



About NexSat



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Approved for public release by: Superintendent NRL Monterey
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1) Basic Description

NexSat – “NRL **N**ext-Generation Weather **S**atellite Demonstration Project” - is a public-accessible weather satellite website developed and maintained by the Naval Research Laboratory in Monterey CA (NRL), in partnership with the Cooperative Institute of Research in the Atmosphere (CIRA) in Fort Collins, CO and sponsored by the Joint Polar Satellite System (JPSS), formerly the National Polar-orbiting Environmental Satellite System Integrated Program Office (NPOESS IPO). NexSat started in 2003 as a demonstration of the potential sensing capabilities of the upcoming [Visible/Infrared Imager Radiometer Suite \(VIIRS\)](#) sensor over the continental US (CONUS) region. The VIIRS sensor within the NPOESS Preparatory Program (NPP) satellite platform is currently scheduled for an October 28, 2011 launch.

Since 2003, NexSat has evolved as a global scale “one-stop shop” of remotely sensed environmental image products, derived from near real time polar-orbiting and geostationary sensors. Currently, NexSat displays derived products from a suite of 37 sensors. Numerical Weather Prediction (NWP) model output from the Navy’s global NOGAPS are also overlaid onto image products. The NexSat product suite consists of the following:

Polar orbiting imagers (heritage sensors to the VIIRS):

Imagers:

- [Advanced Very High Resolution Radiometer \(AVHRR\)](#)
- [Moderate Resolution Imaging Spectroradiometer \(MODIS\)](#)
- [Operational Linescan System \(OLS\)](#)

Additional polar orbiting sensors:

- [CloudSat Cloud Profiling Radar \(CPR\)](#)
- [Advanced Scatterometer \(ASCAT\)](#)

Surface wind sensors:

- [WindSat](#)
- [ASCAT](#)

Precipitation sensor:

- [Tropical Rainfall Measuring Mission \(TRMM\)](#)

Geostationary satellites sensors:

- [Geostationary Operational Environmental Satellites \(GOES\)](#)
- [Multifunctional Transport Satellites \(MTSAT\)](#)
- [METEOSAT](#)

Model Overlay

- [U. S. Navy's Operational Global Atmospheric Prediction System \(NOGAPS\)](#)

The NexSat “products suite” is categorized in Table 1.

 <h1 style="display: inline;">NexSat Product Catalog</h1> 																																													
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Table 1. Catalog of NexSat products.

The products are divided into 4 sections: standard, cloud, and environmental products, along with Numerical Weather Prediction (NWP) model overlays. Once available, VIIRS data will join the heritage sensors listed above to provide a new generation of high quality products. The associated VIIRS-derived products are listed in red.

The NexSat home page in Figure 1 illustrates the global coverage that includes the following regions (from left to right in Figure 1 below):

- North Pacific Ocean (green box)
- Hawaii (orange box)
- North East Pacific Ocean
- North America (yellow box)
- Continental US – CONUS (red box)
- Central America (white box)
- South America (cyan box)
- Europe (blue box)
- Africa (orange box)
- Indonesia (yellow box)
- North West Pacific (cyan box)
- Japan (red box)
- Australia (purple box)

In the lower left corner of the website are selections for active volcanoes as well as close ups for a number of cities throughout the world.

