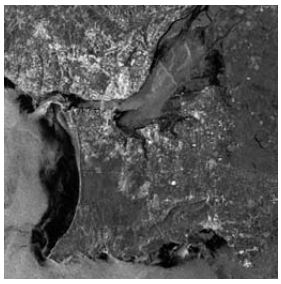
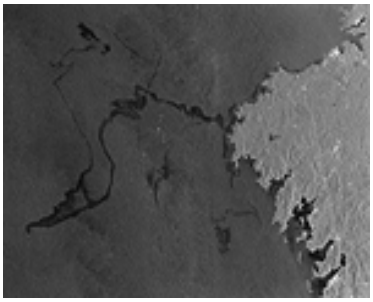
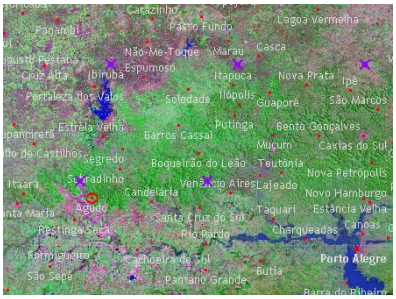
Abbreviation: SPOT 2/4/5 **Long Name:** Systemme pour l'Observation de la Terre **Common Uses:** • cartography • cadastral mapping • defence • intelligence • security agriculture • forestry • land planning and management • maritime applications • telecoms • energy	**Temporal:** 1986 - 2001 **Spatial:** Canada **Resolution:** 10 and 20m	**Agency:** CCRS **URL:** http://ceocat.ccrs.nrcan.gc.ca/ **Sample:**
Abbreviation: NOAA AVHRR **Long Name:** NOAA Advanced Very High Resolution Radiometer **Common Uses:** investigates • Clouds • land-water boundaries • snow and ice extent • ice or snow melt inception • day and night cloud distribution • temperatures of radiating surfaces • sea surface temperature	**Temporal:** 1983 - present **Spatial:** Canada **Resolution:** 0.5km – 1km	**Agency:** CCRS **URL:** http://ceocat.ccrs.nrcan.gc.ca/ **Sample:**
Abbreviation: Radarsat **Long Name:** Radarsat **Common Uses:** environmental change and support to resource sustainablility	**Temporal:** 1995 - present **Spatial:** Canada **Resolution:** 8-100m	**Agency:** CCRS **URL:** http://ceocat.ccrs.nrcan.gc.ca/ **Sample:** 

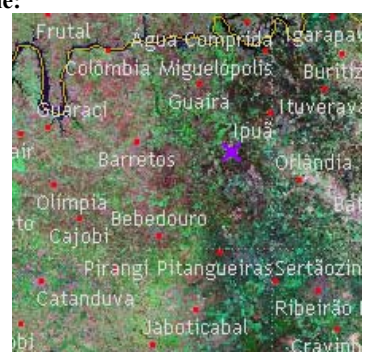
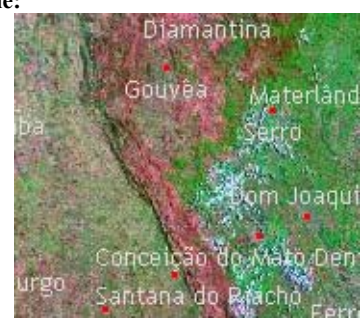
Abbreviation: ERS **Long Name:** European Remote Sensing **Common Uses:** • ice mapping and monitoring • ocean and coastal areas imaging (e.g. oil spill monitoring) • land imaging (e,g. floods) DEM interferometry (small surface movements caused by landslides, earthquakes)	**Temporal:** 1992 - present **Spatial:** Canada **Resolution:** 30m and less	**Agency:** CCRS **URL:** http://ceocat.ccrs.nrcan.gc.ca/ **Sample:**
Abbreviation: Landsat ETM+ **Long Name:** Enhanced Thematic Mapper Plus **Common Uses:** • global change research • agriculture • forestry • geology • resource management • geography • mapping • water quality	**Temporal:** 1999 - present **Spatial:** Canada **Resolution:** 30m and 60m	**Agency:** CCRS **URL:** http://ceocat.ccrs.nrcan.gc.ca/ **Sample:**
Abbreviation: Landsat TM **Long Name:** Landsat Thematic Mapper **Common Uses:** • global change research • agriculture • forestry • geology • resource management • geography • mapping • water quality	**Temporal:** 1982 - 1999 **Spatial:** Canada **Resolution:** 30m	**Agency:** CCRS **URL:** http://ceocat.ccrs.nrcan.gc.ca/ **Sample:**
Abbreviation: Landsat MSS **Long Name:** Landsat Multi Spectral Scanner **Common Uses:** • global change research • agriculture • forestry • geology • resource management • geography • mapping • water quality	**Temporal:** 1972 - 1999 **Spatial:** Canada **Resolution:** 80m	**Agency:** CCRS **URL:** http://ceocat.ccrs.nrcan.gc.ca/ **Sample:**

Abbreviation: Landsat ETM+ **Long Name:** Landsat Enhanced Thematic Mapper Plus • **Common Uses:** global change research • agriculture • forestry • geology • resource management • geography • mapping • water quality	**Temporal:** 1999 - present **Spatial:** global **Resolution:** 15 and 30m	**Agency**: U.S. Geological Survey **URL:** http://landsat7.usgs.gov/index.php **Sample:** Lena Delta
Abbreviation: Landsat TM **Long Name:** Landsat Thematic Mapper • **Common Uses:** global change research • agriculture • forestry • geology • resource management • geography • mapping • water quality	**Temporal:** 1982 - present **Spatial:** global **Resolution:** 30m	**Agency:** U.S. Geological Survey **URL:** http://earthexplorer.usgs.gov/EarthExplorer/ **Sample:**  Hubbard Glacier

