15 Free Satellite Imagery Eyes from the Sky

1. USGS Earth Explorer – Unlock the Power of Landsat and More

Whether you live in the United States, in the Arctic circle or an obscure country like Transnistria, we can all appreciate the abu ndance of data the USGS Earth Explorer has to offer.

We've relentlessly hyped USGS Earth Explorer here, here and here… .and we're about to do it again…

From no data to hyperspectral data, USGS is the **undisputed world champion** of free satellite data providers . Here's why:

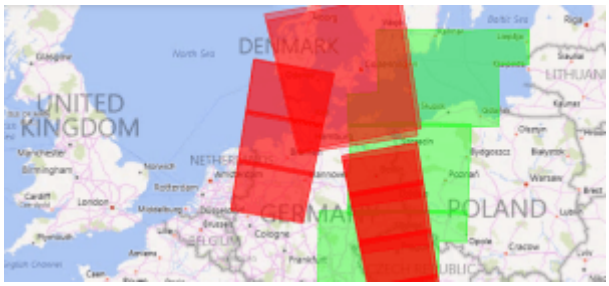
- Access to Landsat satellite data – a legacy that goes unmatched. 40-years o f history of our Earth with consistent spectral bands.
- Vertically position yourself with NASA's ASTER and Shuttle Radar Topography Missions global Digital Elevation Models.
- Gain full access to NASA's Land Data Products and Services including Hyperion's hyperspectral data, MODIS & AVHRR land surface reflectance and disperse Radar data.

We sound like a broken record. But USGS Earth Explorer is a world class source of free satellite data. Regardless where you live, you NEED to look at the USGS Earth Explorer.

Download Landsat Data: How to Download Free Landsat Imagery from the USGS Earth Explorer

2. ESA's Sentinel Mission – New Leader in Free High Resolution Data?

https://scihub.copernicus.eu/



Sentinels Scientific Data Hub is the official download headqu arters for the European Space Agency's Sentinel satellite data. But the question is: Is ESA's sentinel satellites a worthy altern ative to Landsat? I'd say yes… but without the long-lasting le gacy. Here's why:

- Sentinel-2a and 2b have **crisper spatial resolution** (10 meters in the visible and near-infrared). **More spectral bands** (12 in total). And most important of all, it's free satellite imagery for the masses.
- Add Sentinel-1 into the equation. Now, you have C-band Synthetic Aperture Radar of the entire world at your fingertips. Simply put, Sentinel satellites give you high quality passive and active data of the entire Earth.

https://sentinels.copernicus.eu/web/sentinel/home

Read more: What's the Difference Between Active and Passive?

> In the last year or so, ESA's Sentinel 2A has **dethroned Landsat as the undisputed world champi on** of free high spatial resolution satellite data. Bold statement? SAR-C from Sentinel-1. Add the 12 spectral bands from Sentinel 2A. It's not such a bold statement, after all.

ESA's Copernicus Programme is the start of a new and exciting era for the remote sensing community. They will launch 5 more Earth observing satellites along with the Sentinel-2 Toolbox for processing and analyzing Sentinel data and imagery

http://step.esa.int/main/download/

You're wise to take a look at the sharpest, free satellite imagery source available from the European Space Agency.

Download Sentinel Data: How to Download Free Satellite Data (Sentinel-1 and 2A) from the Sentinel Science Data Hub

3. NOAA CLASS – An Ocean of Free Satellite Data

Set sails.

Because NOAA will take you on a journey to fistfuls of **free high quality atmospheric data sets** (and more).