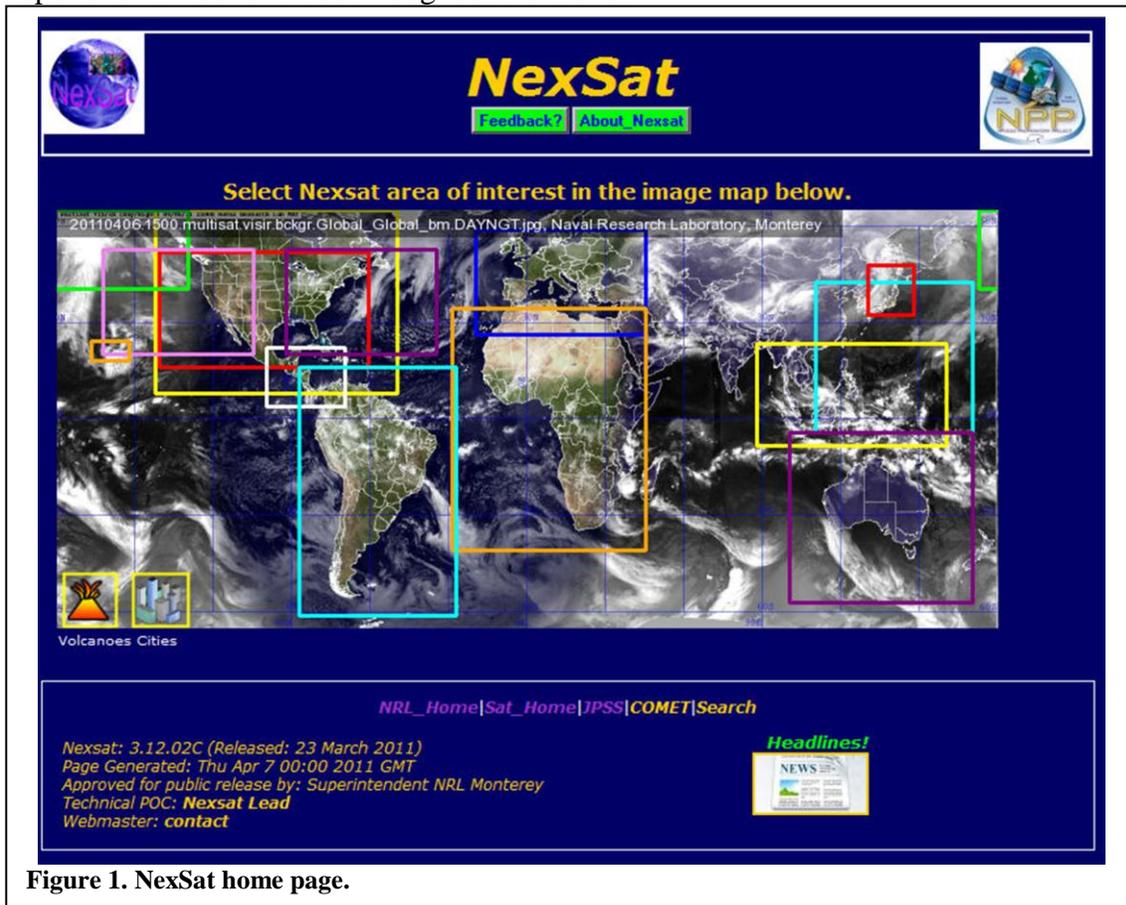


Figure 1. NexSat home page.

2) Navigating the NexSat website

Let's assume the user wishes to get to the latest MODIS IR display over Northwest Africa. Figures 2a and b below illustrate the seven step procedure:

Refer to Steps 1 through 4 in Figure 2a below.

- Step 1: Start from the NexSat home page: www.nrlmry.navy.mil/NEXSAT.html.
- Step 2: Select domain of interest (see yellow arrow). A red transparency over the box will guide the user in the selection process.
- Step 3: A suite of 3 Africa domains will appear. Select the Northwest Africa box (see yellow arrow).
- Step 4: A GEO-color display of the latest image over NW Africa appears. Mouse over the products selection in the left column.