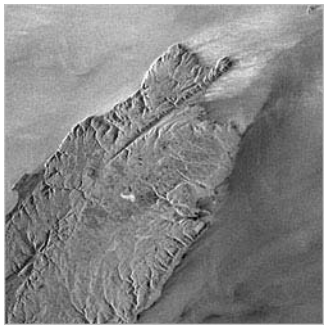
Abbreviation: Landsat MSS **Long Name:** Landsat Multispectral Scanner • **Common Uses:** global change research • agriculture • forestry • geology • resource management • geography • mapping • water quality	**Temporal:** 1972-1992 **Spatial:** global **Resolution:** 80m	**Agency:** U.S. Geological Survey **URL:** http://earthexplorer.usgs.gov/EarthExplorer/ **Sample:** Finger Lakes
Abbreviation: Declass **Long Name:** Declassified Satellite Imagery **Common Uses:** • earth science studies • agriculture • geography	**Temporal:** 1959 - 1980 **Spatial:** global **Resolution:** 2 – 153m	**Agency:** U.S. Geological Survey **URL:** http://earthexplorer.usgs.gov/EarthExplorer/ **Sample:** Eiffel Tower

Abbreviation: NOAA AVHRR **Long Name:** NOAA Advanced Very High Resolution Radiometer **Common Uses:** investigates Clouds • land-water boundaries • snow and ice extent • ice or snow melt inception • day and night cloud distribution • temperatures of radiating surfaces • sea surface temperature	**Temporal:** 1987 - present **Spatial:** global **Resolution:** 1.1km	**Agency:** U.S. Geological Survey **URL:** http://earthexplorer.cr.usgs.gov/EarthExplorer/ **Sample:**  Great Lakes
Abbreviation: EO-1 ALI **Long Name:** Earth Observing-1 Advanced Land Imager **Common Uses:** land imaging	**Temporal:** 2000 - present **Spatial:** global **Resolution:** 10m and 30m	**Agency:** U.S. Geological Survey **URL:** http://earthexplorer.usgs.gov/EarthExplorer/ **Sample:**  Arizona
Abbreviation: EO-1 Hyperion **Long Name:** Earth Obsering-1 Hyperion **Common Uses:** land surface properties	**Temporal:** 2000 - present **Spatial:** global **Resolution:** 30m	**Agency:** U.S. Geological Survey **URL:** http://earthexplorer.usgs.gov/EarthExplorer/ **Sample:** Arizona

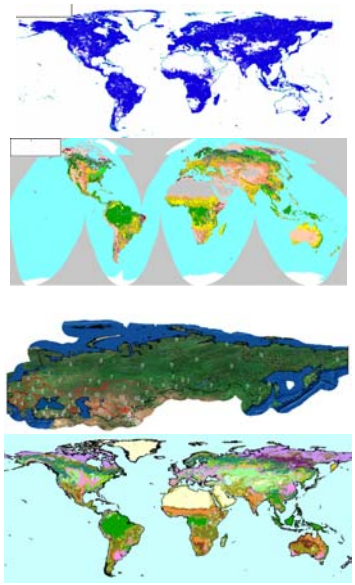
Abbreviation: ERS SAR **Long Name:** ERS-1 & 2 Synthetic Aperture Radar Image Mode **Common Uses:** • ice mapping and monitoring • ocean and coastal areas imaging (e.g. oil spill monitoring) • land imaging (e,g. floods) • DEM - interferometry (small surface movements caused by landslides, earthquakes)	**Temporal:** 1991 - present **Spatial:** mainly Europe **Resolution:** along track less than or equal to 30m; across track less than or equal to 26.3m	**Agency:** European Space Agency **URL:** http://earth.esa.int/services/catalogues.html **URL:** http://earth.esa.int/helpandmail/help_order.html **Sample:**  Lisbon (Portugal), ERS-2 Sep. 2001
Abbreviation: ENVISAT ASAR **Long Name:** ENVISAT Advanced Synthetic Aperture Radar **Common Uses:** • ocean wave characteristics • ocean mesoscale features • sea ice extent and motion • snow and ice sheet extent • surface topography • land surface properties • surface soil moisture and wetland extent • deforestation and extent of desert areas • disaster monitoring (flooding, earthquake, oil spills)	**Temporal:** 2002 - present **Spatial:** global **Resolution:** from 30m	**Agency:** European Space Agency **URL:** http://earth.esa.int/services/catalogues.html **URL:** http://earth.esa.int/helpandmail/help_order.html **Sample:**  Oil Spill near Spain (Dec. 2002)
Abbreviation: CBERS CCD **Long Name:** CCD - High Resolution CCD Cameras **Common Uses:** • forestry • agriculture • global change research • water quality	**Temporal:** 1999 - present **Spatial:** South America and Global **Resolution:** 20m.	**Agency:** National Institute for Space Research - INPE **URL:** http://www.inpe.br or http://www.obt.inpe.br/catalogo/ **Sample:**  Agudo (RS)

