IMAPP: Supporting Aqua and Terra Direct Broadcast Users for 15 Years

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ITSC20
28 October 2015

Lots of Others

Brad Pierce, Elisabeth Weisz, Eva Borbas, Robert Aune, William Straka, Scott Mindock, Ray Garcia, Graeme Martin, Nadia Smith, Jay Cable, Dave Hoese, Eva Schiffer, Katja Hungershöfer, Jeff Key, Jordan Gerth, Scott Bachmeieir, Mike Pavolonis, Crystal Schaaf, Yanmin Shuai, Peter Albert, Kris Bedka, Nigel Atkinson, Denis Denis Margetic, Tom Heinrichs, Dayne Broderson, Peter (Kung-Hwa) Wang, Aniko Kern, Christelle Ponsard, Philip Frost, Riris Adriyanto, Wei Gao, Jerrold Robaidek, Rosie Spangler, Paul Menzel, Tom Rink, Maria Vasys, Jerrold Robaidek, Rosie Spangler, Janean Hill, Douglas Ratcliff, Kevin Hallock, Nick Bearson, Richard Frey, Chris Moeller, Steve Ackerman, Dave Santek, Russ Dengel, William Smith, Scott Nolin, John LaLande, Bill Bellon, Carl Dierking

- UW SSEC
- NOAA/STAR
- Boston University
- NASA Goddard Space Flight Center
- Instituted für Weltraumwissenschaften, Freie Universität, Berlin, Germany
- German Weather Service (DWD)
- NASA Langley
- NASA SPoRT
- Met Office
- NWS
- Taiwan Central Weather Bureau, Taipei
- Australian Bureau of Meteorology
- Eötvös Loránd University, Budapest, Hungary
- East China Normal University, Shanghai, China
- GINA Alaska
- EUMETSAT
- BMKG, Indonesian Agency for Meteorology, Climatology and Geophysics
- CSIR South Africa
- INPE/CPTEC
- Jet Propulsion Lab (JPL)

IMAPP

International MODIS/AIRS Processing Package

Funded by NASA since 2000

http://cimss.ssec.wisc.edu/imapp/

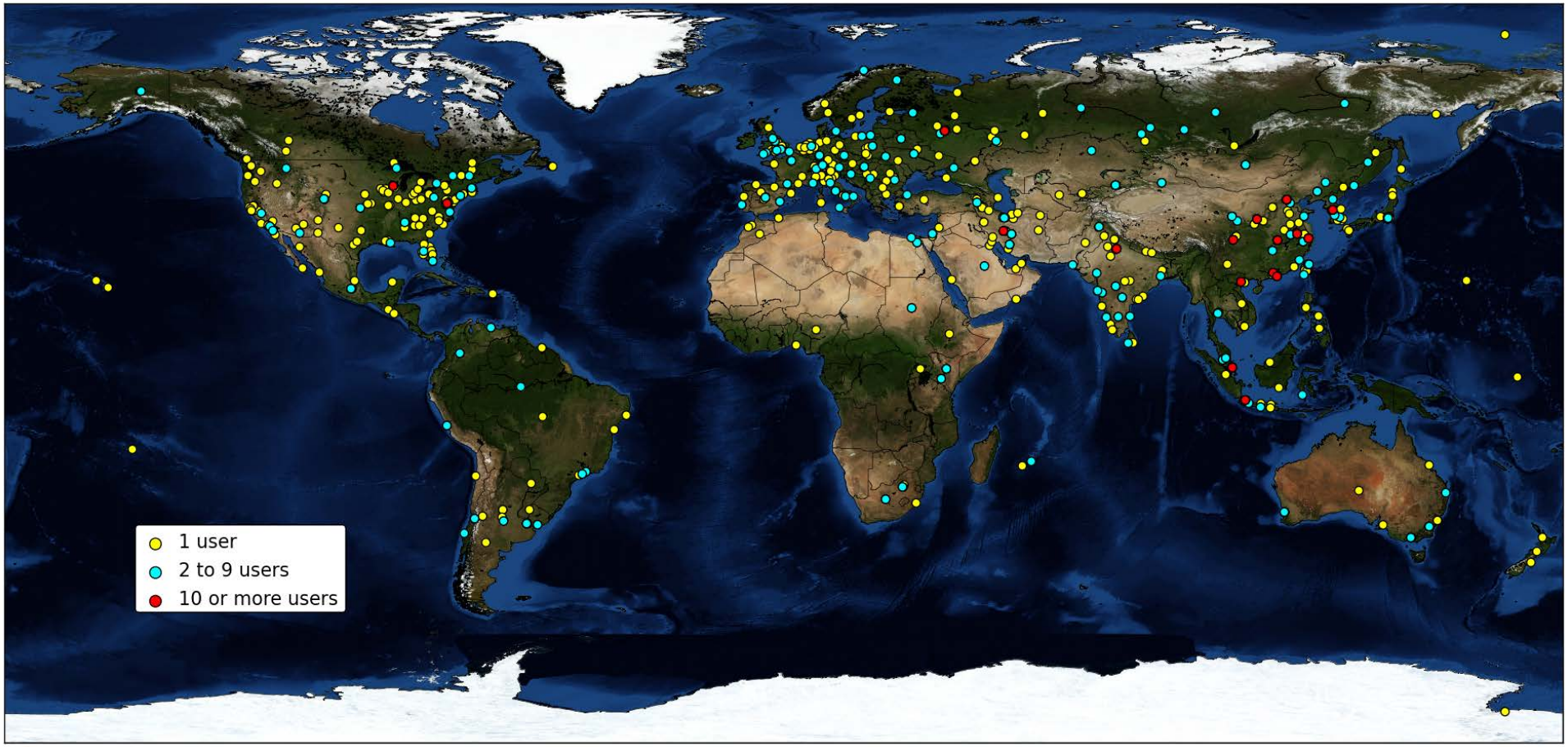
- 64 software packages released in 15 years
- More than 2100 registrants from 76 different countries
- 12 direct broadcast workshops held on 6 continents serving students from more than 60 countries
- 16 MODIS related software packages
- 6 AIRS related software packages
- 4 AMSR-E software packages

IMAPP Global Users

76 Different Countries (> 1/3 of the world total)

Italy	Australia	Mexico	Romania
Argentina	Czech Republic	Hungary	Malaysia
Brazil	Canada	Belgium	Algeria
Kazakhstan	Spain	Norway	Reunion
Ukraine	Chile	Venezuela	Austria
Indonesia	Pakistan	Sri Lanka	Finland
China	Nepal	France	Czech Republic
Denmark	Portugal	Russia	New Zealand
South Africa	Poland	Vietnam	Guatemala
Taiwan	Saudi Arabia	Mongolia	Uruguay
Japan	El Salvador	Turkey	Israel
Morocco	Colômbia	South Korea	Azerbaijan
Iran	Serbia	UAE	Cuba
Singapore	Kenya	Lithuania	Kuwait
India	Oman	United States	Syria
Germany	Sweden	Thailand	Dominican Republic
United Kingdom	Uzbekistan	Philippines	
Iceland	Switzerland	Ethiopia	Belarus
Slovenia	Peru	Suriname	Laos
Uganda	Ethiopia	Netherlands	

IMAPP Global Registrants



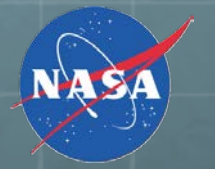
More than 2100 Registrants since launch of new website in 2007

Global IMAPP Workshops

Web site: http://cimss.ssec.wisc.edu/dbs/

2004 – Nanjing, China
2004 – Perth, Australia
2005 – Taipei, Taiwan
2005 – Beijing, China
2006 – Andenes, Norway
2006 – Pretoria, South Africa
2007 - Cachoeira Paulista, Brazil as part of GEOSS
2009 – Stellenbosch University, South Africa
IGARSS Short Course 4: MODIS direct broadcast data for enhanced forecasting and real-time environmental decision making
2011 June – Shanghai, China
2011 September – Jakarta, Indonesia
WMO Region V Training workshop on satellite applications for meteorology and climatology
2013 September – Honolulu, Hawaii
Hawaii VIIRS / MODIS Direct Broadcast Applications Workshop
2015 February – Miami, Florida
AOML Miami VIIRS / MODIS Direct Broadcast Applications Workshop

International MODIS/AIRS Processing Package



The International MODIS/AIRS Processing Package (IMAPP) allows ground stations capable of receiving direct broadcast data from the NASA Terra and Aqua spacecraft to create a suite of products from MODIS, AIRS, AMSU, and AMSR-E. The IMAPP software is freely available, and is supported on Intel Linux host platforms.

IMAPP is also available as a Virtual Appliance for Windows, OS X, and Linux, offering a complete processing system for direct broadcast atmosphere, land, and ocean products from Terra and Aqua.

MODIS products (Terra and Aqua)

Atmosphere and Polar Products

- Cloud mask
- Cloud top pressure and temperature
- Cloud effective radius and cloud optical thickness
- Temperature and moisture profiles
- Total precipitable water
- Stability indices
- Aerosol optical depth (3km and 10km)
- Ice Surface Temperature
- Snow Mask
- Ice Cover and Ice Concentration
- Inversion Strength and Inversion Depth

Learn more ...

Land Products

- Land surface reflectance
  Learn more ...
- Nadir BRDF-adjusted reflectance
  Learn more ...

Image Products

- True color GeoTIFF and KML
  Learn more ...
- MODIS L1B and True Color GeoTIFF
  Learn more ...

AIRS and AMSU Products (Aqua)

Sensor Products

- Calibrated and geolocated radiances and reflectances (AIRS)
- Calibrated and geolocated antenna temperatures (AMSU)

Learn more ...

Atmosphere Products

- JPL Temperature and moisture profiles (3x3 AIRS FOV)
  Learn more ...
- UW Temperature and moisture profiles (single FOV AIRS, CrIS and/or IASI dual regression technique)
  Learn more ...
- Collocated AIRS/MODIS temperature and moisture profiles (single AIRS FOV; clear and cloudy sky)
  Learn more ...

Utilities

- AIRS HDF to BUFR converter
  Learn more ...

NWP Products

The Direct Broadcast CIMSS Regional Assimilation System (DBCRAS) is a regional numerical weather prediction model that assimilates MODIS products in real time and creates forecasts up to 72 hours at 48 km and 16 km resolution.

Learn more ...

GeoTIFF Web Mapping Service (WMS) MODIS Display Tool

This package provides users with the capability to display and share GeoTIFF products through a web browser in a Google Maps interface. It is designed specifically for display of MODIS and VIIRS default GeoTIFF files created by the Polar2Grid reprojection software package. It is distributed as a virtual machine (VM).

Learn more ...

Aviation/Severe Weather Forecast Products

The IMAPP Overshooting Tops (OT) software package identifies regions of MODIS data that contain convective cloud tops that have broken through the tropopause into the lower stratosphere because of a strong updraft. Convective storms with OTs have the potential to produce severe weather at the ground (heavy rain, damaging winds, hail and tornadoes) as well as aviation hazards including lightning and turbulence.

Learn more ...