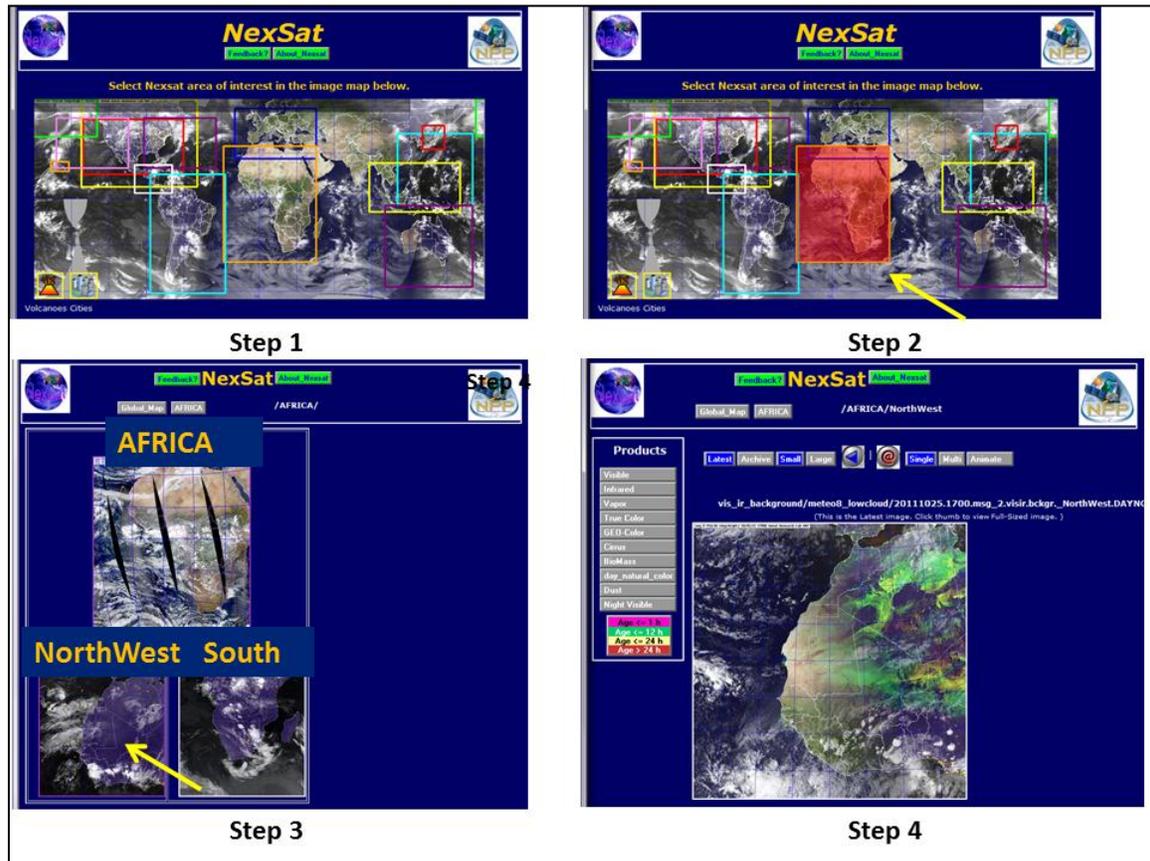


Figure 2a. Steps 1 - 4 as described within "Navigating the NexSat website".

Refer to steps 5 through 7 in Figure 2b below.

- Step 5: As you mouse over the product “Infrared” (see yellow arrow), two sensor selections appear: modis_composite and ols. Select modis_composite by clicking the left button.
- Step 6: An IR composite of the latest MODIS passes over NW Africa appears. With the mouse, click anywhere (see yellow arrow) within the image to obtain the large view.
- Step 7: The final product: a large IR view over NW Africa.