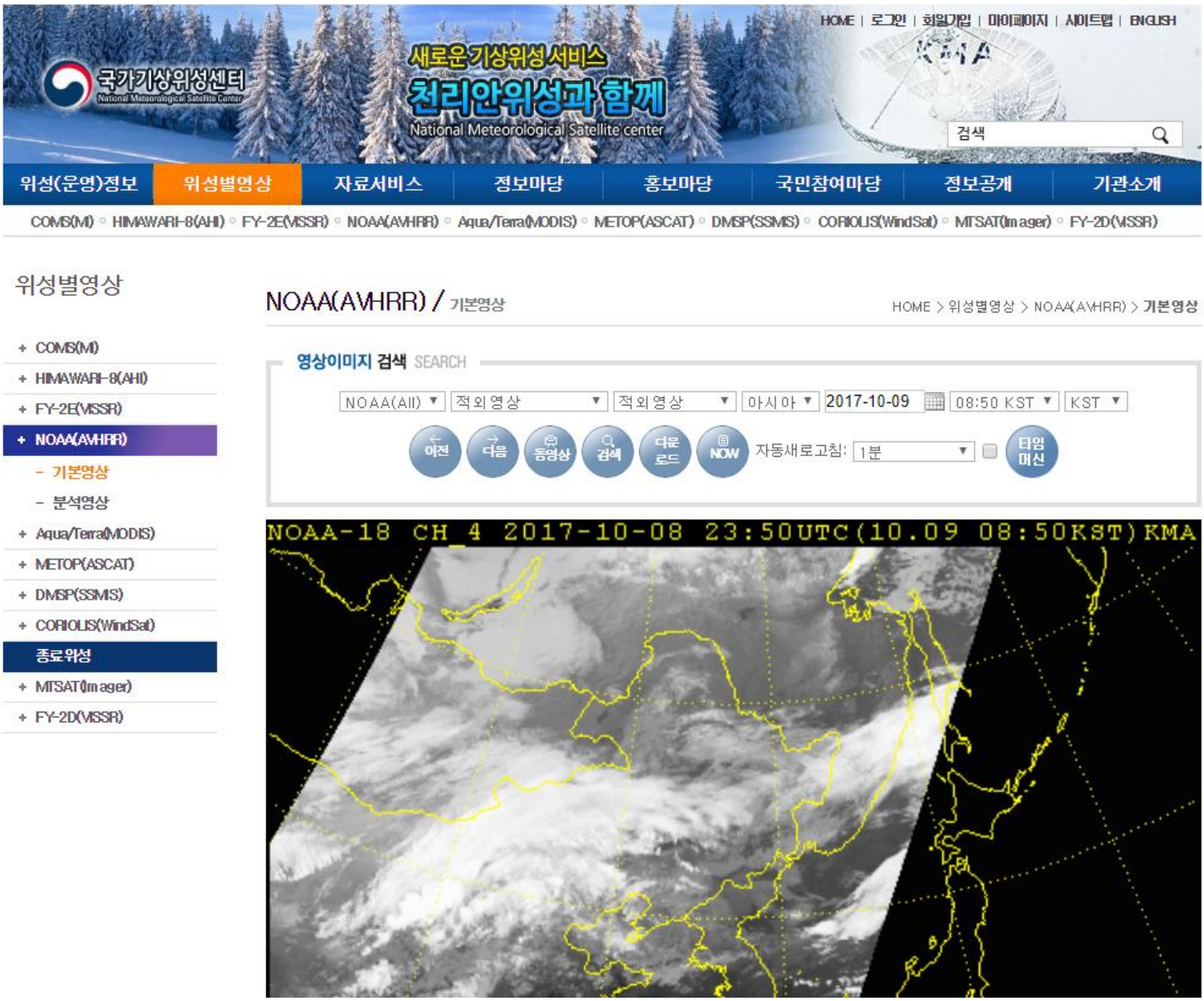
https://www.satimagingcorp.com/satellite-sensors/other-satellite-sensors/sentinel-2a/

Sentinel-2A Satellite Sensor Specifications

Sentinel-2A launch	June 2015, by Vega from Kourou, French Guiana
Sentinel-2B launch	July 2016, by Rockot from Plesetsk, Russia
Orbit	Sun-synchronous at altitude 786 km, Mean Local Solar Time at descending node: 10:30 (optimum Sun illumination for image acquisition)
Geometric revisit time	Five days from two-satellite constellation (at equator)
Design life	Seven years (carries consumable for 12 years: 123 kg of fuel including end of life deorbiting)
MSI (Multispectral Imager)	MSI covering 13 spectral bands (443–2190 nm), with a swath width of 290 km and a spatial resolution of 10 m (four visible and near-infrared bands), 20 m (six red edge and shortwave infrared bands) and 60 m (three atmospheric correction bands).

Sentinel-2 Bands	Central Wavelength (µm)	Resolution (m)
Band 1 - Coastal aerosol	0.443	60
Band 2 - Blue	0.490	10
Band 3 - Green	0.560	10
Band 4 - Red	0.665	10
Band 5 - Vegetation Red Edge	0.705	20
Band 6 - Vegetation Red Edge	0.740	20
Band 7 - Vegetation Red Edge	0.783	20
Band 8 - NIR	0.842	10
Band 8A - Vegetation Red Edge	0.865	20
Band 9 - Water vapour	0.945	60
Band 10 - SWIR - Cirrus	1.375	60
Band 11 - SWIR	1.610	20
Band 12 - SWIR	2.190	20

http://nmsc.kma.go.kr/html/homepage/ko/satellite/searchSatelliteImageN.do?data_type=1077