Air Quality Forecast Products

- The Infusing Satellite Data Into Environmental Applications - International (IDEA-I) software utilizes the MODIS Aerosol Product (MOD04) to identify regions of elevated air pollution, then runs a trajectory model to forecast the vertical and horizontal movement of the aerosols in the next 48 hours.

  Learn more ...

- A second version of the IDEA-I software identifies regions of high

What's New

- MODIS Polar2Grid Reprojection Software v2.0
- MODIS Overshooting Tops Aviation Weather Hazard Software v1.1
- MODIS DB Processing System Virtual Appliance v2.0
- MODIS Level 2 Package v3.1
- MODIS Reprojection Software v2.0
- AIRS, CrIS and IASI Stratospheric Ozone Intrusion Forecast Package v1.0
- AIRS, CrIS and IASI Hyperspectral Sounder Retrieval Package v1.3
- GeoTIFF Web Mapping Service Display Package v1.0

http://cimss.ssec.wisc.edu/imapp/

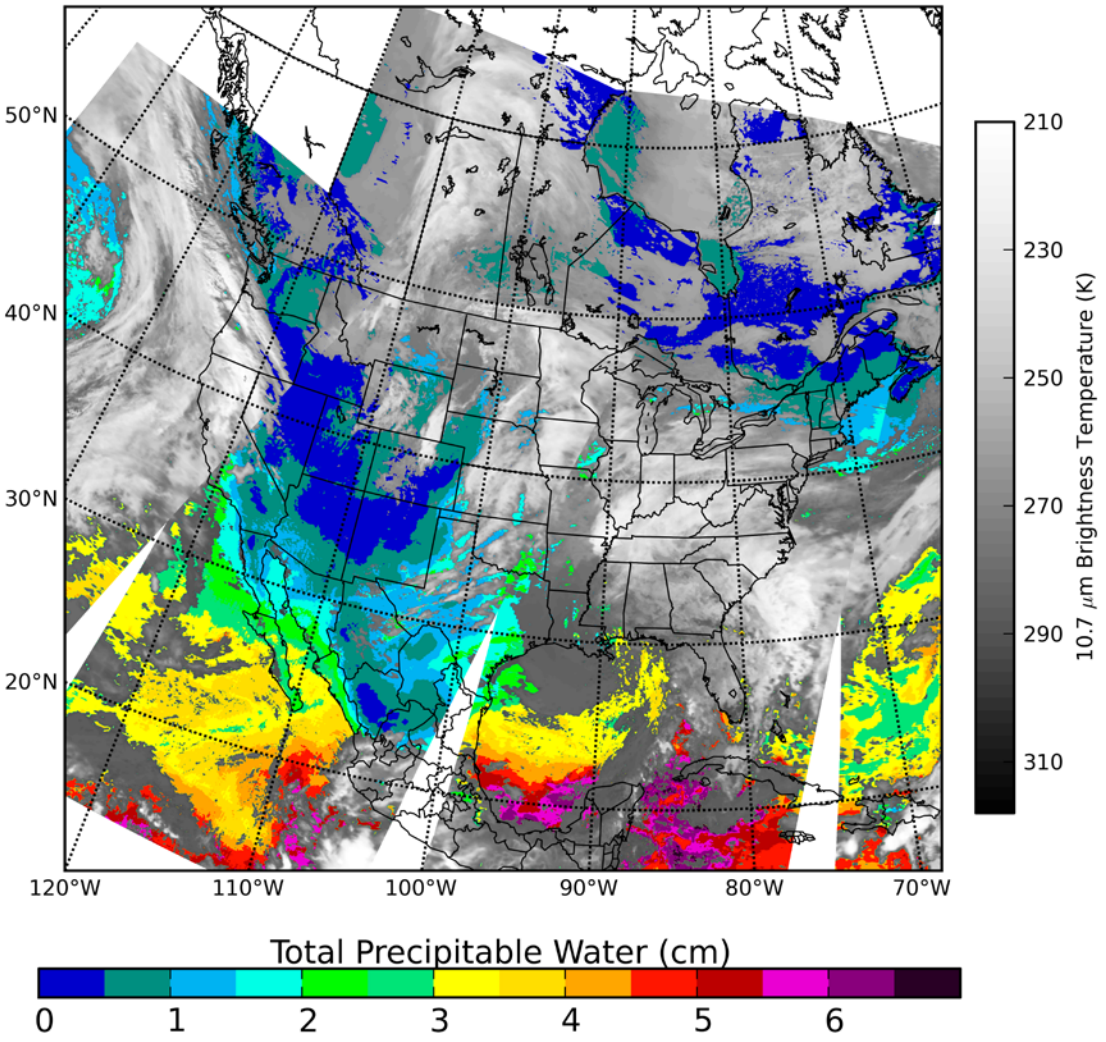
Suite of Products

MODIS Products (Terra and Aqua)

- Atmosphere Group Collect 6
  - Cloud mask (MOD35)
  - Cloud top pressure and temperature (MOD06CT)
  - Cloud effective radius and cloud optical thickness (MOD06OD)
  - Temperature and moisture profiles (MOD07)
  - Total precipitable water (MOD07)
  - Stability indices (MOD07)
  - Aerosol optical depth (3km and 10km) (MOD04)
  - Bright Target Aerosol Optical Depth (Deep Blue) (MOD04)
- Polar Products from Jeff Key (NOAA Cryosphere)
  - Ice Surface Temperature
  - Snow Mask
  - Ice Cover and Ice Concentration
  - Inversion Strength and Inversion Depth

MODIS Total Column Precipitable Water

Aqua 2015-10-27 night 0549UTC 0725UTC 0902UTC 1041UTC



Suite of Products

MODIS Land Products (Terra and Aqua)

- MODIS Surface Reflectance (MOD09)
- Nadir Bidirectional Reflectance Distribution Function (BRDF) - With Crystal Schaaf

MODIS Image Products

- Polar2Grid reprojection software for AWIPS, GeoTIFF, KML, HDF5 and binary Version 2.0 just released (Poster 3p.10)
- True Color Reprojection for Display in Google Earth (DB Google Earth) – Full Resolution

AIRS and AMSU Products (Aqua) from Jet Propulsion Lab (JPL)

- Calibrated and geolocated radiances (AIRS)
- Calibrated and geolocated antenna temperatures (AMSU)

Suite of Products

AIRS and AMSU Products (Aqua)

- 3x3 AIRS FOV retrievals – JPL (Collect 5)
- UW Dual Regression single FOV retrievals (AIRS, CrIS, IASI)
- Collocated AIRS/MODIS retrievals.
- AIRS/AMSU HDF4 to BUFR Converter with Met Office (Meeting request from John Le Marshall at BOM)

AMSR-E Products

- Calibrated and Geolocated Antenna Temperatures
- Rain Rate
- Soil Moisture
- Snow Water Equivalent

Suite of Products

HYDRA2 Multispectral Data Analysis Toolkit – More Later.

Numerical Weather Prediction (NWP) Model DBCRAS

- Direct Broadcast CIMSS Regional Assimilation system (DBCRAS).
- Globally configurable NWP at 48 km resolution
- Nested grid at 16 km.
- 72 hour forecast of gridded meteorological fields.
- Assimilates MODIS Cloud (MOD06) and Moisture (MOD07) Retrievals to improve initial conditions in the model.
- Output includes forecast IR and Water Vapor Satellite Imagery.
- Used in several sites around the world including ISRO India.

WIDE AREA MONITORING INFORMATION SYSTEM

WAMIS

HOME | PRODUCTS | TIME SERIES VIEWER | A BRIEF INTRODUCTION TO MODIS | PHOTO GALLERY | NEWS | ABOUT US | CONTACT US | LINKS

Pages

- Home
- Products
  - Surface Reflectance
  - Cloud
  - Atmospheric
  - Fire
  - Fire Danger
  - Fire Frequency Map
  - Long-Term Time
  - Time Series Viewer
  - A Brief Introduction to MODIS
  - Photo Gallery
- News
- About Us
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Fire Danger

More information about this product

Choose a day from the calendar below to view the fire danger products for that day:

Aug 2015

Su	Mo	Tu	We	Th	Fr	Sa
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

September 2015

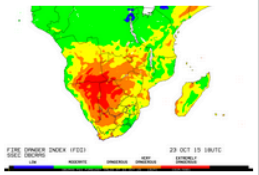
Su	Mo	Tu	We	Th	Fr	Sa
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

October 201

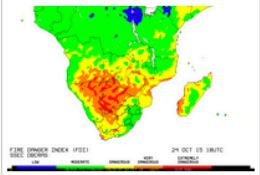
Su	Mo	Tu	We	Th
4	5	6	7	
11	12	13	14	1
18	19	20	21	2
25	26	27	28	2

Lowveld Fire Danger Index (LFDI) for the next 72 hours from 2015-10-23

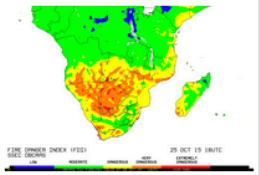
(Click image to download)



2015-10-23



2015-10-24



2015-10-25

Legend:
- Low
- Moderate
- Dangerous
- Very dangerous
- Extremely dangerous

http://wamis.meraka.org.za/products

Suite of Products

Web Mapping Service for display of GeoTIFFs created by Polar2Grid - More later

Overshooting Tops Aviation Hazard Software – More Later

Infusing satellite Data into Environmental Applications – International (IDEA-I)

- Globally configurable package for Air Quality Forecasters
  - MODIS Aerosol Pollution forecast trajectories, using MOD04 products with web interface and control of animations.
  - AIRS Stratospheric Ozone intrusions trajectories, using AIRS upper tropospheric ozone retrievals with webs inteface and control of animations.