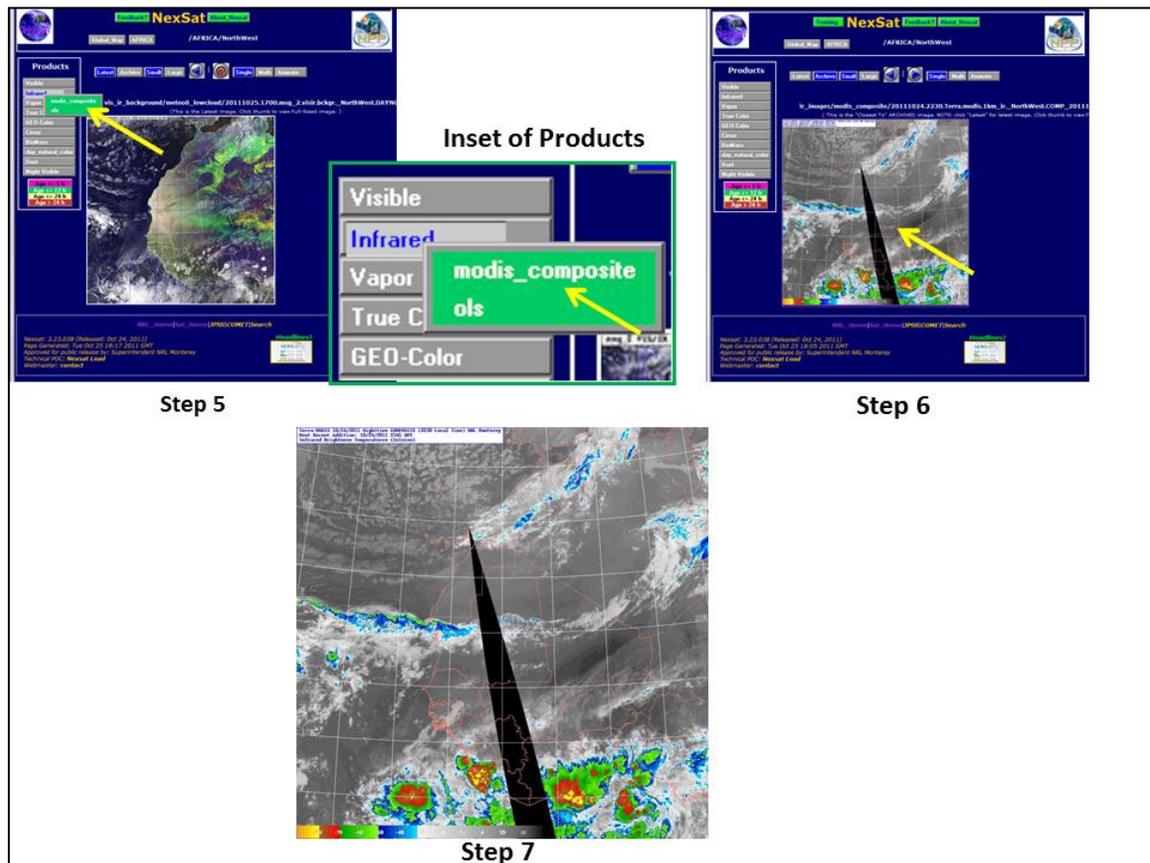


Figure 2b. Continuation of Figure 2a. Steps 5 - 7 as described within "Navigating the NexSat website".

Once the user arrives at the product suite (Fig. 2b, Step 5), there is a color legend box below the products that depicts a traffic light pattern and pink rectangles (Fig. 3). The legend represents product latency – time between the satellite pass and the creation of the latest product on NexSat. As the user “mouses over” the Infrared button, three color-coded products emerge: modis_composite, ols, and meteosat-8 (meteo8). The top two products are highlighted in green, indicating that these products are less than 12 hours old. The last product is highlighted in magenta, or less than one hour old, i.e., near real time. Ideally, the goal is to display the latest products within the “green” or “magenta”

zones. On the other extreme, latest products within the red (> 24 hours old) usually alert users and developers about potential problems for this product set (e.g., missing satellite passes).