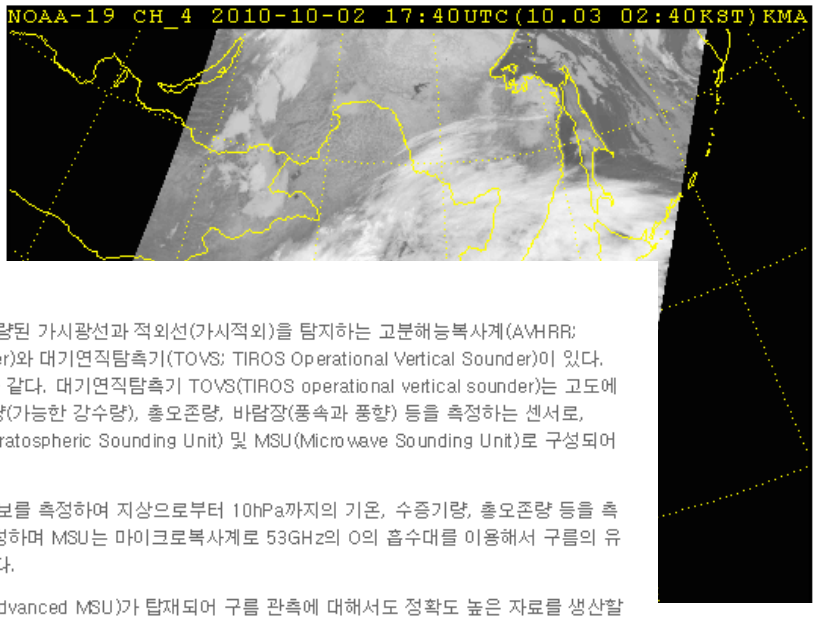


◘ 극궤도 기상위성의 특징

극궤도기상위성은 남극과 북극을 오가며 지구 주위를 공전한다. 극궤도기상위성은 1960년에 제1호기 TIROS- I 이 발사된 이래 세계에서 널리 이용되고 있다. 약 36000km의 고도를 가지는 기상이나 통신목적의 정지궤도위성과는 달리 궤도 높이가 1/30~1/40으로 낮기 때문에 보다 자세하게 기상을 관측할 수 있다. 따라서 이러한 위성을 이용하여 고도에 따른 기온분포나 신호가 아주 약한 마이크로파복사 등도 측정가능하다. 하지만 대략 지구를 1회 공전하는데 대략 100분이 소요되어 하루에 두 번 같은 장소를 관측함으로써, 정지위성이 하고 있는 변화가 심한 기상변화의 추적, 연속관측에 의한 구름의 움직임으로부터 풍향과 풍속 산출, 자료 및 방송통신 등은 불가능하다.

현재 운용되고 있는 극궤도기상위성은 미국의 TIROS-N/NOAA 시리즈와 중국의 FY-1D가 있다. TIROS-N/NOAA 위성은 1978년까지 사용되어온 TIROS-M(ITOS/NOAA) 시리즈의 차세대 극궤도위성으로써 개발된 대형 기상위성이다. 1960년에 발사된 최초의 기상위성 TIROS- I 은 원통형이었으나 제2세대인 TIROS-M(ITOS)과 제3세대인 TIROS-N 시리즈는 3축 안정방식으로 자세를 제어한다. 공전궤도주기는 101.6분으로 이 동안 지구는 25.5°자전하기 때문에, 적도에서의 궤도 간격은 약 2,840km가 된다.

NOAA 위성 영상의 수신 조건은 지상에서 위성을 올려보는 각도가 3°이상이면 수신이 가능하다. 위성의 궤도는 매일 약간씩 이동하며 하나의 위성에 대해 하루에 두 궤도의 관측으로 한정되는 경우가 많다. NOAA 위성에서 관측한 자료는 그 일부를 위성에 장착되어 있는 테이프 레코더에 기록해, 미국의 위성수신센터 상공에서 재생한다. 테이프의 용량이 한정되어 있기 때문에 모든 영상자료를 기록할 수는 없다. 또한 관측 자료는 위성으로부터 직접 방송되고 있기 때문에, 각국에서 NOAA 위성 수신소를 중심으로 수천 km 범위의 구름분포 영상과 기온을 실시간으로 수신할 수 있다. 그림 6은 NOAA-18호에서 촬영한 적외영상의 예이다.