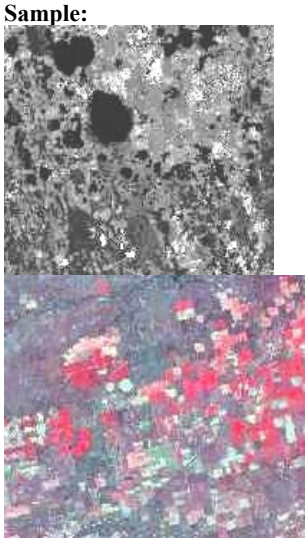
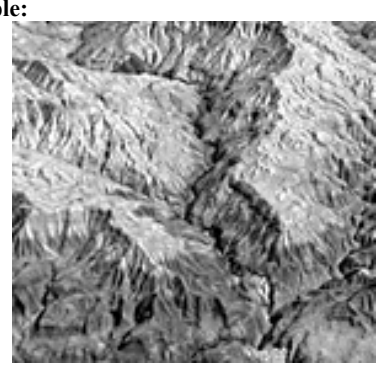
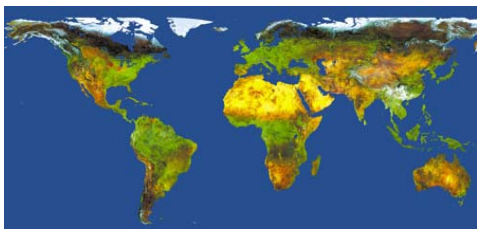
Abbreviation: CBERS IRMSS **Long Name:** IRMSS - Infra-Red Multispectral Scanner Camera **Common Uses:** • forestry • agriculture • global change research • water quality	**Temporal:** 1999 - present **Spatial:** South America **Resolution:** 80m.	**Agency:** National Institute for Space Research - INPE **URL:** http://www.inpe.br or http://www.obt.inpe.br/catalogo **Sample:**  Itaju (SP)
Abbreviation: CBERS WFI **Long Name:** WFI - Wide Field Imager Camera **Common Uses:** ground swath of 890km which provides a synoptic view the Earth surface each 3 days.	**Temporal:** 1999 - present **Spatial:** South America **Resolution:** 260m.	**Agency:** National Institute for Space Research - INPE **URL:** http://www.inpe.br or http://www.obt.inpe.br/catalogo **Sample:**  Piui (MG)
Abbreviation: Landsat MSS **Long Name:** Landsat Multispectral Scanner **Common Uses:** • global change research • agriculture • forestry • geology • resource management • geography • mapping • water quality	**Temporal:** 1973-1984 **Spatial:** South America **Resolution:** 80m	**Agency:** National Institute for Space Research - INPE **URL:** http://www.dgi.inpe.br/catalogo/ (available at the end of 2004). **Sample:** Brazil

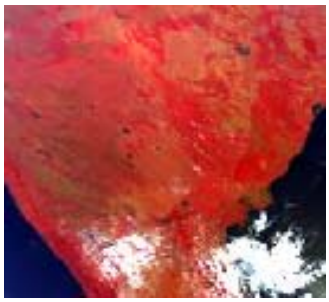
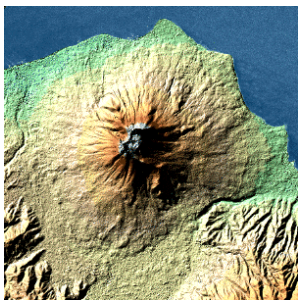
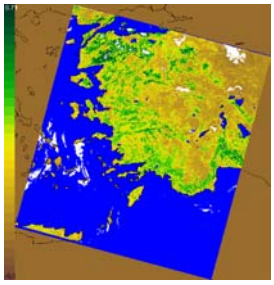
Abbreviation: Landsat TM **Long Name:** Landsat Thematic Mapper **Common Uses:** • global change research • agriculture • forestry • geology • resource management • geography • mapping • water quality	**Temporal:** 1984 - present **Spatial:** South America **Resolution:** 30m	**Agency:** National Institute for Space Research - INPE **URL:** http://www.dgi.inpe.br/catalogo/ **Sample:** Brazil
Abbreviation: Landsat ETM+ **Long Name:** Landsat Enhanced Thematic Mapper Plus • **Common Uses:** global change research • agriculture • forestry • geology • resource management • geography • mapping • water quality	**Temporal:** 1999 - 2003 **Spatial:** South America **Resolution:** 15 & 30m	**Agency:** National Institute for Space Research - INPE **URL:** http://www.dgi.inpe.br/catalogo/ **Sample:** Brazil
Abbreviation: MODIS **Long Name:** Moderate Resolution Imaging Spectroradiometer **Common Uses:** unprecedented look at terrestrial, atmospheric, and ocean phenomenology for a wide and diverse community of users throughout the world	**Temporal:** 2002 - present **Spatial:** South America **Resolution:** 250, 500 & 1000 meters	**Agency:** National Institute for Space Research - INPE **URL:** http://www.cptec.inpe.br/ **Sample:**

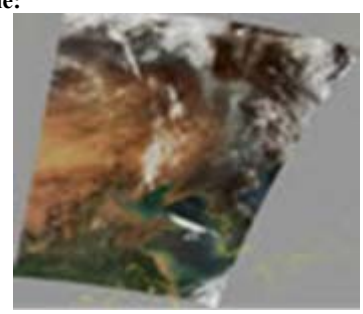
Abbreviation: Landsat TM **Long Name:** LANDSAT 5,7 Thematic Mapper **Common Uses**: natural resource management	**Temporal:** 1987 – present **Spatial:** Regional **Resolution:** 30 m - Band 6 has resolution of 120 m	**Agency:** Geo-Informatics and Space Technology Development Agency (Public Organization) - GISTDA **URL:** http://www.gistda.or.th/ **Sample:** Thailand
Abbreviation: **Long Name:** RADARSAT 1 **Common Uses:** • natural hazard monitoring and mitigation • natural resource management	**Temporal:** 2000 - present **Spatial:** Regional **Resolution:** **Standard** 28 x 25 m **Wide** 28 x 25 m **Fine** 10 x 9 m **Extended** 20 x 28 m **ScanSAR** 50 x 50 m **(narrow)** **ScanSAR** 100 x 100 m **(wide)**	**Agency:** Geo-Informatics and Space Technology Development Agency (Public Organization) - GISTDA **URL:** http://www.gistda.or.th/ **Sample:** 

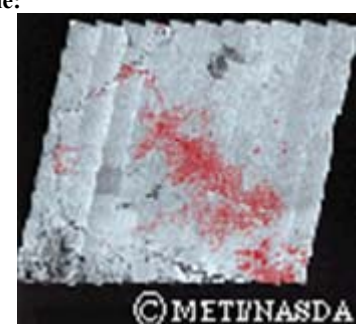
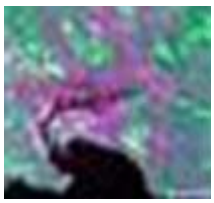
Abbreviation: **Long Name:** IRS 1 **Common Uses:** • natural resource management • urban planning	**Temporal:**2000 - present **Spatial:** Regional **Resolution:** **PAN:** 5.8m **LISS III:** 23.5m	**Agency:** Geo-Informatics and Space Technology Development Agency (Public Organization) - GISTDA **URL:** http://www.gistda.or.th/ **Sample:** Tucson, AZ

