



GEOSS Operational Agricultural Monitoring System
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Update on Global Data Sets from National Aeronautics and Space Administration

Edwin Sheffner
Earth Science Division
NASA Ames Research Center



A few things to remember about NASA

- NASA is a research organization that designs, builds, launches and operates earth observation systems to address Earth science questions related to weather, climate and natural hazards.
- NASA also has the mandate to extend the use of its Earth science research, data and products, data systems and IT to meet social and economic needs.
- NASA does not operate "operational" systems. Responsibilities for observations that require regular, on-going acquisition reside with agencies (NOAA and USGS) with operational mandates.



Global, Data Sets for Agricultural Monitoring

Current Activities (NASA/USDA):

1. Moderate resolution land observations
 - MODIS data and data products
 - Transition to NPP/NPOESS
2. Rainfall observations
3. Reservoir height for water availability

Planned Activities:

1. High resolution observations
 1. Mid-Decadal Global Land Survey (MDGLS)
 2. Landsat Data Gap and LDCM
2. Decadal Survey - future missions



Cooperative Projects on Agricultural Monitoring



- Adding MODIS to the USDA PECAD data stream (GLAM)
 - Surface Reflectance/ V.I.'s (inc. 250m)
 - Crop Cover/Crop Type Mapping
- Continued provision of AVHRR time-series - calibrated NOAA 18 data (GIMMS)
- TRMM Rainfall data (GSFC DAAC)
- Development of a USDA/NASA MODIS to NPP Processing System at NASA GSFC (GLAM)
 - Improved timeliness of delivery (period +1day)
- Reservoir Height



MODIS Collection 5 (C5) Processing



- 4th Reprocessing of Complete MODIS data record
 - Current data will differ from the archive until reprocessing is completed
- C5 Algorithm improvements
 - Surface Reflectance - improved aerosol model
 - Vegetation Index (VI) compositing method, cloud masking
- Collection 5 Started Jan 2007
 - Reprocessing entire archive (2000-present)
 - Currently completed first 2 years
 - Planned completion by early 08
- Some differences identified in the VI's - problem for anomalies in some areas
- USDA/NASA looking into an interim production of C4

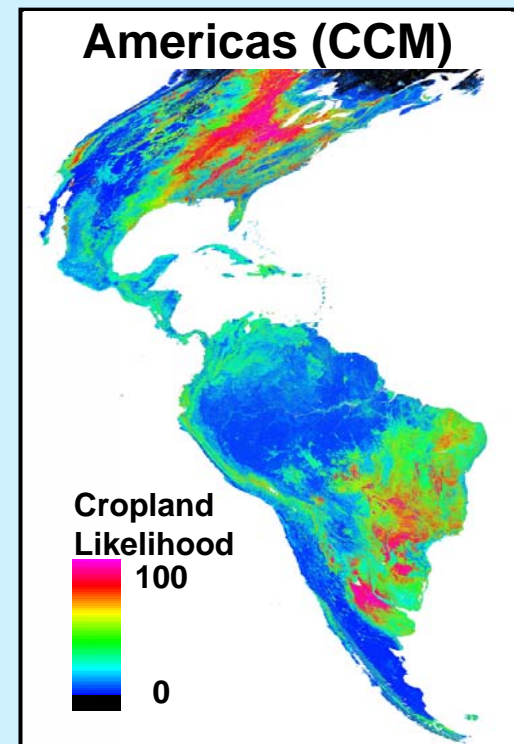


Crop Cover/Type Mapping using MODIS



New experimental crop products:

- A continuous crop-likelihood map (CCM) using 4 years of MODIS 500m data (2001-2004)
 - Allows thresholding of cropland membership according to region of interest and needs
 - Currently under evaluation and validation
- High spatial resolution crop type map integrating MODIS high temporal res. data with high-spatial resolution data