Suite of Products

IMAPP Virtual Appliance

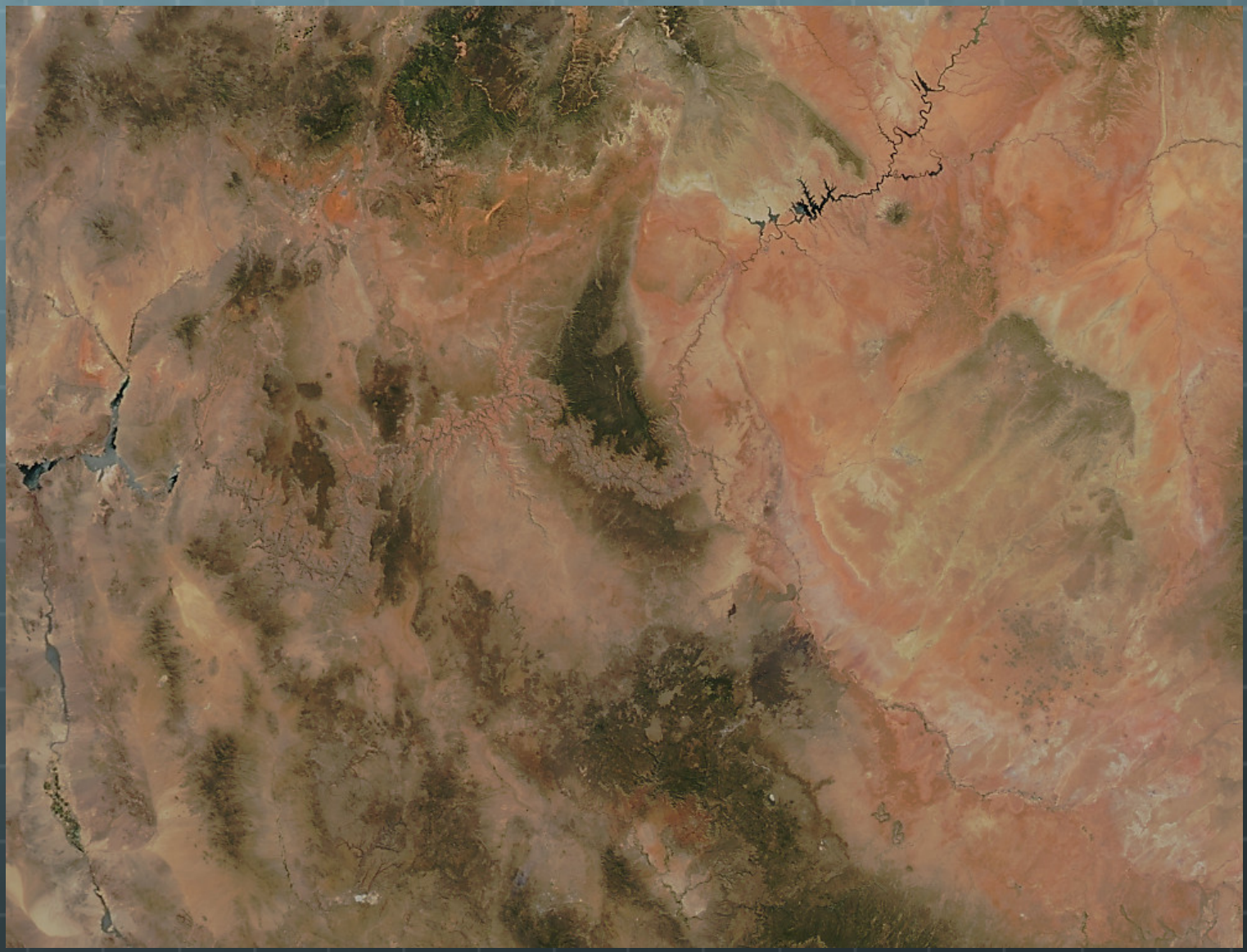
- A complete free Aqua and Terra MODIS DB processing system (Level 0 to Level 2 products plus quicklooks) in the form of a Virtual Appliance which can be installed and run on:
  - Microsoft Windows (7, Vista, XP)
  - Linux
  - Apple OS X
- Uses all freely available software that is available from IMAPP, SeaDAS and NASA DRL
- Easy to install and run full-featured processing system Level 0 – Level 2 plus browse images

What's New?

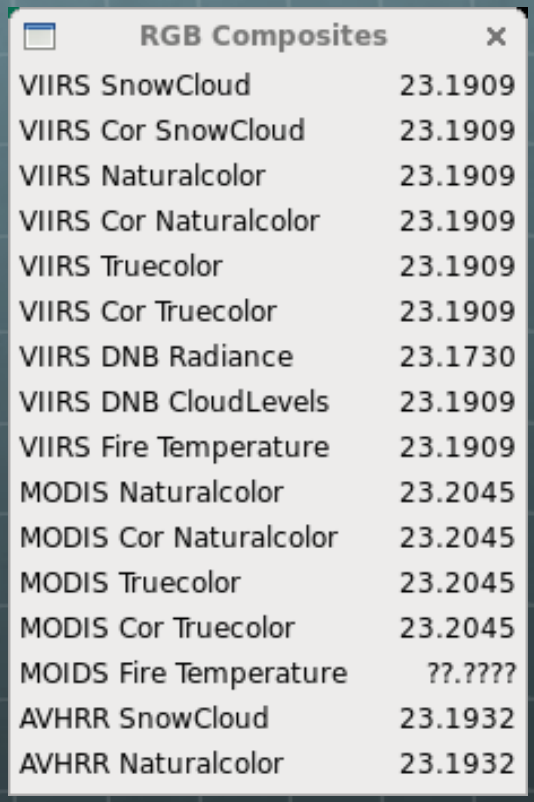
Polar2Grid Version 2.0

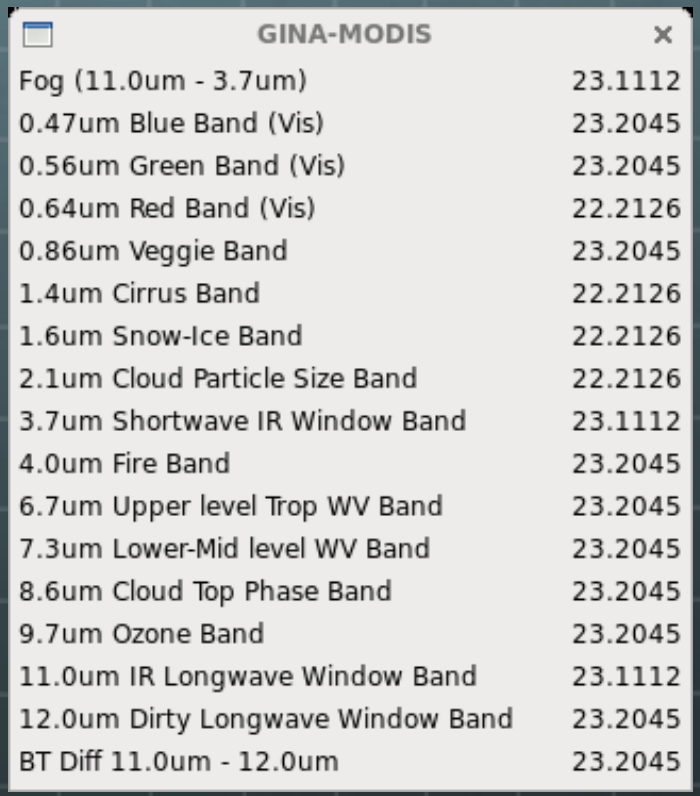
- Written to reproject/reformat MODIS and VIIRS L1b and L2 products for display in UW National Weather Service visualization and analysis system AWIPS (I and II)
- Extended for creation of GeoTIFFS including true color (v1.2), KMZ, HDF5 and binary(v2.0)
- Extended for use with other sensors – AVHRR
- Executes NASA DRL Corrected Reflectance (crefl) to create true and false color reprojections.
- Simple implementation through bash scripts wrapping python:
  - modis2awips.sh –g grid -f <files>
  - modis2gtiff.sh –g <grid> -f <files> (-g is optional – defaults to Google projection ~ 600m)
  - crefl2gtiff.sh –g <grid> -f <files> (-g is optional – defaults to Google projection ~ 600m)