Abbreviation: **Long Name:** IKONOS **Common Uses**: • mapping • natural resource management	**Temporal:** 2003 - present **Spatial:** **Resolution:** 1m, 4m	**Agency:** Geo-Informatics and Space Technology Development Agency (Public Organization) - GISTDA **URL:** http://www.gistda.or.th/ **Sample:** Cairo, Egypt
Abbreviation: FAO-GeoNetwork **Long Name:** FAO Spatial Information Infrastructure **Common Uses:** ISO, OGC standardized access to FAO spatial data and information; interoperability with other organizations within and outside UN system to support sustainable development, food security, forestry and fisheries	**Temporal:** variable **Spatial resolution:** various: 30m, 250m, 1km, 5 km (thematic maps and low/high resolution satellite imagery)	**Agency:** FAO of the UN **URL:** http://www.fao.org/geonetwork/ **Sample:** 

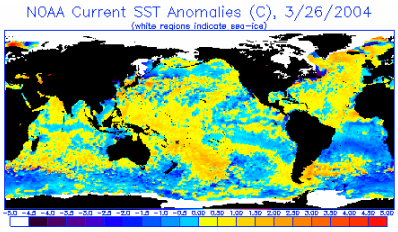
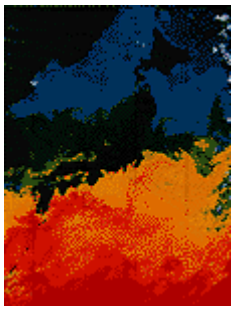
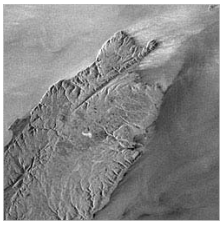
Abbreviation: SPOT **Long Name:** SPOT Scenes **Common Uses:** • geometric image processing, • photo-interpreting, • thematic studies, • making DEM from stereopairs	**Temporal:** 1986 - present **Spatial :** global **Resolution:** Black & white : 2.5m/5m/10m Color: 2.5m/5m/10m/20m (swath 60km)	**Agency:** SPOTIMAGE / CNES **URL:** http://www.spotimage.fr/ **Sample:** 
Abbreviation: SPOT 3D **Long Name:** SPOT Reference 3D **Common Uses:** applications that rely on very high quality elevation databases	**Temporal:** 1986 - present **Spatial:** global **Resolution:** a) DEM Sampling step: 1 second of arc. Absolute elevation accuracy: 10m. Absolute planimetric accuracy: 15mb) HRS orthoimages Absolute altimetric accuracy: 16m Sampling step: 1/6 second of arc	**Agency:** SPOTIMAGE / CNES **URL:** http://www.spotimage.fr/ **Sample:**  Dead Sea
Abbreviation: VEGETATION **Long Name:** VEGETATION **Common Uses:** continuous, regional and global monitoring of the continental biosphere for accurate measurements of the main vegetation coverage characteristics, particularly for agricultural production and the effects of deforestation. VEGETATION also provides information on the color of sea water, used for oceanography applications	**Temporal:** 1998 - present **Spatial:** global **Resolution:** 1km (swath 2200km)	**Agency:** SPOTIMAGE / CNES **URL:** http://www.spotimage.fr/ **URL:** http://www.vgt.vito.be **Sample:** 

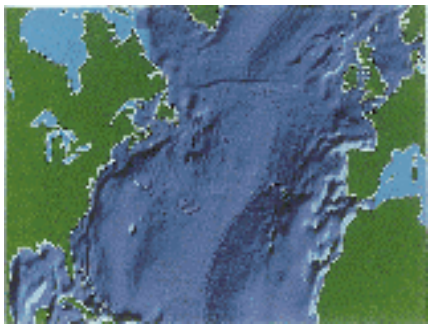
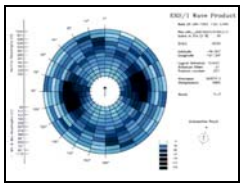
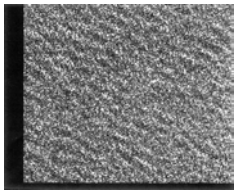
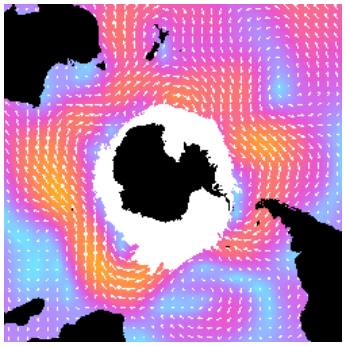
Abbreviation: POLDER **Long Name:** POLarization and Directionality of the Earth's Reflectances **Common Uses:** • Aerosols, • Earth radiation budget, Water vapor, clouds • Land surfaces • Ocean color	**Temporal:** 1996-2003 **Spatial:** global **Resolution:** 6x7km at nadir (swath: 2400km)	**Agency:** CNES **URL:** http://smsc.cnes.fr/POLDER/index.htm **Sample:**  India
Abbreviation: NOAA AVHRR **Long Name:** Advanced Very High Resolution Radiometer **Common Uses:** NDVI (Normalized Differential Vegetation Index) & LST (Land Surface Temperature)	**Temporal:** 1994 - present **Spatial:** Europe **Resolution:** 1km daily	**Agency:** German Aerospace Center (DLR) **URL:** http://eoweb.dlr.de **Sample:**
Abbreviation: SRTM, X-SAR **Long Name:** Shuttle Radar Topography Mission **Common Uses:** global digital land elevation data	**Temporal:** 2000 mission **Spatial:** global **Resolution:** 1" by 1" at 16-bit integer and 6m relative accuracy in height	**Agency:** German Aerospace Center (DLR) **URL:** http://www.caf.dlr.de/srtm/srtm.html **Sample:** 
Abbreviation: ENVISAT MERIS **Long Name:** Medium Resolution Imaging Spectrometer **Common Uses:** NDVI; land cover change	**Temporal:** 2004 - present **Spatial:** Europe **Resolution:** 300m	**Agency:** German Aerospace Center (DLR) **URL:** http://eoweb.dlr.de **Sample:** 