Percent Corn Fields
MODIS 500m



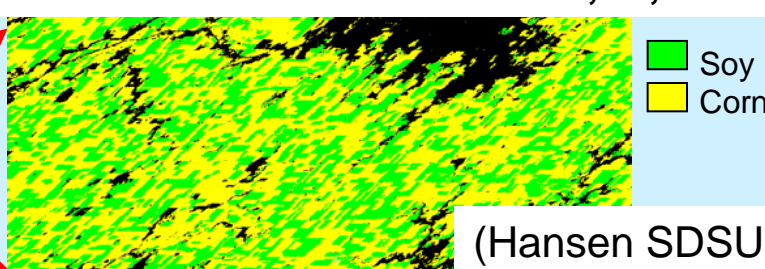
0 100% 0

Percent Soy Fields
MODIS 500m



0 100% 0

MODIS to AWIFS-derived Crop
Classification 56m : Decatur, IL, area



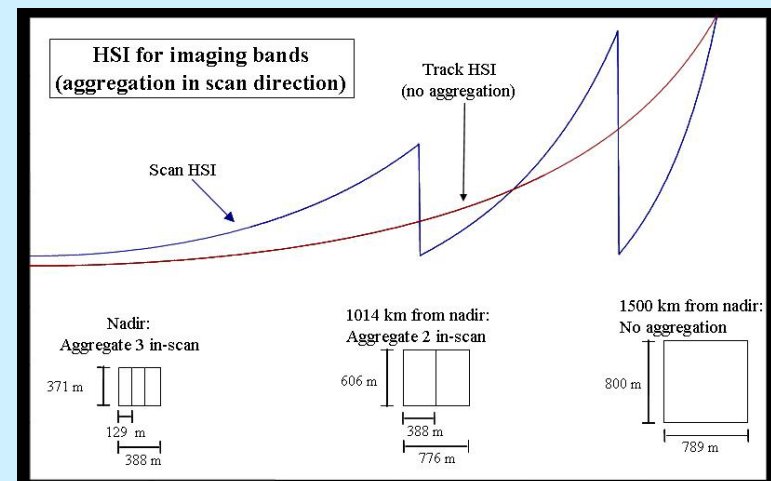
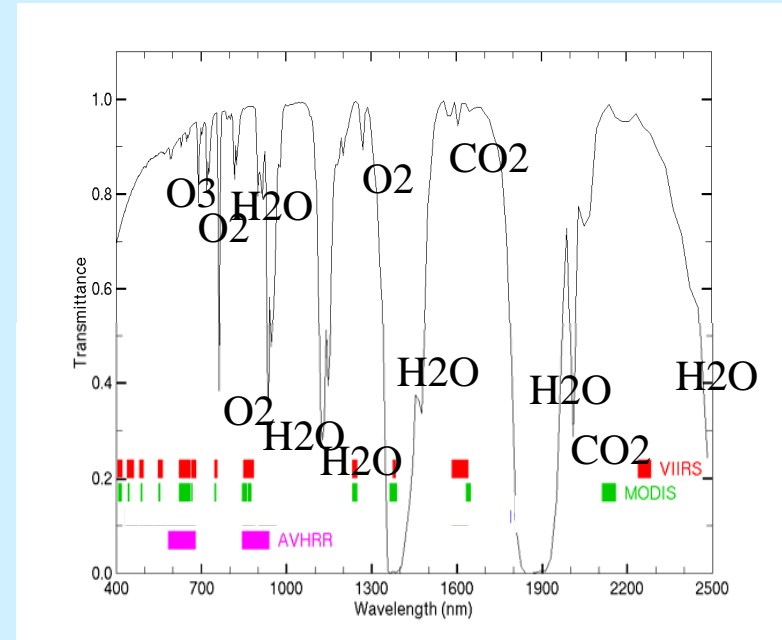
(Hansen SDSU)



USDA/NASA Data Production



- NPOESS Preparatory Project (NPP)
- NPOESS an Operational System
- VIIRS will be the MODIS-like sensor replacing the AVHRR
- USDA/NASA collaborating on a data production system at GSFC tailored to agricultural needs
- Generation of MODIS-like products
 - Global VI / SR at 375m
 - Near real time data
- Continuity sought with MODIS /AVHRR long term records
- Launch planned for late 2009
- Data production early 2010