◘ 극궤도 기상위성의 관측센서의 특징

NOAA 위성에 탑재된 기상관측용 센서는 개량된 가시광선과 적외선(가시적외)을 탐지하는 고분해능복사계(AVHRR; Advanced Very High Resolution Radiometer)와 대기연직탐측기(TOVS; TIROS Operational Vertical Sounder)이 있다. 가시적외 고분해능복사계의 특성은 표2-3과 같다. 대기연직탐측기 TOVS(TIROS operational vertical sounder)는 고도에 따른 각 기압면에서의 기온과 습도, 가강수량(가능한 강수량), 총오존량, 바람장(풍속과 풍향) 등을 측정하는 센서로, HIRS(High Resolution IR sounder), SSU(Stratospheric Sounding Unit) 및 MSU(Microwave Sounding Unit)로 구성되어 있다.

HIRS는 필터에 의해 20개 다른 파장대의 정보를 측정하여 지상으로부터 10hPa까지의 기온, 수증기량, 총오존량 등을 측정한다. SSU는 15~1hPa까지의 기온을 측정하며 MSU는 마이크로복사계로 53GHz의 O의 흡수대를 이용해서 구름의 유무에 관계없이 20hPa까지의 기온을 측정한다.

NOAA-15호부터는 MSU를 개량한 AMSU(Advanced MSU)가 탑재되어 구름 관측에 대해서도 정확도 높은 자료를 생산할 수 있다. NOAA 위성의 대기연직탐측기와 같은 기능은 MTSAT과 같은 정지기상위성에는 없는 기능이다. 주변이 바다인 우리나라의 경우NOAA 위성의 대기연직탐측기로부터 고층관측자료를 얻을 수 없는 해양에서의 유용한 기상정보를 취득할 수 있다.

센서명	파장대(μm)	거리분해능(km)	신호분해능bit(단계)	관측대상
channel 1	0.58~0.68	1.1	10(1024)	하층운, 안개 등 지표면
channel 2	0.73~1.0	1.1	10(1024)	식생, 해안선
channel 3A	1.58~1.64	1.1	10(1024)	해수면온도, 하층운
channel 3B	3.55~3.93	1.1	10(1024)	해수면온도, 하층운
channel 4	10.3~11.3	1.1	10(1024)	구름온도, 해수면온도
channel 5	11.5~12.5	1.1	10(1024)	구름온도, 해수면온도

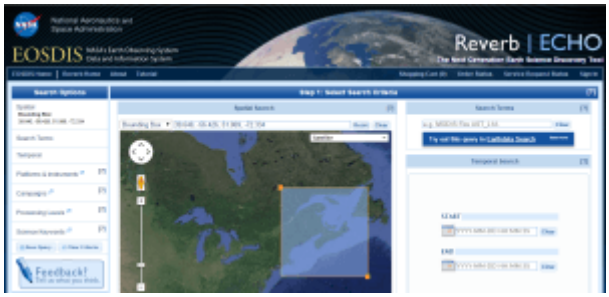
NOAA uses an online library system called the Comprehensive Large Array-data Stewardship System (CLASS) to store a plethora of environmental data. Data comes from the US Department of Defense (DoD) Polar-orbiting Operational Environmental Satellite (POES), NOAA's Geostationary Operational Environmental Satellite (GOES), and other derived data.

Currently, the NOAA National Data Centers support POES, DMSP, GOES, MetOp, Jason-2 data, and selected model reanalysis data. It will archive data collections from the NPP, JPSS (formerly NPOESS), GOES-R, Jason - 3, and planned Earth-based observing systems include NEXRAD products.

A LOT is here. But we found it a bit hard to navigate in NOAA's CLASS. The user-friendliness from the USGS Earth Explorer and Sentinel Science Data Hub simply can't be beat.

4. NASA Reverb – Satellite Data from the Masters

There's a lot to like about NASA's Reverb Data Hub.



Especially, after it's new facelift. It has a fresh new look and interface for discovering Earth Science data, NASA Reverb contends

First off – the choices of satellite data is incredible: Aqua,

Terra, Aura, TRMM, Calipso, NASA DC, JASON,

ENVISAT, ALOS, METEOSAT, GOES, ICESAT, GMS, Landsat, NIMBUS, SMAP, RADARSAT, NOAA satellites, GPS satellites, the list goes on…

Admittedly, it takes a bit of practice to navigate. There are 30 ways to narrow down your data. Our suggestion is to start with a simple search. Change the time range criteria. Narrow it down, and download your free satellite imagery.