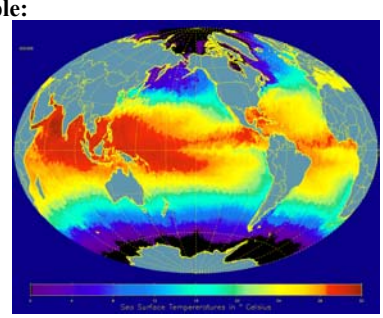
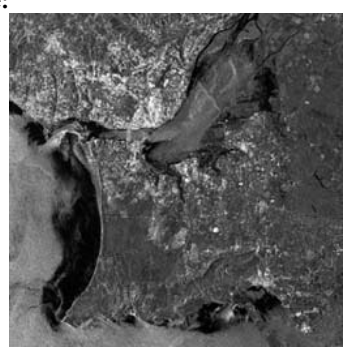
Abbreviation: SAC-C MMRS **Long Name:** SAC-C Multispectral Medium Resolution Scanner **Common Uses:** • land surface properties • global change research • agriculture • forestry • geology • resource management • geography and mapping • Disaster monitoring: fires, floods, landscape epidemiology	**Temporal:** 2000 - present **Spatial:** global **Resolution:** 175m	**Agency:** CONAE **URL:** http://ggt.conae.gov.ar/catalogo/index.htm **Sample:**
Abbreviation: SAC-C HRTC **Long Name:** SAC-C High Resolution Technological Camera **Common Uses:** Improvement of SAC-C MMRS spatial resolution	**Temporal:** 2000 - present **Spatial:** global **Resolution:** 35m	**Agency:** CONAE **URL:** http://ggt.conae.gov.ar/catalogo/index.htm **Sample:**
Abbreviation: ADEOS-II GLI **Long Name:** Advanced Earth Observing Satellite – II Global Imager **Common Uses:** an optical sensor to observe globally and frequently the reflected solar radiation from the earth's surface including land and ocean, a cloud or the infrared radiation for measuring the physical content such as chlorophyll, dissolved organic substance, surface temperature, vegetation distribution, vegetation biomass, distribution of snow and ice, and albedo of snow and ice, etc.	**Temporal:** 2002 - 2003 **Spatial:** global **Resolution:** 250m and 1km	**Agency:** JAXA Earth Observation Research and Application Center (EORC) **URL:** http://www.eorc.jaxa.jp/TRMM **Sample:**  Continent prepares for early summer

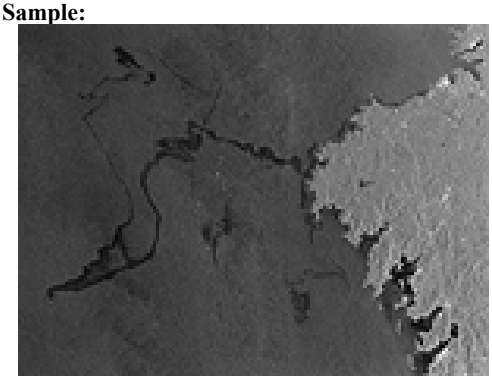
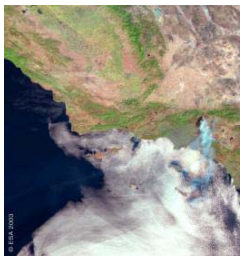
Abbreviation: ADEOS AVNIR **Long Name:** Advanced Earth Observing Satellite, Advanced Visible Near Infrared Radiometer **Common Uses:** environmental awareness and monitoring of such phenomena as desertification, destruction of tropical forests, and pollution of coastal zones as well as for resource exploration, land use, etc.	**Temporal:** 1996 - 1997 **Spatial:** mainly Asia **Resolution:** 16m Multi, 8m Pan	**Agency:** JAXA Earth Observation Research and Application Center (EORC) **URL:** http://www.eorc.jaxa.jp/TRMM **Sample:** Tokyo Bay Area
Abbreviation: JERS-1 SAR **Long Name:** Japanese Earth Resources Satellite-1, Synthethic Apeture Radar **Common Uses:** high-resolution, high-contrast observation, and accurate determination of topographical features, such as undulations and slopes, independently of weather conditions, even during fog or cloud cover.	**Temporal:** 1992 - 1998 **Spatial:** mainly Asia, South America and Africa region **Resolution:** 18m x 18m	**Agency:** JAXA Earth Observation Research and Application Center (EORC) **URL:** http://www.eorc.jaxa.jp/TRMM **Sample:**  Amazon mosaic
Abbreviation: JERS-1 OPS **Long Name:** Japanese Earth Resources Satellite-1, Optical Sensor **Common Uses:** • survey the earth resources • monitors sea status • obtains other information useful for improving our life	**Temporal:** 1992 - 1998 **Spatial:** mainly Asia, South America and Africa region **Resolution:** 18m x 18m	**Agency:** JAXA Earth Observation Research and Application Center (EORC) **URL:** http://www.eorc.jaxa.jp/TRMM **Sample:**  Melbourne, Australia