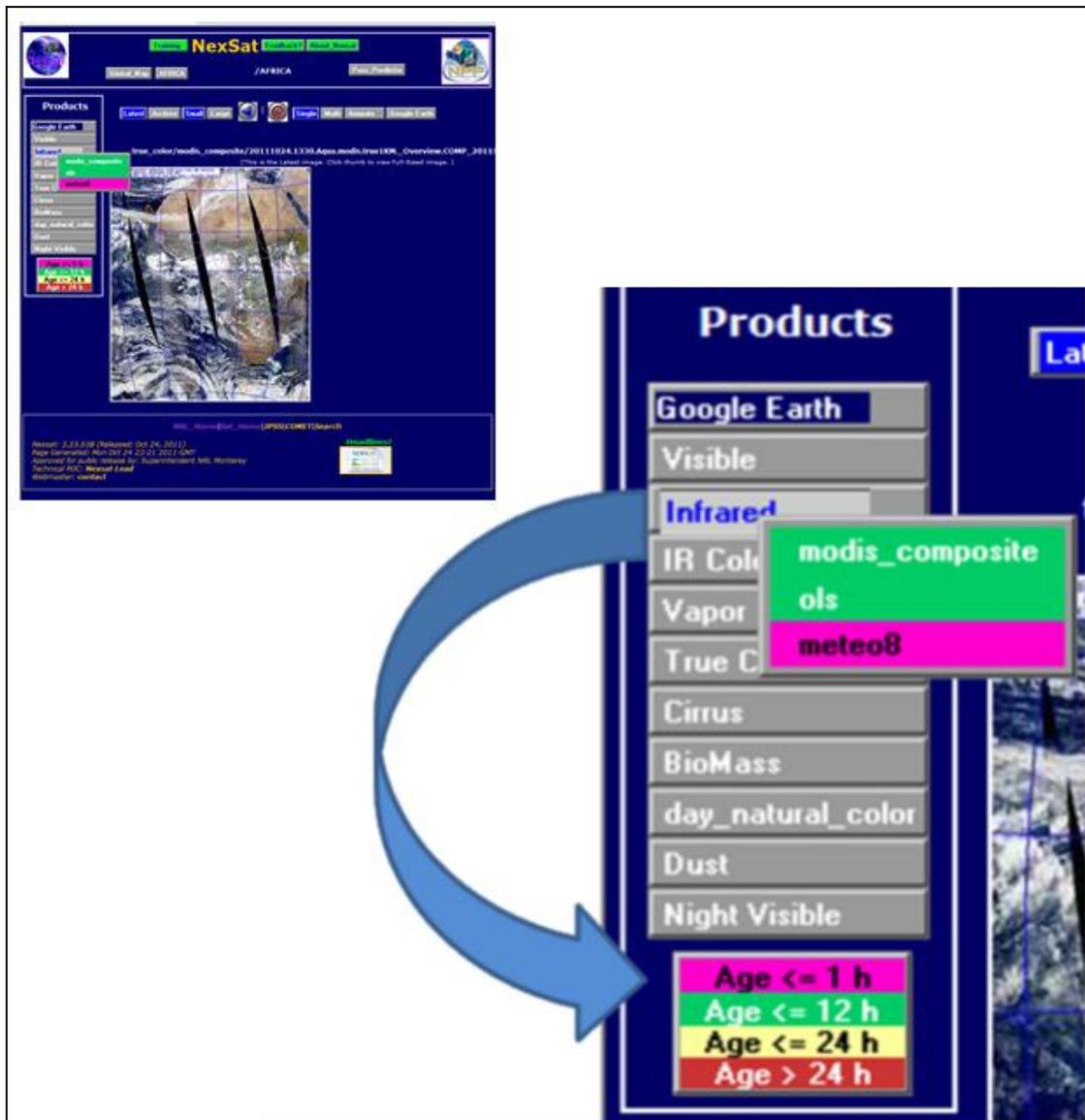


Figure 3. NexSat view over Africa (upper left) and corresponding inset highlighting the product latency (color bar) legend.

3) NexSat datasets and contributing agencies

- MODIS
 - LANCE-MODIS at [NASA \(Goddard Space Flight Center\)](#)
 - [Space Science and Engineering Center \(SSEC\)](#) at the University of Wisconsin's Cooperative Institute for Meteorological Satellite Studies (CIMSS)
- Defense Meteorological Satellites Program (DMSP)

- [Air Force Weather Agency \(AFWA\)](#) via Fleet Numerical Meteorology and Oceanography Center (FNMOC)
- AVHRR
 - [NOAA Comprehensive Large Array-Data Stewardship System \(CLASS\)](#)
- GOES (East and West)
 - [Direct GVAR capture](#) at the Naval Research Laboratory (NRL) in Monterey, CA
- CloudSat
 - [CloudSat Data Processing Center](#) at the Cooperative Institute for Research in the Atmosphere (CIRA)
- NexSat "Geo-Color" product
 - Background image scenes supplied by NASA's Earth Observatory team and NOAA's [National Geophysical Data Center \(NGDC\)](#)
- Current/Forecast Icing Product (CIF)
 - [The National Center for Atmospheric Research \(NCAR\)](#)
- Cloud tracked Wind Products
 - [The Cooperative Institute for Meteorological Satellite Studies \(CIMSS\)](#)

4) References and Training Resources

a) The following publications are available for NexSat and the VIIRS sensor:

- Miller, S.D., J.D. Hawkins, J. Kent, F.J. Turk, T.F. Lee, A.P. Kuciauskas, K. Richardson, R. Wade and C. Hoffman, NexSat: Previewing NPOESS/VIIRS imagery capabilities. Bulletin of the American Meteorological Society, 87 4 (2006), pp. 433–446.
- Lee, T., S. Miller, C. Schueler, S. Miller, NASA MODIS previews NPOESS VIIRS capabilities, Weather and Forecasting, 21 4 (2006), pp. 649-655.

b) For training on NexSat and VIIRS, the user is encouraged to access the following training modules via collaborative efforts with the COMET[®] MetEd resource: www.meted.ucar.edu (free registration)

MetEd topic titles of interest:

- [NexSat: Preparing Users for the NPOESS/VIIRS Era \(2005\)](#)
- [Imaging with NPOESS VIIRS: A Convergence of Technology and Experience \(2004\)](#)

5) Disclaimer

This is an official U.S. Navy Website. Please see complete notice and disclaimer here. (URL link)

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