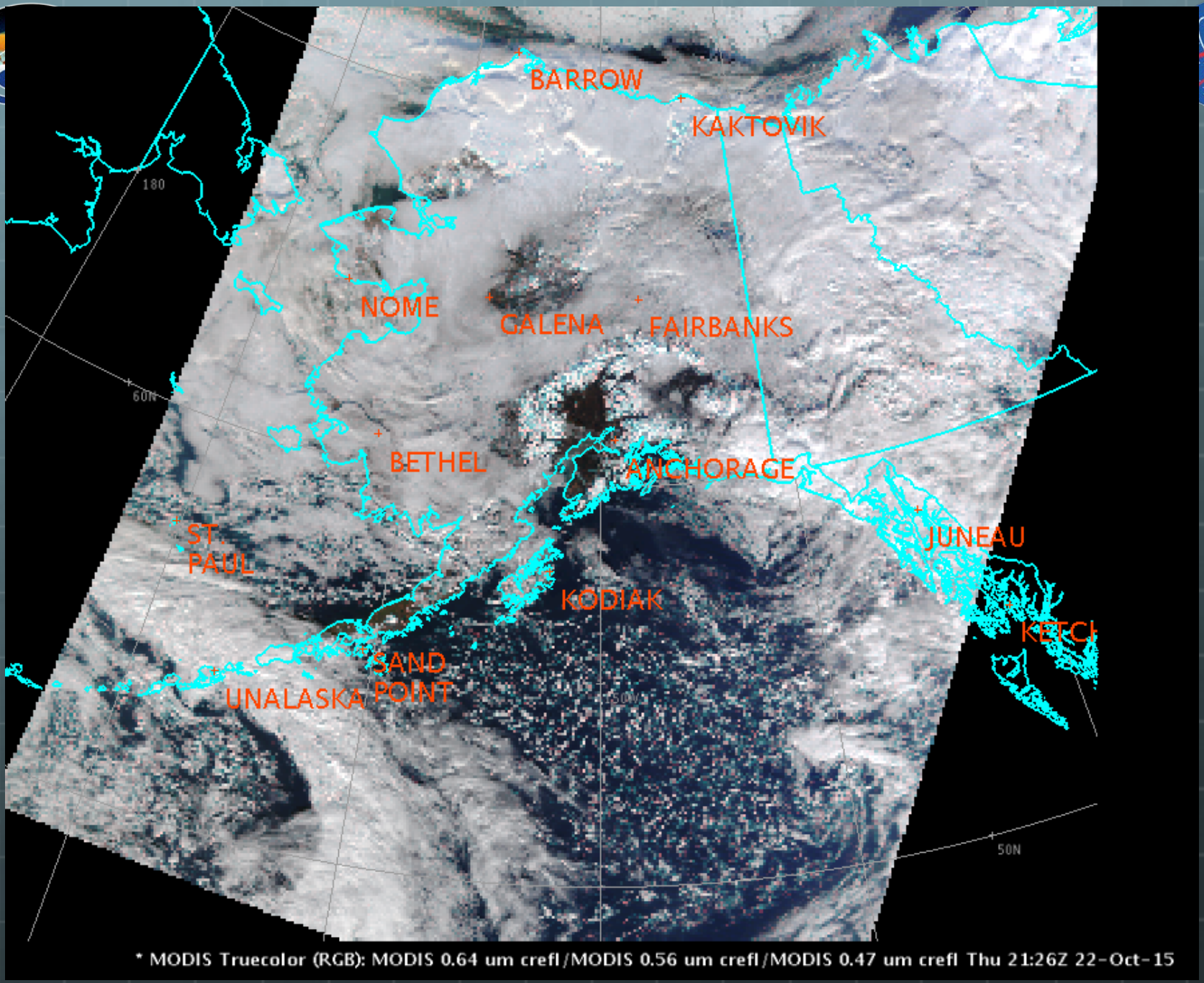
Polar2Grid



AWIPS-II New NWS Alaska Menus






BARROW
KAKTOVIK
NOME
GALENA
FAIRBANKS
BETHEL
ANCHORAGE
JUNEAU
ST. PAUL
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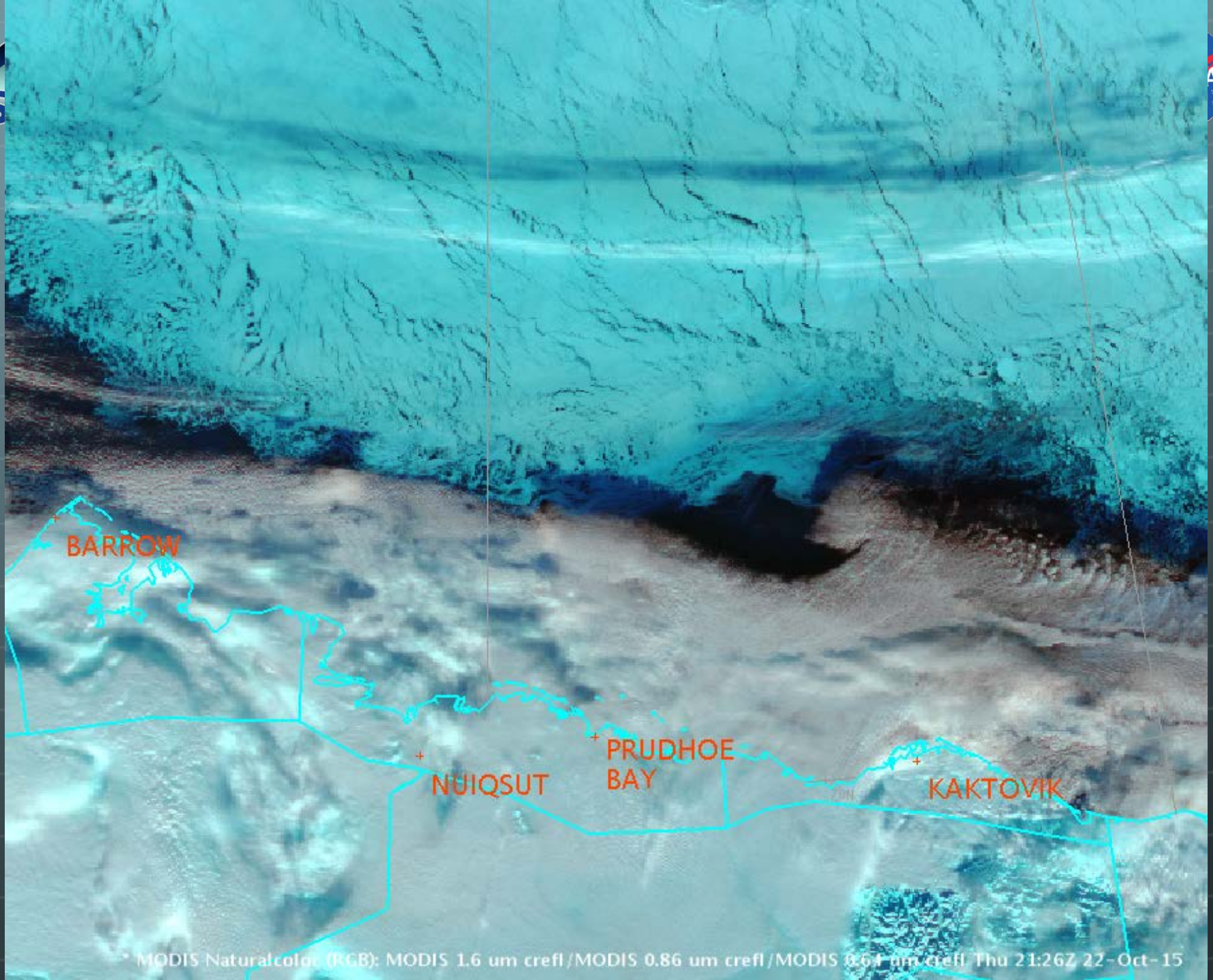
* MODIS Truecolor (RGB): MODIS 0.64 um refl/MODIS 0.56 um refl/MODIS 0.47 um refl Thu 21:26Z 22-Oct-15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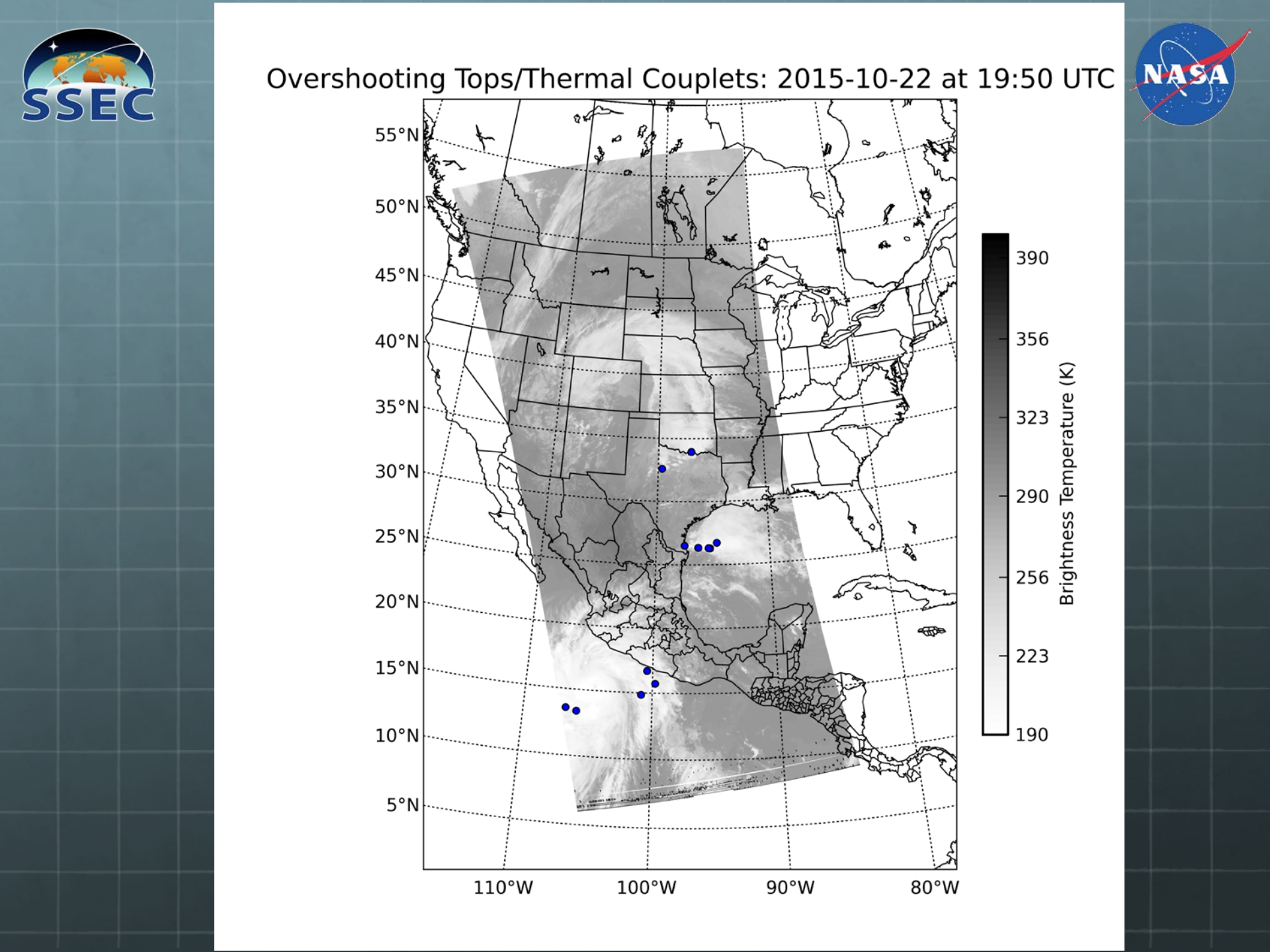
MODIS Naturalcolor (RGB): MODIS 1.6 um crefl/MODIS 0.86 um crefl/MODIS 0.64 um crefl Thu 21:26Z 22-Oct-15

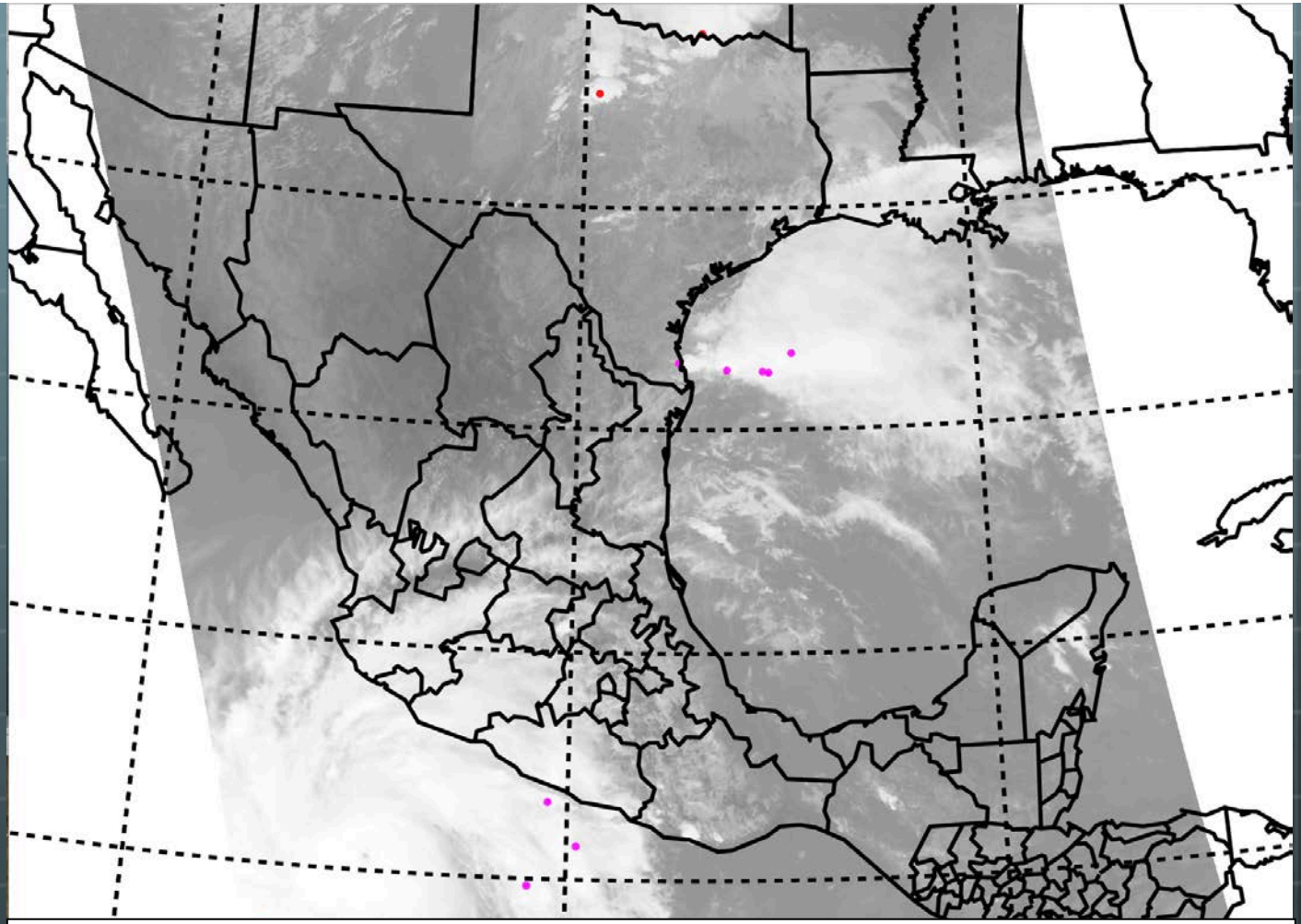
IMAPP MODIS Overshooting Tops

Overshooting Tops Aviation Hazard Software

- Identifies potentially dangerous convection that protrudes into the stratosphere.
- Using Dr. Kris Bedka algorithm applied to IR bands.
- Creates output product images that include areal coverage of danger of lightning and turbulence.