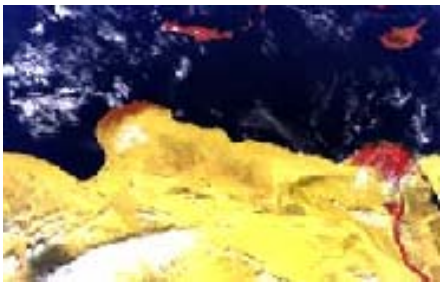
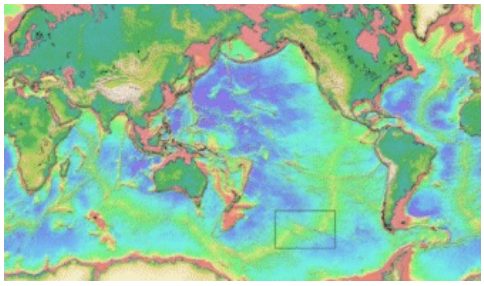
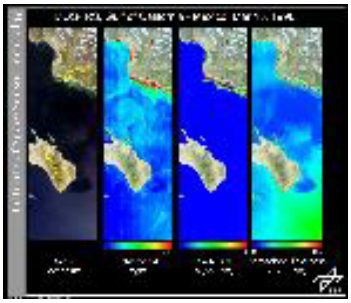
1.3. Oceanographic Data

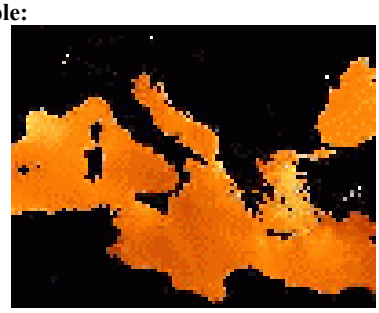
DATA DESCRIPTION	PARAMETERS	ACCESS MEANS
Abbreviation: SST **Long Name:** Sea Surface Temperature **Common Uses:** • weather prediction • climate change	**Temporal:** 1985 - resent **Spatial:** global **Resolution:** 8 km – 54km	**Agency:** NOAA/National Environmental Data and Information Service **URL:** http://www.saa.noaa.gov/ **Sample:**  Sea Surface Temperature
Abbreviation: MOS **Long Name:** Marine Observation Satellite **Common Uses:** • natural resource utilization • environmental protection	**Temporal:** 1988 - 1993 **Spatial:** Canada **Resolution:** 50m	**Agency:** CCRS **URL:** http://ceocat.ccrs.nrcan.gc.ca/ **Sample:**  Sea Surface Temperature 1990
Abbreviation: Radarsat **Long Name:** Radarsat **Common Uses:** • environmental change • support to resource sustainability	**Temporal:** 1995 - present **Spatial:** Canada **Resolution:** 8-100m	**Agency:** CCRS **URL:** http://ceocat.ccrs.nrcan.gc.ca/ **Sample:** 
Abbreviation: ERS **Long Name:** **Common Uses:** • ice mapping and monitoring • ocean and coastal areas imaging (e.g. oil spill monitoring) • land imaging (e.g. floods)	**Temporal:** 1992 - present **Spatial:** Canada **Resolution:** 30m and less	**Agency:** CCRS **URL:** http://ceocat.ccrs.nrcan.gc.ca/ **Sample:**

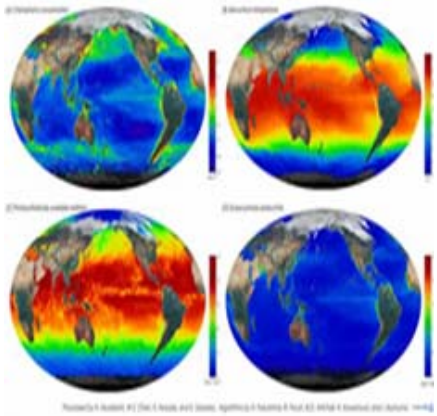
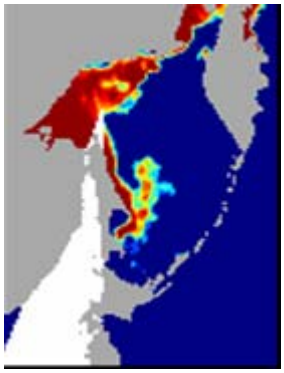
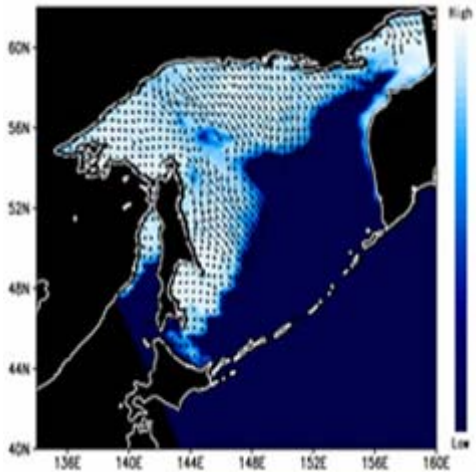
Abbreviation: ERS RA and ENVISAT RA2 **Long Name:** ERS-1 & 2 Radar Altimeter , ENVISAT Radar Altimeter 2 **Common Uses:** Microwave sensor that provides information on ocean and ice e.g. significant wave height, surface wind speed, sea surface elevation, (which relates to ocean currents, the surface geoid and tides), various parameters over sea ice and ice sheets	**Temporal:** 1991 - 2002 **Spatial:** global **Resolution:** n/a	**Agency:** European Space Agency **URL:** http://earth.esa.int/services/catalogues.html , **URL:** http://earth.esa.int/helpandmail/help_order.html **Sample:** 
Abbreviation: ERS WAVE **Long Name:** ERS-1 & 2 SAR Wave Mode Data **Common Uses:** • Oceanography (internal waves, small-scale variations in wind and modulations due to surface currents, etc.) • Glaciology • Climatology • meteorology (forecasts of sea conditions, etc.) • geodesy	**Temporal:** 1991 - present **Spatial:** global **Resolution:** 50km	**Agency:** European Space Agency **URL:** http://earth.esa.int/services/catalogues.html , **URL:** http://earth.esa.int/helpandmail/help_order.html **Sample:**  ERS wave spectra  ERS wave imagette
Abbreviation: ERS WS **Long Name:** ERS-1 & 2 Wind Scatterometer **Common Uses:** wind speed and direction at the ocean surface	**Temporal:** 1991 – present **Spatial**: global **Resolution:** 25km	**Agency:** European Space Agency **URL:** http://earth.esa.int/services/catalogues.html , **URL:** http://earth.esa.int/helpandmail/help_order.html **Sample:**  Antarctica, Oct. 1992