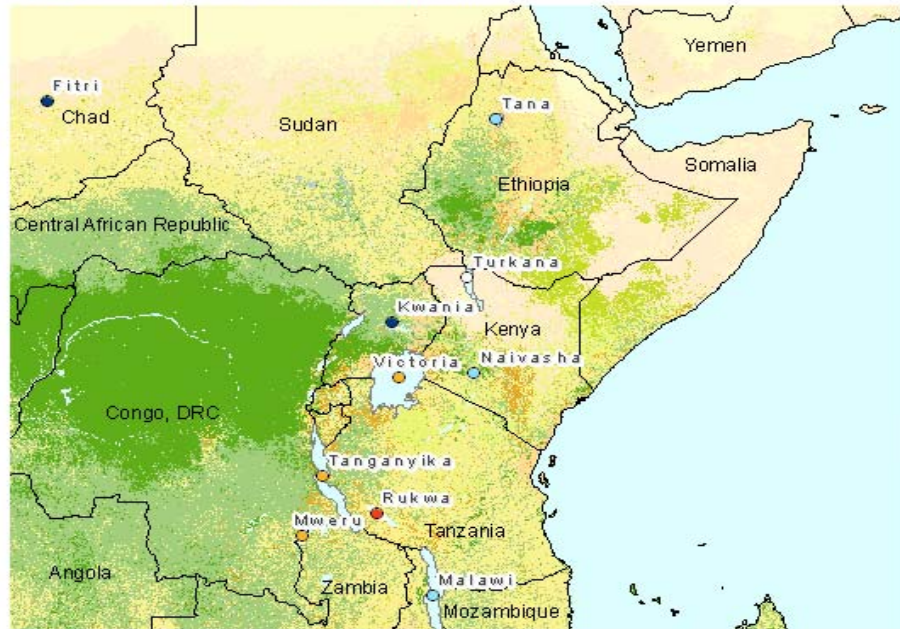
Global Lake Level Monitoring

http://www.pecad.fas.usda.gov/cropexplorer/global_reservoir/

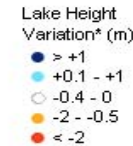


Global Reservoir and Lake Elevation Database — Eastern Africa

Click on a blue circle to see Lake Level Variations



Jump to a new region

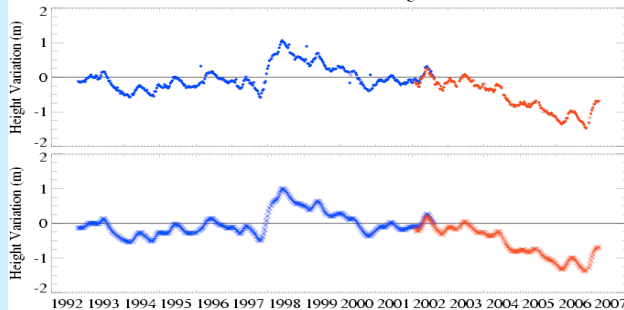


* from 10-year mean level

Landcover - MODIS



Lake Victoria Height Variations
TOPEX 10 Year Geo-referenced 10Hz Along Track Reference



*** TOPEX/Poseidon historical archive
*** Jason-1 interim near real time product

Last valid elevation : 27 Feb., 2007



Click on a region to view Reservoir/Lake Heights

* from 10-year mean level

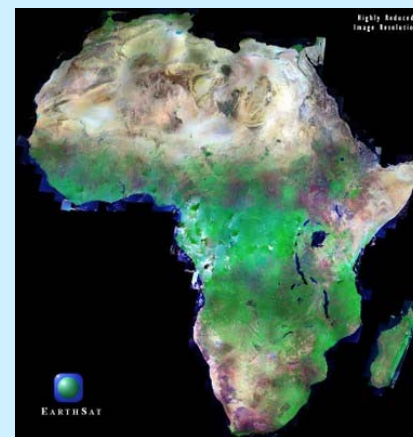


Mid-Decadal Global Land Survey (MDGLS)



Follow-on to the GeoCover
orthorectified global data sets
(1975, 1990, and 2000 epochs)
centered on 2004-2006

- Partnership between USGS and NASA, in support of CCSP
- Support global assessments of land-cover, land-cover change, and ecosystem dynamics (disturbance, vegetation health, etc)
- Landsat-5 TM and Landsat-7 imagery, with ASTER and EO-1 ALI data as needed





MDGLS Development



Phase 1: identify all candidate L5 and L7 scenes and ingest into the USGS archive

- MDGLS Period 2004-2007 using Landsat 7 gap-filled data and available Landsat 5 data (including scenes from non US stations)