Overshooting Tops/Thermal Couplets: 2015-10-22 at 19:50 UTC
55°N
50°N
45°N
40°N
35°N
30°N
25°N
20°N
15°N
10°N
5°N
110°W
100°W
90°W
80°W
390
356
323
290
256
223
190
Brightness Temperature (K)

Lightning Risk: 2015-10-22 at 19:50 UTC



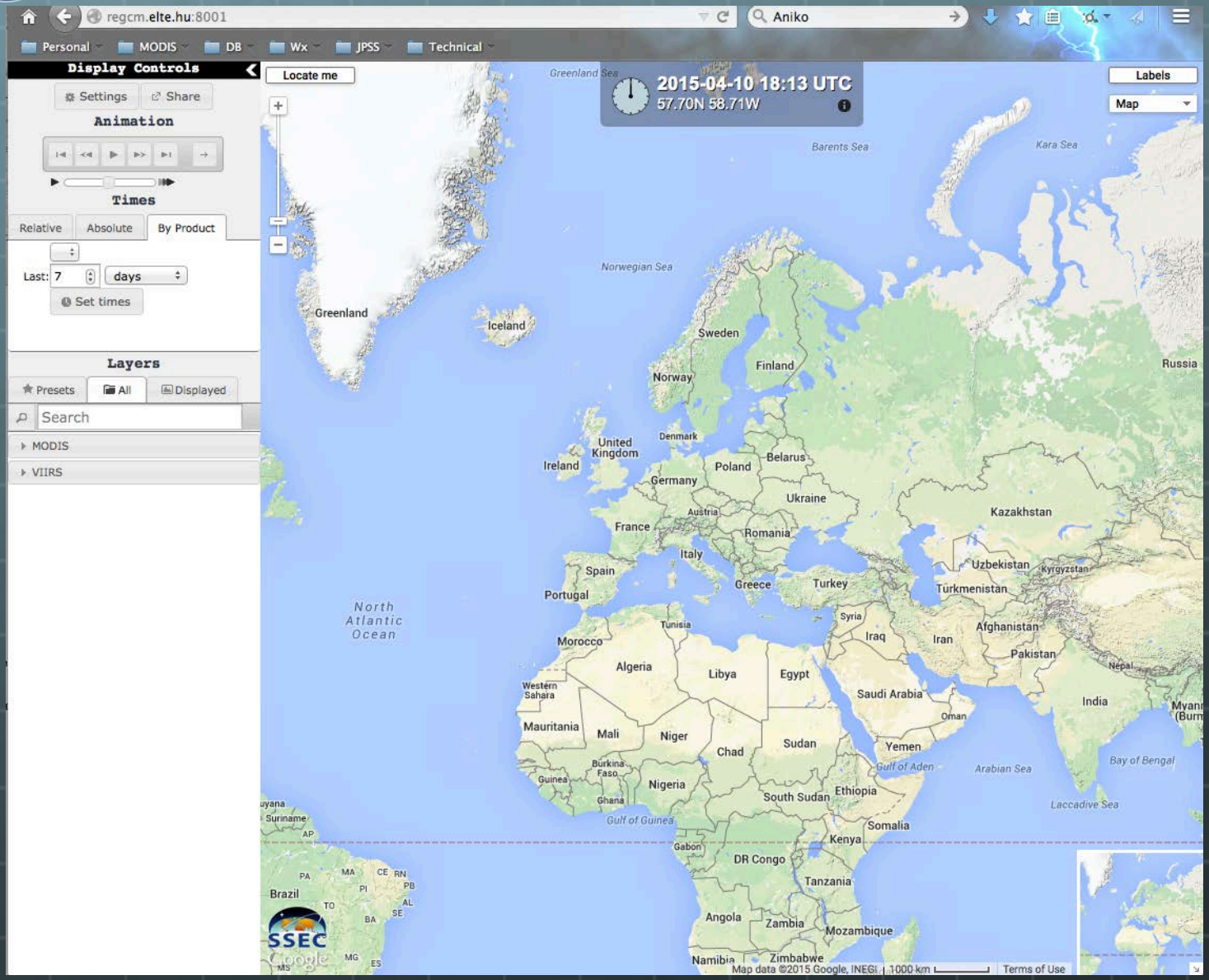
70 65 50 35

Lightning Risk within 10 km of overshooting top (%)

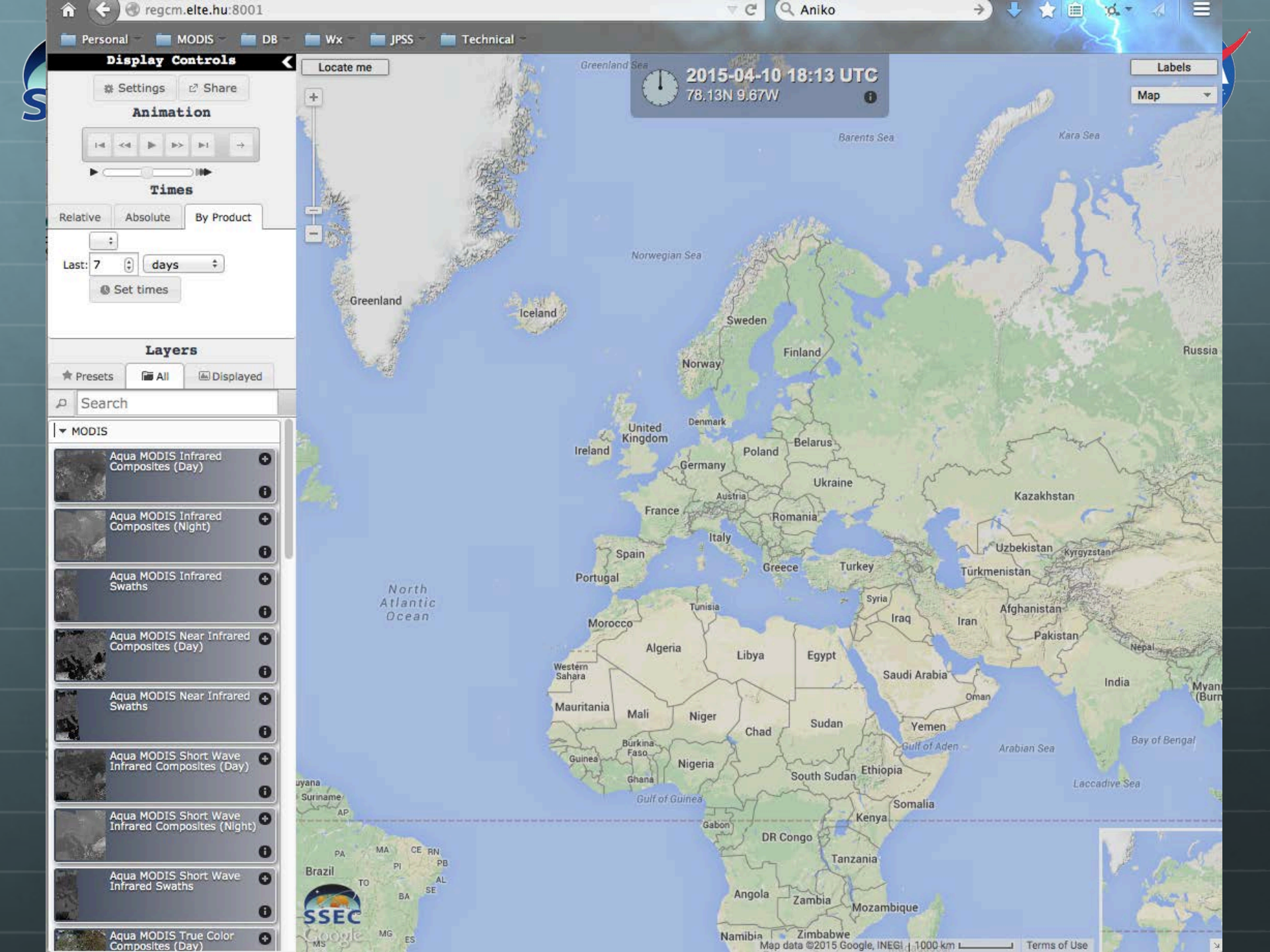
IMAPP RealEarth Web Mapping Service

- This package provides users with the capability to display and share GeoTIFF products through a web browser in a Google Maps interface.
- It is designed specifically for display of MODIS and VIIRS default GeoTIFF files created by the Polar2Grid reprojection software package.
- It is distributed as a virtual machine (VM).