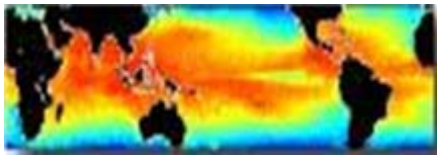
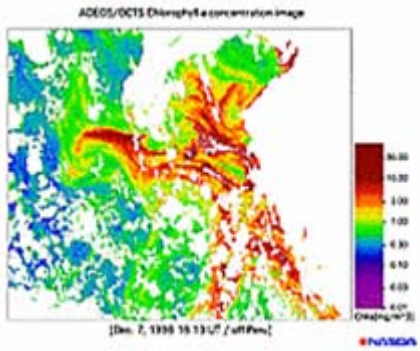
Abbreviation: ERS ATSR **Long Name:** ERS-1 & 2 Along Track Scanning Radiometer **Common Uses:** • Sea surface temperature • water vapour content of the atmosphere • observations of clouds • aerosols • haze • land-ice and sea-ice surface emissivity • tropospheric range correction of the Radar Altimeter measurements	**Temporal:** 1991 - present **Spatial:** global **Resolution:** km	**Agency:** European Space Agency **URL:** http://earth.esa.int/services/catalogues.html , **URL:** http://earth.esa.int/helpandmail/help_order.html **Sample:**  ERS Monthly SST, June 2003
Abbreviation: ENVISAT MERIS **Long Name:** ENVISAT Medium Resolution Imaging Spectrometer **Common Uses:** • ocean color data for the ocean carbon cycle • thermal regime of the upper ocean • management of fisheries • management of coastal zones	**Temporal:** 2002 - present **Spatial:** almost global **Resolution:** 250-1200m	**Agency:** European Space Agency **URL:** http://earth.esa.int/services/catalogues.html , **URL:** http://earth.esa.int/helpandmail/help_order.html **Sample:** MERIS, Caspian Sea, September 2003
Abbreviation: ERS SAR **Long Name:** ERS-1 & 2 Synthetic Aperture Radar Image Mode **Common Uses:** • ice mapping and monitoring • ocean and coastal areas imaging (e.g. oil spill monitoring) • land imaging (e,g. floods) DEM - Interferometry (small surface movements caused by landslides, earthquakes)	**Temporal:** 1991 - present **Spatial:** mainly Europe **Resolution:** along track less than or equal to 30m; across track less than or equal to 26.3m	**Agency:** European Space Agency **URL:** http://earth.esa.int/services/catalogues.html , **URL:** http://earth.esa.int/helpandmail/help_order.html **Sample:**  Lisbon (Portugal), ERS-2 September 2001

Abbreviation: ENVISAT ASAR **Long Name:** ENVISAT Advanced Synthetic Aperture Radar **Common Uses:** • ocean wave characteristics, • ocean mesoscale features • sea ice extent and motion • snow and ice sheet extent • surface topography • land surface properties • surface soil moisture • wetland extent • deforestation and extent of desert areas • disaster monitoring (flooding, earthquake, oil spills)	**Temporal:** 2002 – present **Spatial:** global **Resolution:** from 30m depending on instrument mode	**Agency:** European Space Agency **URL:** http://earth.esa.int/services/catalogues.html , **URL:** http://earth.esa.int/helpandmail/help_order.html **Sample:**  Oil Spill near Spain (Dec. 2002)
Abbreviation: ENVISAT AATSR **Long Name:** ENVISAT Advanced Along Track Scanning Radiometer **Common Uses:** • sea surface temperature • vegetation biomass • vegetation moisture • vegetation and growth stage	**Temporal:** 2002 - present **Spatial:** global Resolution: 1km	**Agency:** European Space Agency **URL:** http://earth.esa.int/services/catalogues.html **URL:** http://earth.esa.int/helpandmail/help_order.html **Sample:**  AATSR - California Fires, Oct 2003
Abbreviation: MODIS **Long Name:** Moderate Resolution Imaging Spectroradiometer **Common Uses:** terrestrial, atmospheric, and ocean phenomenology for a wide and diverse community of users throughout the world.	**Temporal:** 2002 - present **Spatial:** South America **Resolution:** 250, 500 & 1000m	**Agency:** National Institute for Space Research - INPE **URL:** http://www.cptec.inpe.br/ **Sample:**

Abbreviation: POLDER **Long Name:** POLarization and Directionality of the Earth's Reflectances **Common Uses:** • Aerosols, • Earth radiation budget, water vapor, clouds • Land surfaces • Ocean color	**Temporal:** 1996 - 2003 **Spatial:** global **Resolution:** 6x7km at nadir (swath: 2400 km)	**Agency:** CNES **URL:** http://smsc.cnes.fr/POLDER/index.htm **Sample:**  Mediterranean Basin
Abbreviation: AVISO **Long Name:** Archiving, Validation and Interpretation of Satellite Oceanographic data **Common Uses:** • Forecasting the ocean • Marine tides • Level of oceans, enclosed seas and lakes, hydrology • Ocean circulation • Geophysics • Geodesy • Marine meteorology and atmospheric studies • Climate previsions El Nino • Ice over seas and lands • Ocean seasons • Ocean's hot news	**Temporal:** 1991-present **Spatial:** global **Resolution:** variable	**Agency:** CLS / CNES **URL:** http://aviso.cls.fr/ **Sample:** 
Abbreviation: IRS-P3 MOS **Long Name:** Modular Optoelectronic Scanner **Common Uses**: • Ocean color • land mapping • atmospheric composition/aerosols	**Temporal:** 1996 - present **Spatial:** selected regional at reception stations **Resolution:** 500m	**Agency:** German Aerospace Center (DLR) **URL:** http://eoweb.dlr.de **Sample:** 