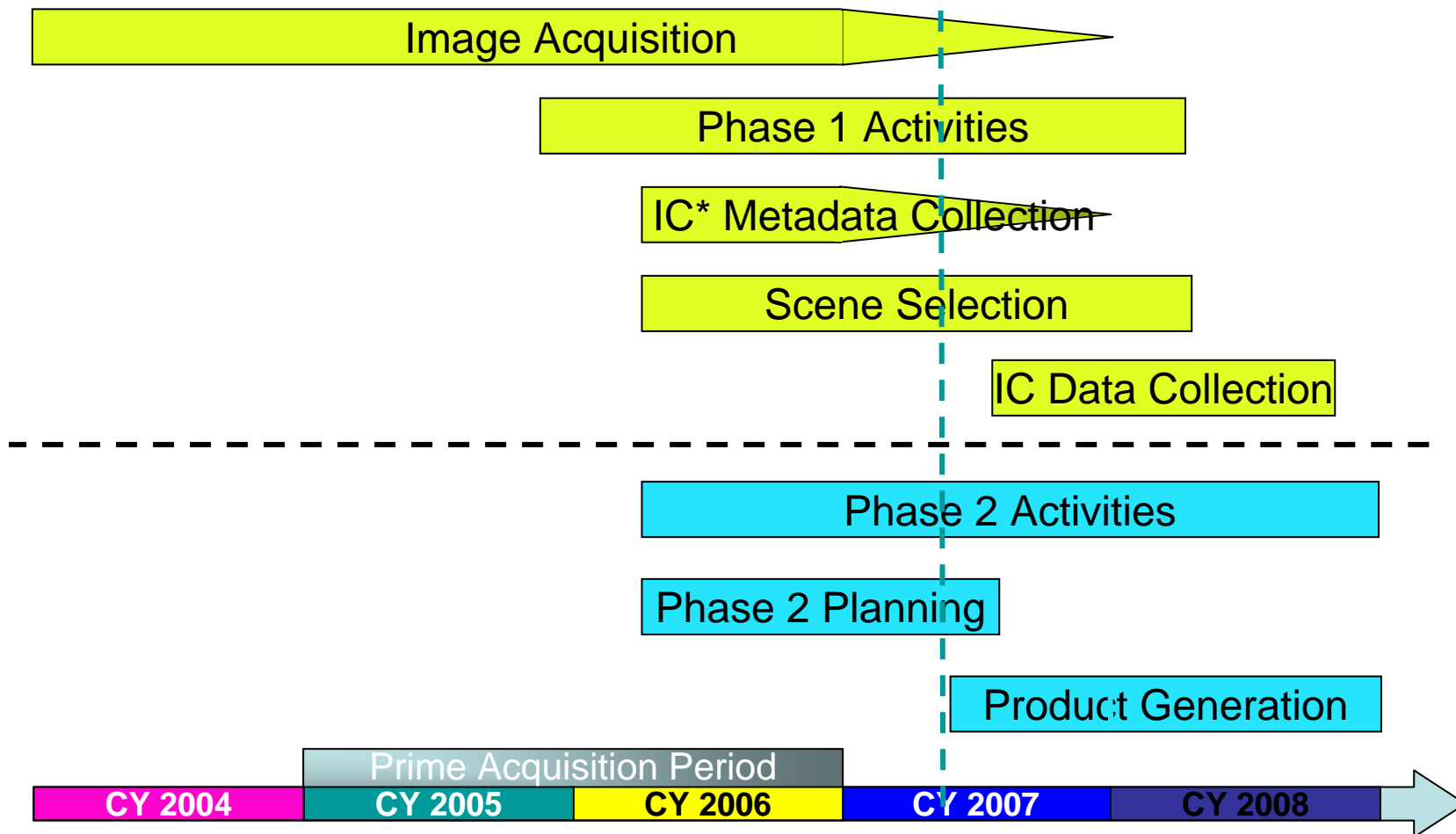
Phase 2: Process selected data into an orthorectified dataset compatible with previous surveys (NASA lead)

- Distributed from USGS/EDC at no cost

Phase 3: Analyze data set to quantify trends in land cover and vegetation dynamics (NASA LCLUC)



MDGLS Schedule



*IC = International Cooperator



MGDLS Specifications



- UTM / WGS-84 projection
- 14.25 / 28.5/ 57 meter resolution
- Cubic Convolution resampling (1 step)
- GeoTiff format
- Orthorectified, Gap-filled
- Geodetic accuracy (relative to 2000 Geocover):
30m RMSE or better; maximum error 100m.
- Processing by USGS/EDC
- FTP distribution of individual MGDLS scenes
at no cost, with limited provision for bulk distribution
of entire dataset (e.g. via hard disk transfer).