IMAPP WMS



http://regcm.elte.hu:8001/


regcm.elte.hu:8001
Aniko
Personal
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MODIS
Aqua MODIS Infrared Composites (Day)
Aqua MODIS Infrared Composites (Night)
Aqua MODIS Infrared Swaths
Aqua MODIS Near Infrared Composites (Day)
Aqua MODIS Near Infrared Swaths
Aqua MODIS Short Wave Infrared Composites (Day)
Aqua MODIS Short Wave Infrared Composites (Night)
Aqua MODIS Short Wave Infrared Swaths
Aqua MODIS True Color Composites (Day)
Locate me
2015-04-10 18:13 UTC
78.13N 9.67W
Labels
Map
Greenland Sea
Barents Sea
Kara Sea
Norwegian Sea
Greenland
Iceland
Sweden
Finland
Norway
Russia
United Kingdom
Ireland
Denmark
Poland
Belarus
Germany
Ukraine
Austria
France
Romania
Kazakhstan
Italy
Spain
Portugal
Greece
Turkey
Uzbekistan
Kyrgyzstan
Türkmenistan
North Atlantic Ocean
Syria
Iraq
Iran
Afghanistan
Pakistan
Nepal
India
Tunisia
Morocco
Algeria
Libya
Egypt
Western Sahara
Saudi Arabia
Oman
Mauritania
Mali
Niger
Chad
Sudan
Yemen
Gulf of Aden
Arabian Sea
Bay of Bengal
Burkina Faso
Guinea
Nigeria
Ghana
South Sudan
Ethiopia
Laccadive Sea
Gulf of Guinea
Somalia
Kenya
Gabon
DR Congo
Tanzania
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Zambia
Mozambique
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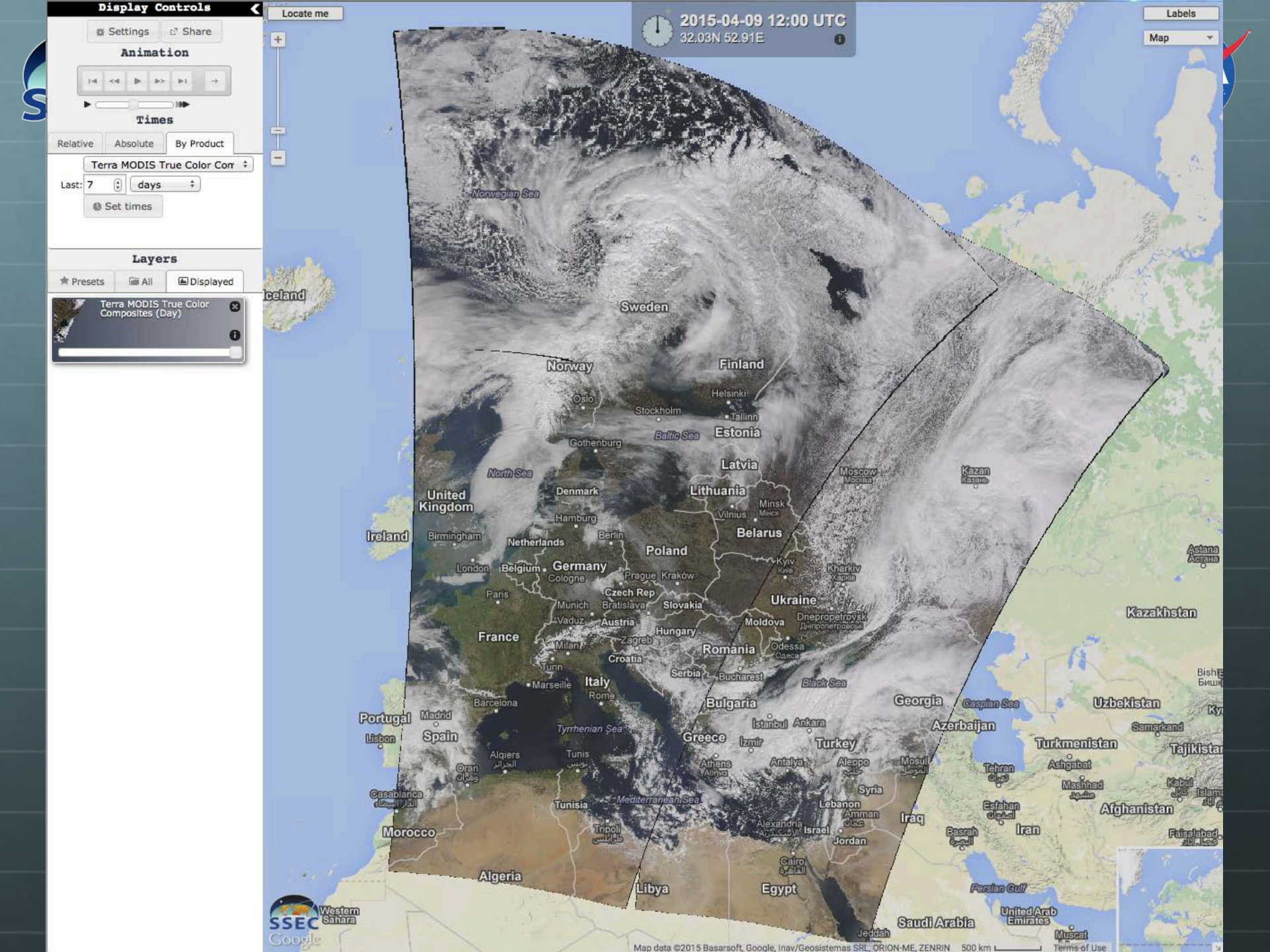
SSEC
Google
Map data ©2015 Google, INEGI
1000 km
Terms of Use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Terra MODIS True Color Composites (Day)
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Labels
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Norwegian Sea
Iceland
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Norway
Finland
Oslo
Stockholm
Helsinki
Tallinn
Baltic Sea
Estonia
Gothenburg
Latvia
North Sea
Moscow
Kazan
United Kingdom
Denmark
Lithuania
Minsk
Vilnius
Hamburg
Belarus
Ireland
Birmingham
Berlin
Netherlands
Poland
Kyiv
Kharkiv
London
Belgium
Germany
Cologne
Prague
Kraków
Astana
Paris
Czech Rep
Ukraine
Munich
Bratislava
Slovakia
Kazakhstan
Vaduz
Austria
Moldova
Dnepropetrovsk
France
Hungary
Zagreb
Milan
Romania
Odessa
Croatia
Turin
Serbia
Bucharest
Marseille
Italy
Black Sea
Rome
Georgia
Caspian Sea
Uzbekistan
Barcelona
Bulgaria
Portugal
Madrid
Istanbul
Ankara
Azerbaijan
Tyrrhenian Sea
Samarkand
Lisbon
Spain
Greece
Izmir
Turkey
Turkmenistan
Tajikistan
Alqiers
Tunis
Athens
Antalya
Aleppo
Mosul
Tehran
Ashgabat
Oran
Syria
Mashhad
Casablanca
Mediterranean Sea
Lebanon
Afghanistan
Tunisia
Esfahan
Amman
Iraq
Alexandria
Israel
Iran
Morocco
Tripoli
Jordan
Basrah
Faisalabad
Cairo
Algeria
Libya
Egypt
Persian Gulf
Western Sahara
Saudi Arabia
United Arab Emirates
Jeddah
Muscat
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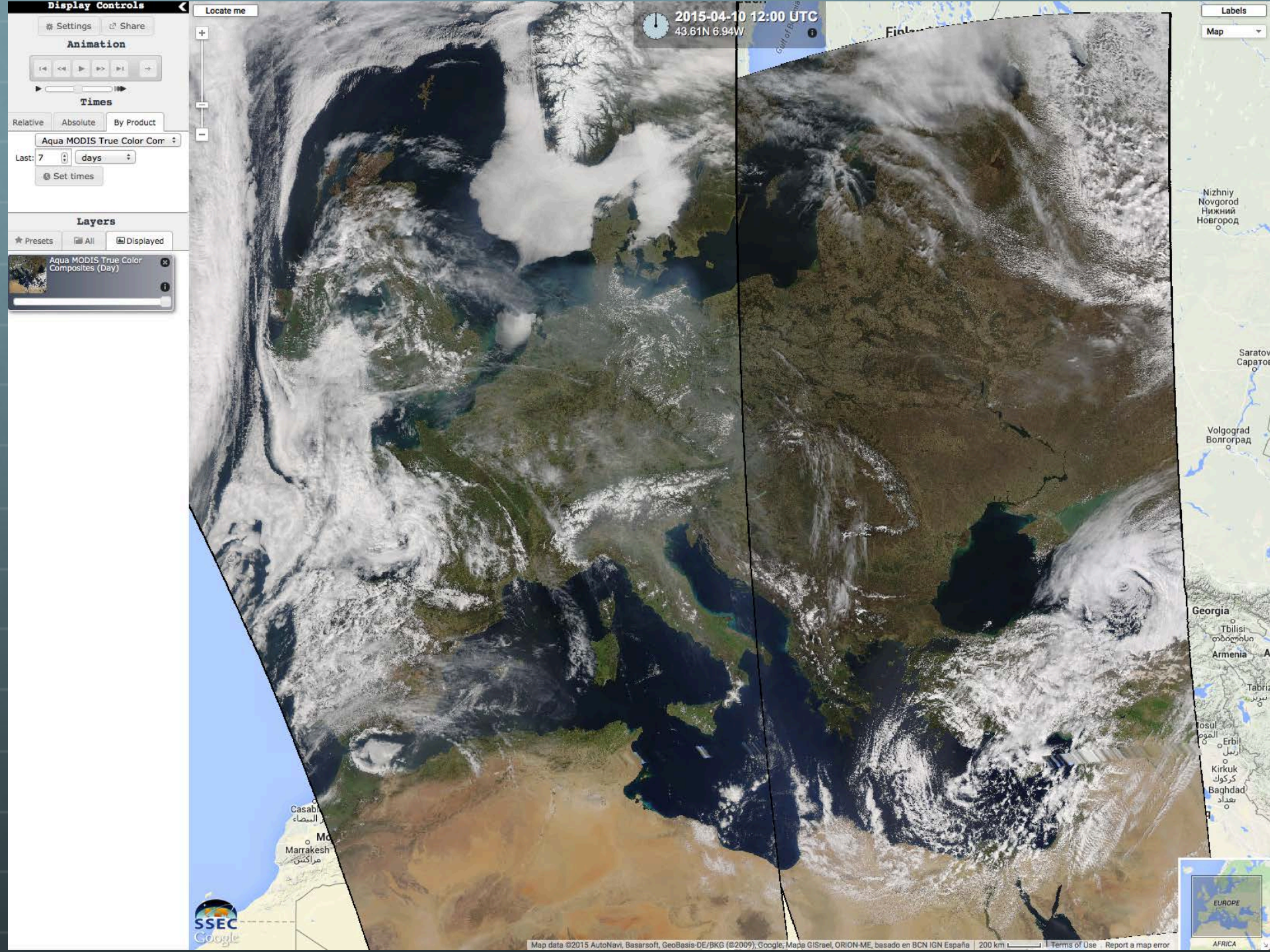
Map data ©2015 Basarsoft, Google, Inav/Geosistemas SRL, ORION-ME, ZENRIN
500 km


Display Controls
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days
Set times
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Presets
All
Displayed
Aqua MODIS True Color Composites (Day)
Locate me
2015-04-10 12:00 UTC
43.61N 6.94W
Labels
Map
Nizhniy Novgorod
Нижний Новгород
Volgograd
Волгоград
Georgia
Tbilisi
Armenia
Erbil
Kirkuk
Baghdad
Marrakesh
مراكش
SSEC
Google
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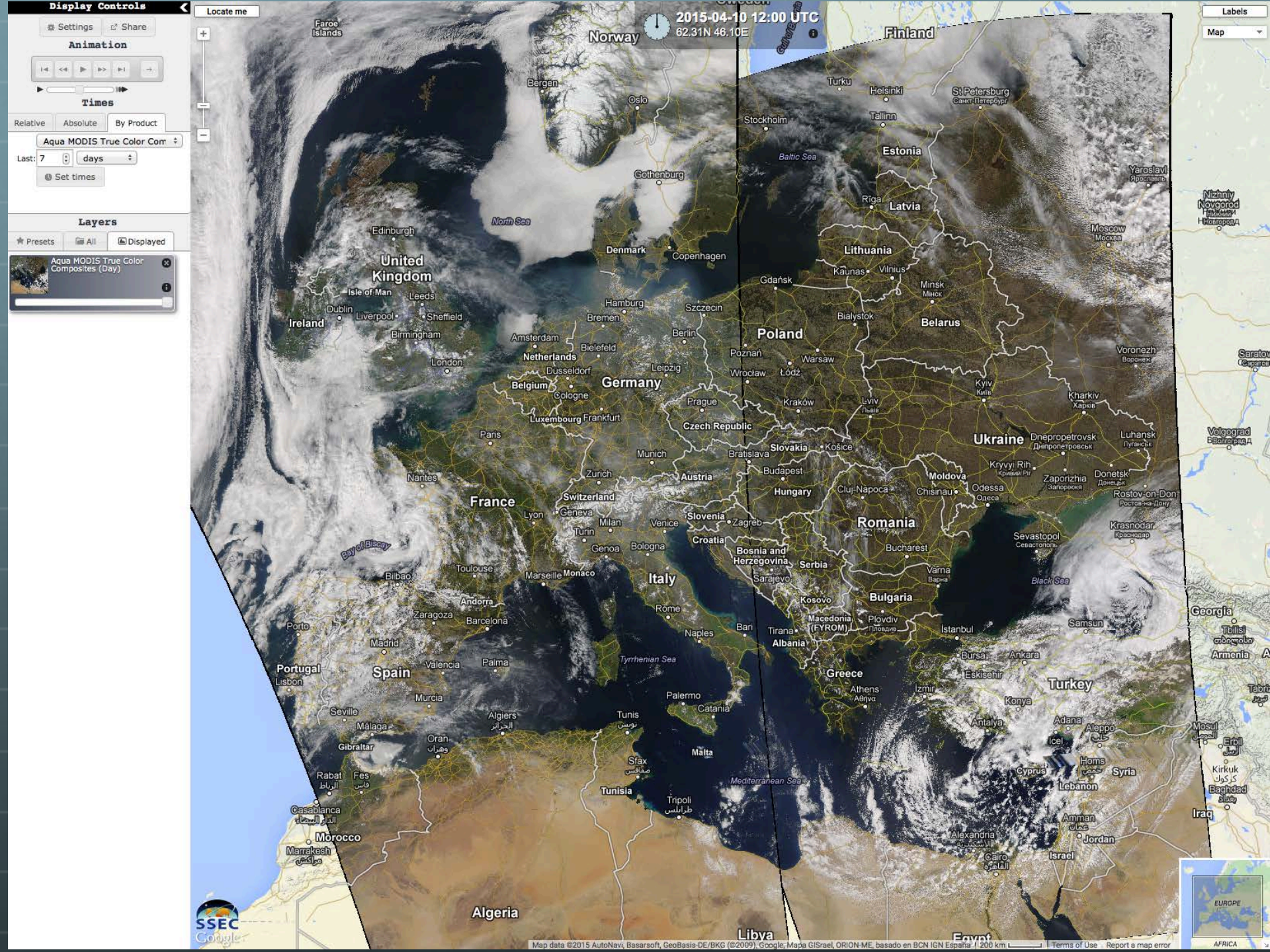
200 km
Terms of Use
Report a map error
EUROPE
AFRICA