Abbreviation: NOAA AVHRR **Long Name:** Advanced Very High Resolution Radiometer **Common Uses:** SST (Sea Surface Temperature)	**Temporal:** 1994 - present **Spatial:** European seas and oceans **Resolution:** 1km	**Agency:** German Aerospace Center (DLR) **URL:** http://eoweb.dlr.de **Sample:** 
Abbreviation: SAC-C MMRS **Long Name:** SAC-C Multispectral Medium Resolution Scanner **Common Uses:** • Coastal and oceanographic studies • ocean color • Disaster monitoring: oil spills	**Temporal:** 2000 - present **Spatial:** global **Resolution:** 175m	**Agency:** CONAE **URL:** http://ggt.conae.gov.ar/catalogo/index.htm **Sample:**
Abbreviation: SAC-C HRTC **Long Name:** SAC-C High Resolution Technological Camera **Common Uses:** Improvement of SAC-C MMRS spatial resolution.	**Temporal:** 2000 - present **Spatial:** global **Resolution:** 35m	**Agency:** CONAE **URL:** http://ggt.conae.gov.ar/catalogo/index.htm **Sample:**

Abbreviation: ADEOS-II GLI **Long Name:** Advanced Earth Observing Satellite – II Global Imager **Common Uses:** an optical sensor aiming at observing globally and frequently the reflected solar radiation from the earth's surface including land and ocean, cloud or the infrared radiation for measuring the physical content such as chlorophyll, dissolved organic substance, surface temperature, vegetation distribution, vegetation biomass, distribution of snow and ice, and albedo of snow and ice, etc.	**Temporal:** 2002 - 2003 **Spatial:** global **Resolution:** 250m and 1km	**Agency:** JAXA Earth Observation Research and Application Center (EORC) **URL:** http://www.eorc.jaxa.jp/TRMM **Sample:**  ADEOS-II GLI monthly ocean products April 2003
Abbreviation: Aqua AMSR-E **Long Name:** Advanced Microwave Scanning Radiometer for EOS **Common Uses:** Various geophysical parameters, including; • water vapor • cloud liquid water • precipitation • sea surface temperature • sea surface wind speed • sea ice concentration • snow water equivalent • soil moisture	**Temporal:** 2002 - present **Spatial:** global **Resolution:** 5 to 25km	**Agency:** JAXA Earth Observation Research and Application Center (EORC) **URL:** http://www.eorc.jaxa.jp/TRMM **Sample:**  Sea Ice Distribution in the Sea of Okhotsk
Abbreviation: ADEOS-II AMSR **Long Name:** Advanced Earth Observing Satellite – II Advanced Microwave Scanning Radiometer **Common Uses:** water-related parameters such as; • water vapor • precipitation • soil moisture • snow depth retrieved	**Temporal:** 2002 - 2003 **Spatial:** global **Resolution:** 5 to 25km	**Agency:** JAXA Earth Observation Research and Application Center (EORC) **URL:** http://www.eorc.jaxa.jp/TRMM **Sample:**  Sea ice distribution and motion vector

Abbreviation: TRMM TMI Long Name: Tropical Rainfall Measuring Mission, TRMM Microwave Imager Common Uses: data related to rainfall rates over the oceans combined with PR	**Temporal:** 1997 - present **Spatial:** tropical region (0 to 33 degree latitude north and south) **Resolution:** 6-50km	**Agency:** JAXA Earth Observation Research and Application Center (EORC) **URL:** http://www.eorc.jaxa.jp/TRMM/index_e.htm **Sample:**  Tropical Region Sea Surface Temperature
Abbreviation: ADEOS OCTS **Long Name:** Advanced Earth Observing Satellite, Ocean Color and Temperature Scanner **Common Uses:** • determines ocean primary production • carbon cycle • ocean conditions for fishery • environmental monitoring	**Temporal:** 1996 - 1997 **Spatial:** Global **Resolution:** Maximum 700m	**Agency:** JAXA Earth Observation Research and Application Center (EORC) **URL:** http://www.eorc.jaxa.jp/TRMM **Sample:**  Chlorophyll-a offshore of Peru

2. CONCLUSIONS

The civil government agencies and non-governmental organizations that comprise CEOS provide vast amounts of satellite data supporting environmental projects ranging from small tracts of land to entire ocean basins. Discovering these diverse holdings can often be challenging. This paper identifies and briefly describes atmospheric, terrestrial and oceanographic sources created from satellites and provides links for interested researchers to obtain data that may satisfy their project needs.

3. REFERENCES

- Committee on Earth Observation Satellites. http://www.ceos.org/pages/agencies.html
- Improving Utilization of Earth Observation Satellite Data: Decisions of the 17th CEOS Plenary on Satellite Data Utilization, Boulder, CO, USA, December 2003. http://www.ceos.org/utilization

4. SOURCES

- Canada Centre for Remote Sensing (CCRS) http://www.ccrs.nrcan.gc.ca/ccrs/homepg.pl?e
- Centre National d'Etudes Spatiales (CNES) http://www.cnes.fr/WEB_UK/index.htm
- Comision Nacional de Actividades Espaciales (CONAE) http://www.conae.gov.ar/principal.html
- Duetsches Zentrum fur Luft- und Raumfahrt (DLR) http://www.dlr.de/dlr;internal&action=_setlanguage.action?LANGUAGE=e
- European Space Agency (ESA) http://www.esa.int/export/esaCP/index.html
- Geo-Informatics & Space Technology Development Agency (GISTDA) http://www.gistda.or.th/Gistda/HtmlGistda/Html/EnIndexMain.html
- Instituto Nacional de Pesquisas Espaciais (INPE) http://www.inpe.br/english/
- National Oceanic & Atmospheric Administration http://www.noaa.gov/
- Swedish National Space Board (SNSB) http://www.snsb.se/dyn_aktuellt.asp?languageId=2
- United Nations Food and Agriculture Organization (FAO) http://www.fao.org/
- United States Geological Survey (USSGS) http://www.usgs.gov/