MDGLS Web Site: <http://mdgls.umd.edu>



Mid-Decadal Global Land Survey



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Background

Status

Documents

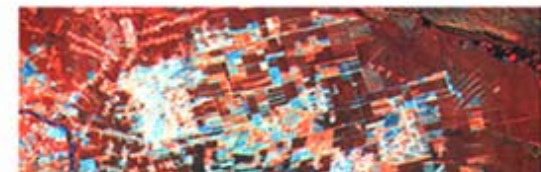
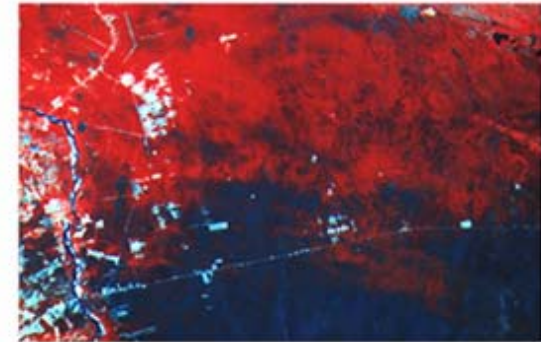
Links

The Mid-Decadal Global Land Survey (MDGLS) is a partnership between the U.S. Geological Survey (USGS) and the National Aeronautics and Space Administration (NASA), in support of the U.S. Climate Change Science Program (CCSP) and the NASA Land-cover Land-use Change (LCLUC) Program.

Characterizing trends in land cover and land use remains a key goal for Earth science. The MDGLS is assembling a global dataset of 30-meter resolution satellite imagery to support measurement of Earth's land cover and rates of land cover change during the first decade of the 21st century.

The MDGLS builds on the existing Geocover data sets developed for the 1970's, 1990, and 2000. Some 9500 Landsat images from the period 2004-2007 will be acquired, processed, and made available to the public via FTP download. Given the failure of the Landsat-7 ETM+ Scan Line Corrector in 2003, a combination of Landsat-7 gap-filled data and Landsat-5 data from U.S. and international ground stations will be used in the project. Additional imagery from ASTER and EO-1 ALI imagers will be included to augment the Landsat coverage. Processing will begin in early 2007 and orthorectified products will be made available for download throughout the project. The complete dataset is expected to be completed in late 2008.

We are interested in your feedback. Questions or comments may be directed to: mdglsinfo@XXXXXX





Global Landsat-Type Data Sets



- Possible basis for an international global agriculture monitoring/mapping initiative such as a global agricultural land mask updated every 5 years.
 - Needed
 - Can be accomplished at moderate to high resolution
 - Technology exists
 - Suitable for collaborations at national to regional scales
 - Extendable data set
- NASA and USGS are interested in participating in an international initiative to generate a global 2010 data set from available systems - to fill the Landsat data gap.



Global Landsat-Type Data Sets



- Landsat Data Continuity Mission
 - Planned by NASA for 2012
 - Operated by USGS
 - Ground segment managed by USGS
 - LDCM Science Team formed.



Decadal Survey Missions

- 17 missions for development over the next 10-15 years to address Earth science questions.
- Focus on global observations.
- Terrestrial, aquatic and atmospheric observations.
- Development of first four missions underway - first launch about 2013.



First 4 Decadal Survey Missions

<u>Mission</u>	<u>Instrument</u>	<u>Description</u>
<u>ICESat-II</u>	Laser altimeter	Ice sheet height changes for climate change; vegetation height/biomass
SMAP	L-band radar L-band radiometer	Soil moisture and freeze/thaw for weather and water cycle processes
<u>DESDynI</u>	L-band <u>InSAR</u>	Land surface and ice sheet deformation; vegetation structure for ecosystem health
CLARREO (with NOAA)	Absolute, spectrally resolved <u>interferometer</u>	Solar radiation



Contact Information:

Edwin Sheffner

Earth Science Division

NASA Ames Research Center

(Mountain View, California)

edwin.sheffner@nasa.gov

(USA) 650.604.5899