Display Controls
Settings
Share
Animation
Times
Relative
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By Product
Aqua MODIS True Color Com
Last: 7
days
Set times
Layers
Presets
All
Displayed
Aqua MODIS True Color Composites (Day)
Locate me
2015-04-10 12:00 UTC
62.31N 46.10E
Labels
Map
Faroe Islands
Norway
Finland
Bergen
Oslo
Turku
Helsinki
St.Petersburg
Stockholm
Tallinn
Estonia
Baltic Sea
Gothenburg
Riga
Latvia
Yaroslavl
Nizhniy Novgorod
North Sea
Edinburgh
United Kingdom
Denmark
Copenhagen
Moscow
Lithuania
Kaunas
Vilnius
Gdańsk
Minsk
Isle of Man
Leeds
Hamburg
Szczecin
Dublin
Liverpool
Sheffield
Bremen
Bialystok
Belarus
Ireland
Birmingham
Amsterdam
Berlin
Poland
Bielefeld
Poznań
Warsaw
Voronezh
Netherlands
London
Düsseldorf
Leipzig
Wrocław
Łódź
Belgium
Germany
Cologne
Kyiv
Kharkiv
Prague
Kraków
Lviv
Luxembourg
Frankfurt
Czech Republic
Paris
Ukraine
Dnepropetrovsk
Luhansk
Slovakia
Košice
Munich
Bratislava
Kryvyi Rih
Nantes
Zurich
Austria
Budapest
Moldova
Zaporizhia
Donetsk
Hungary
Cluj-Napoca
Chisinau
Odessa
Rostov-on-Don
France
Switzerland
Lyon
Geneva
Slovenia
Zagreb
Milan
Venice
Romania
Turin
Krasnodar
Sevastopol
Croatia
Genoa
Bologna
Bucharest
Bosnia and Herzegovina
Serbia
Bay of Biscay
Toulouse
Bilbao
Marseille
Monaco
Italy
Varna
Sarajevo
Black Sea
Andorra
Kosovo
Bulgaria
Rome
Zaragoza
Macedonia (FYROM)
Plovdiv
Georgia
Porto
Barcelona
Naples
Bari
Tirana
Istanbul
Samsun
Madrid
Albania
Armenia
Tyrrhenian Sea
Portugal
Spain
Valencia
Palma
Bursa
Ankara
Lisbon
Greece
Eskisehir
Turkey
Izmir
Murcia
Palermo
Catania
Konya
Seville
Algiers
Tunis
Antalya
Adana
Aleppo
Málaga
Icel
Mosul
Gibraltar
Oran
Malta
Erbil
Homs
Kirkuk
Cyprus
Syria
Rabat
Fes
Sfax
Mediterranean Sea
Lebanon
Baghdad
Tunisia
Tripoli
Casablanca
Iraq
Amman
Morocco
Jordan
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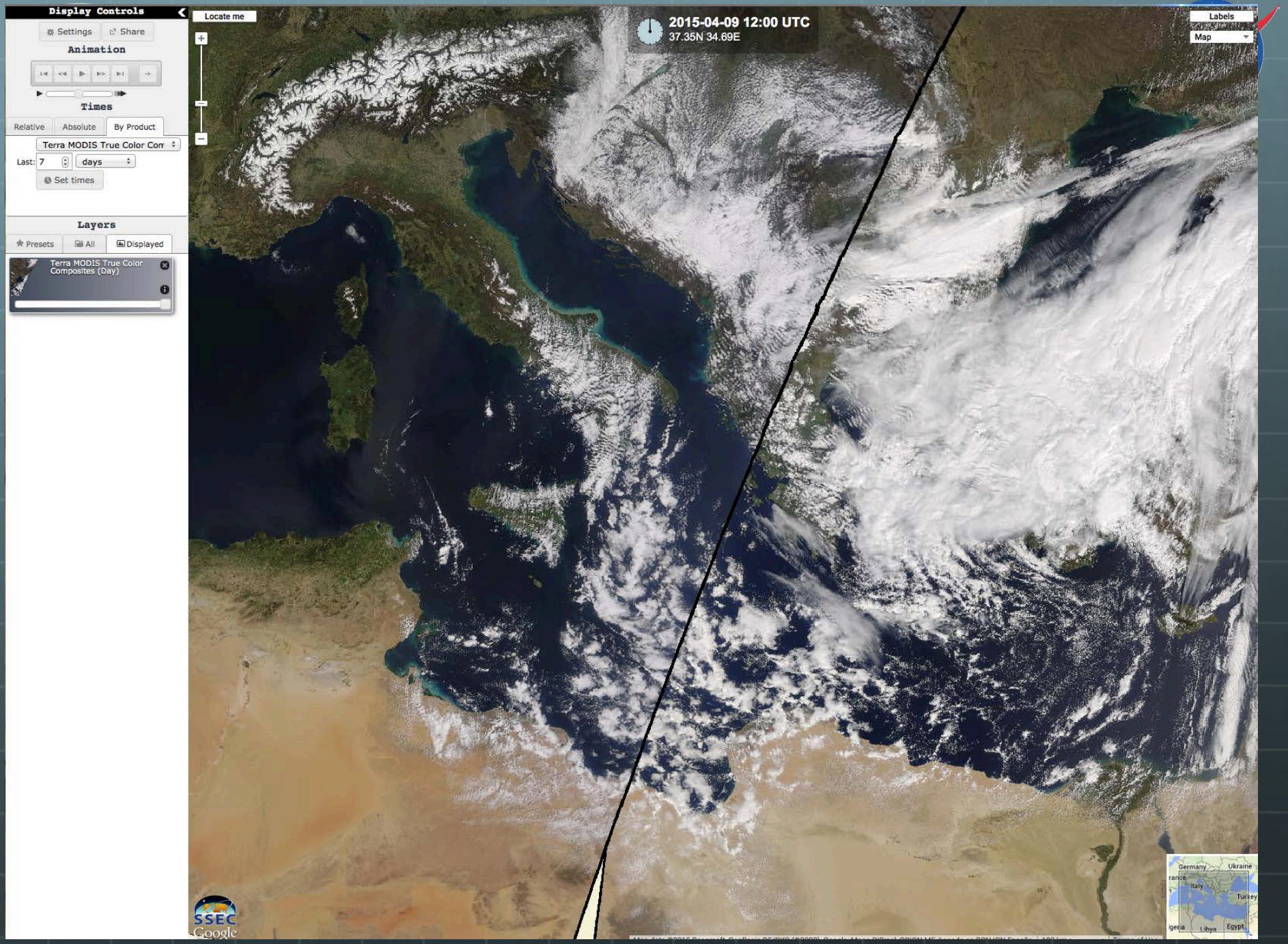
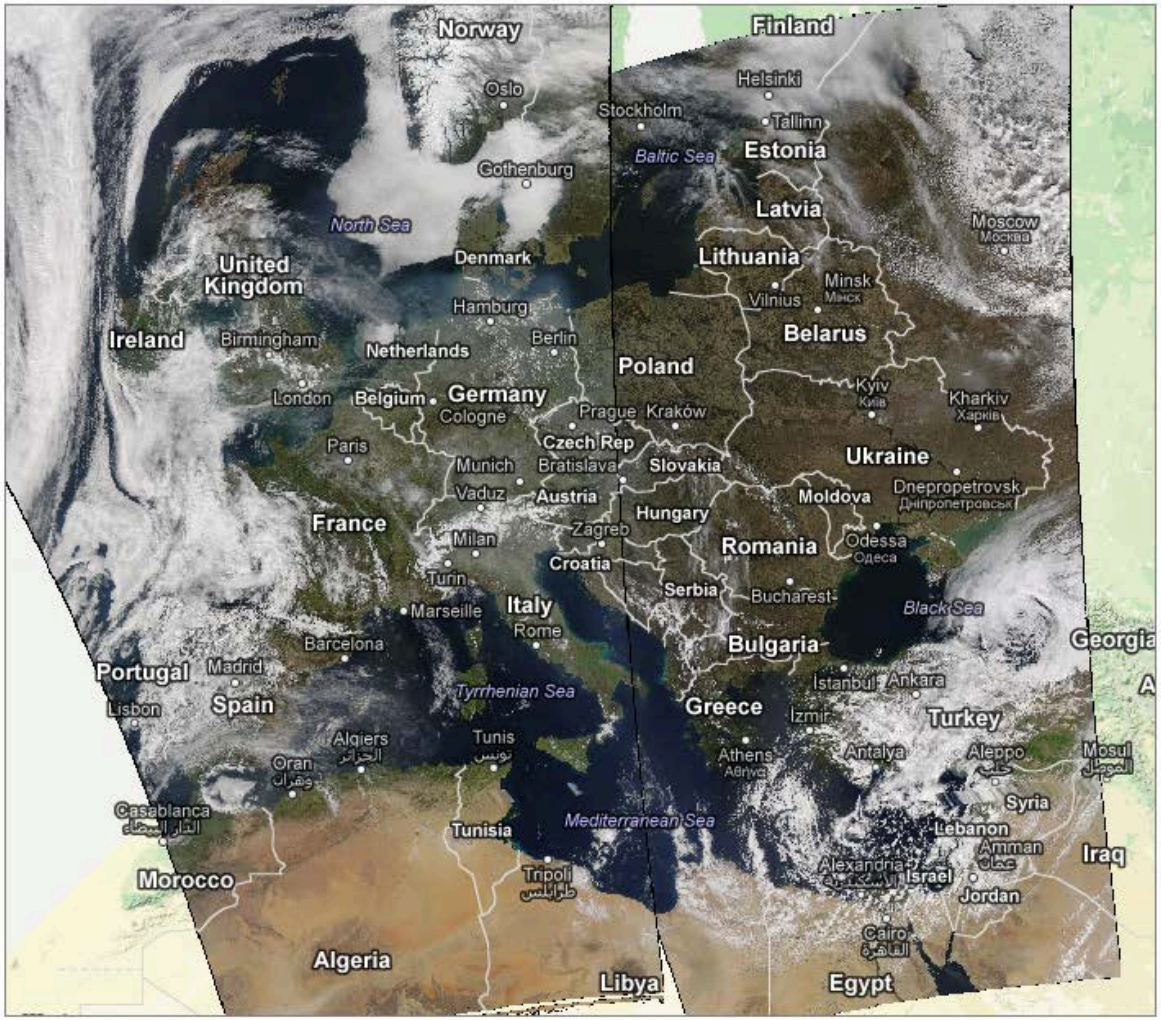
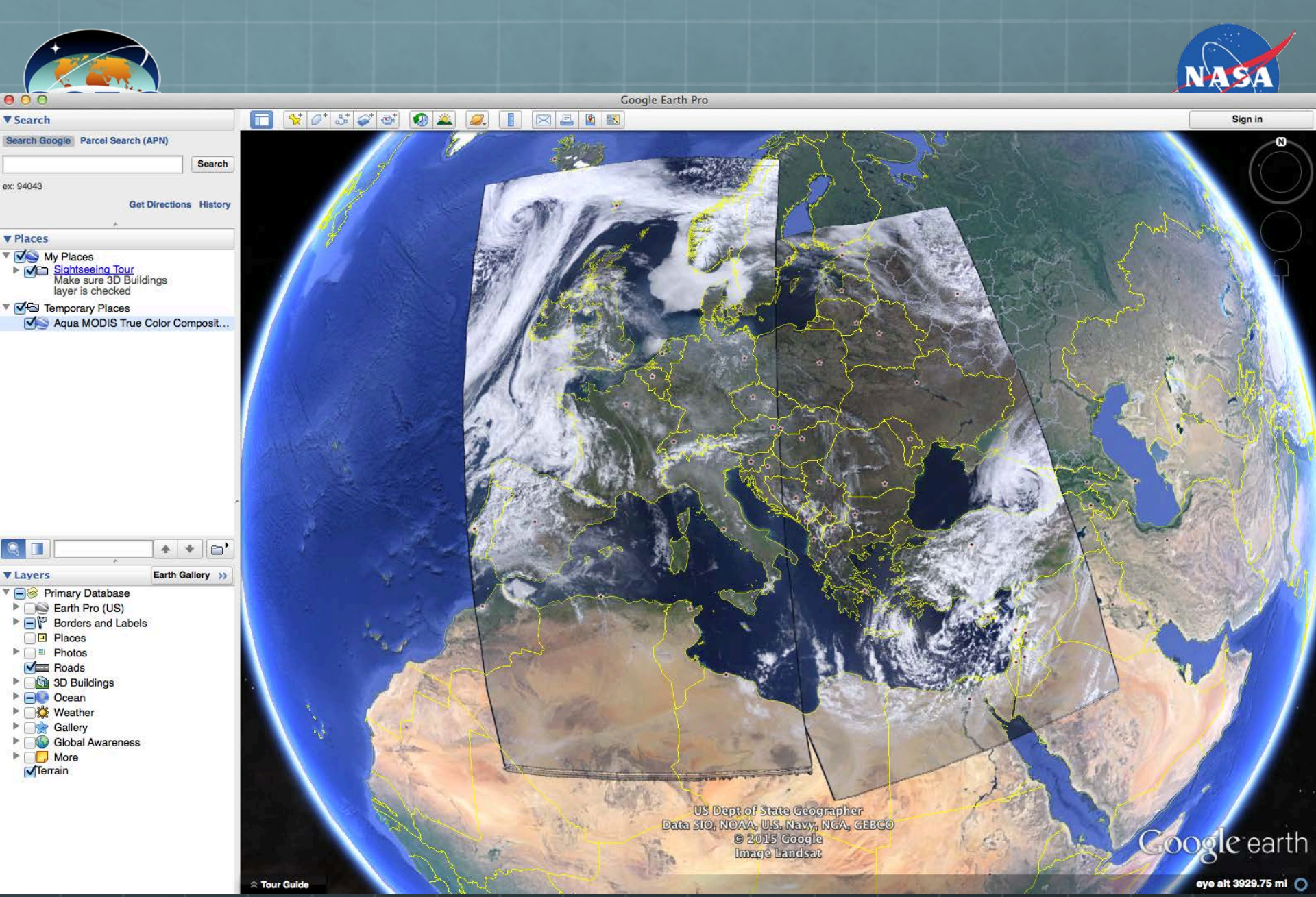

Display Controls
Settings
Share
Animation
Times
Relative
Absolute
By Product
Terra MODIS True Color Com
Last: 7
days
Set times
Layers
Presets
All
Displayed
Terra MODIS True Color Composites (Day)
Locate me
2015-04-09 12:00 UTC
37.35N 34.69E
Labels
Map
SSEC
Google
Germany
Ukraine
Italy
Turkey
Libya
Egypt

Share Display

Aqua MODIS True Color Composites (Day)
Last 6 hours

Google Maps	Web link http://regcm.elte.hu:8001/s/Gmd
Google Earth	KML link *(Aqua MODIS True Color Composites (Day))*
THREDDS Catalog	THREDDS catalog
Social	
Image	Static Animated





Share files for display in Google Earth

HYDRA2

- Allows interactive display of Level 1B and Level 2 products from multispectral imagers (VIIRS, MODIS, AVHRR), high spectral resolution sounders (CrIS, IASI, AIRS), and microwave sounders (ATMS, AMSU).
- Different data sets can be collocated, compared, combined, and masked.
- Designed to be easy to learn and use, especially for students.
- Supported on Windows, OS X, and Linux.
- Tool used for direct broadcast workshops
- Created by Paul Menzel and Tom Rink.

HYDRA2 – A Multispectral Data Analysis Toolkit for sensors on Suomi NPP and other current satellite platforms

Accepted for publication in BAMS

HYDRA-2 Version 3.5 Coming Soon

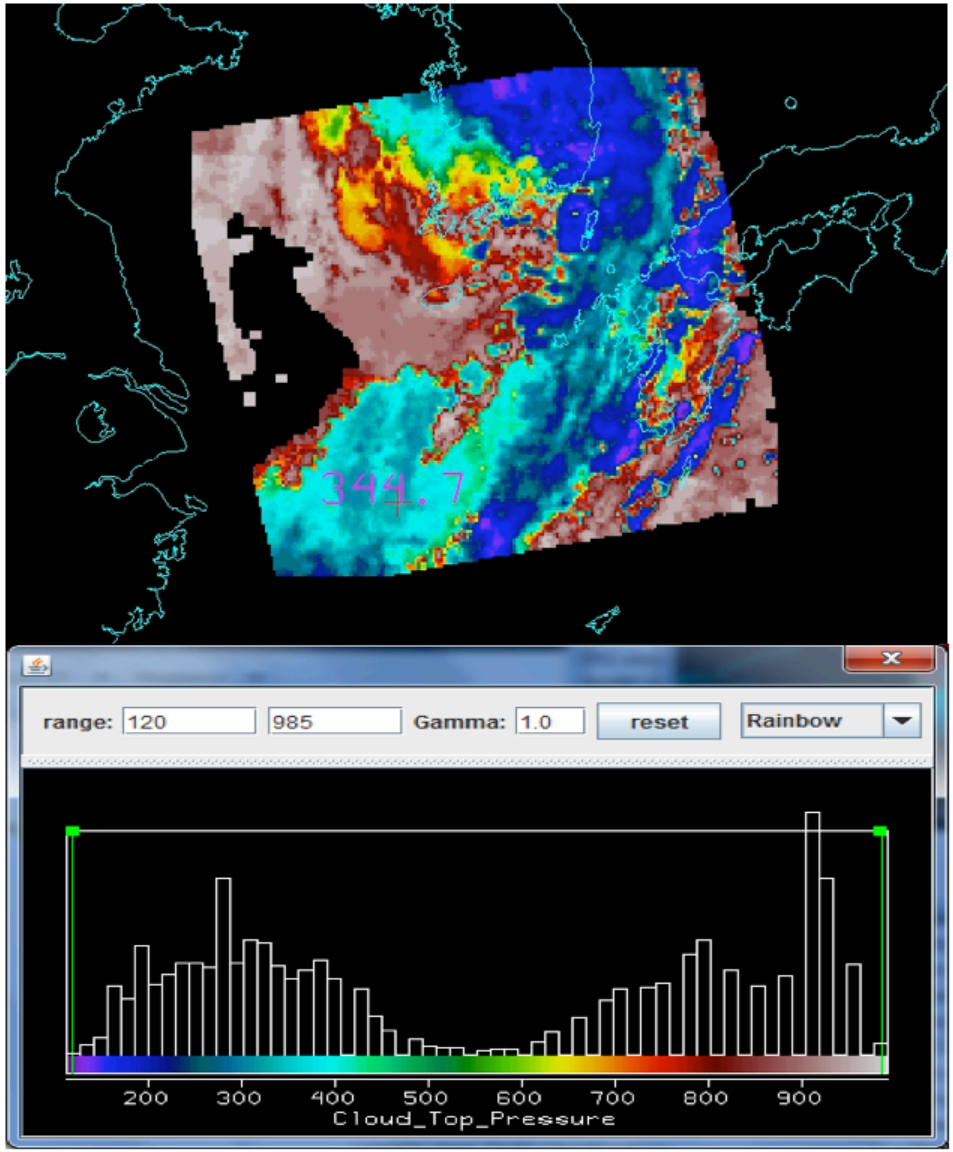


Figure 8: (Top) Derived image product of Aqua MODIS cloud top pressure levels (in hPa) from the MODIS Level 2 (MOD06) cloud properties for 30 August 2012 at 440 UTC. (Bottom) Corresponding histogram and color code of cloud top pressure levels within the entire image and associated color bar.

Future Plans

NASA Funding through mid-2017

Coming Soon:

- HYDRA2 Version 3.5
  - Paper accepted for BAMS publication
- AIRS L1 and L2 Jet Propulsion Lab (JPL)
  - Collect 6 Software for Direct Broadcast
- Aviation Hazard Products (in GEOCAT)
  - Fog/Low Cloud Software – Provided by Mike Pavolonis, NOAA
  - Visibility Product – Provided by Brad Pierce, NOAA
- Update to the Web Mapping Service software
  - Improved interface – easier and faster.
- Update to BRDF package – with Crystal Schaaf
- Replacement for DBCRAS NWP
  - Working on WRF distribution that assimilates IMAPP MODIS L2 products