You'll get the hang of it, after a couple of tries.

This Reverb Basic Usage Tutorial will help.

5. Earth Observation Link (EOLi) – ESA's EO Catalogue

The Earth Observation Link (EOLi) is the European Space Agency's client for Earth Observation Catalog and Ordering Services.

The EOLi is a bit dated. It's a JAVA application that you can] download to your PC. It works on any major operating system.

While slow and buggy, you can browse and preview images from Earth Observation data from Envisat, ERS, IKONOS, DMC, ALOS, SPOT, Kompsat, Proba, IRS, SCISAT.

Select your study area or add a shapefile or KMZ. Select your satellite collection with a limit of 10 to search from. Click "Search catalogue". If satellite data is available, click Append. The search results will be shown in the bottom with scene previews on the right. Select the scene you want to download, and click the order button (shopping cart).

6. National Institute for Space Research (INPE)

The partnership between Brazil and China has their own image catalog of remotely-sensed data which lets you download free satellite imagery using the INPE Image Catalog

The catalog includes satellite imagery from their own China– Brazil Earth Resources Satellite 2 and 2b (CBERS-2, CBERS- 2b). It includes satellites from the United States, the United Kingdom and the India from Aqua, CBERS, Landsat, ResourceSat, S-NPP, Terra & UK-DMC 2.

The one caveat is that the data is **specific to South America and Africa**. You'll have to create an account because each request you make will be sent to your email. You can use your English translation to translate from Portuguese.

Select your satellite and sensor. Choose a country in South America and Africa. Add it to your cart, and click "Go Ahead". From there you can download your chosen free satellite imagery from the INPE FTP site.

7. Bhuvan Indian Geo-Platform of ISRO

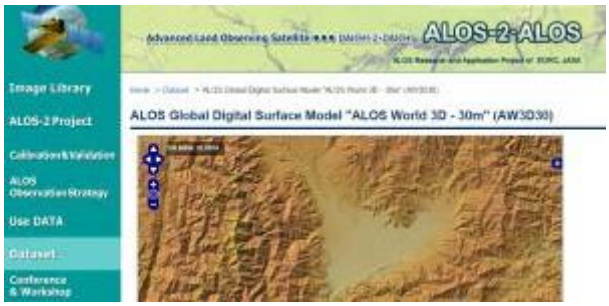
India has really made big strides in satellite remote sensing

technology. It dates back to 1998 with the launch of the Indian Remote Sensing (IRS 1A) satellite.

Now, data is available on the Bhuvan Indian Geo-Platform. The platform is well-built but most of the data is for India only. This includes IMS-1 (Hyperspectral), Cartosat, OceanSat and ResourceSat – which are all Indian satellites.

The following products are available to download outside of India – NDVI (Normalized Difference Vegetation Index) Global Coverage, CartoDem Version -3R1 for SAARC countries and Climate products for North Indian Ocean.

8. JAXA's Global ALOS 3D World

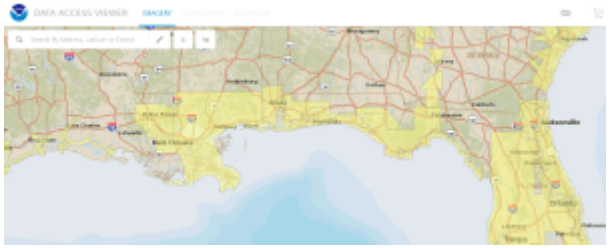


The ALOS World 3d is a 30-meter spatial resolution digital surface model (DSM) constructed by the Japan Aerospace Exploration Agency's (JAXA). Recently, this DSM has been made available to the public.

The neat thing about is that it is the **most precise global-scal e elevation data at this time** using the Advanced Land Observing Satellite "DAICHI" (ALOS) – PALSAR's L-band. JAXA's SAR mosaics is an exciting development for global elevation.

In order to obtain this highly accurate DSM, you'll have to register online through the JAXA Global ALOS portal to download it.

9. NOAA Data Access Viewer – Discover Authoritative Datasets



Once upon a time, the NOAA Aerial Photo Ordering System was the place to go for aerial photos in the United States. It's currently MIA – missing in action.

NOAA Data Access Viewer is now the place to go for imagery, land cover and elevation data. Here's where you discover authoritative datasets, customize and download the latest, greatest data – all free.

It's in beta mode now. The download speeds are slow and sluggish. There's no registration needed in beta mode

– which is its current state at this time. We'll be adjusting this write-up as all the kinks get ironed out.

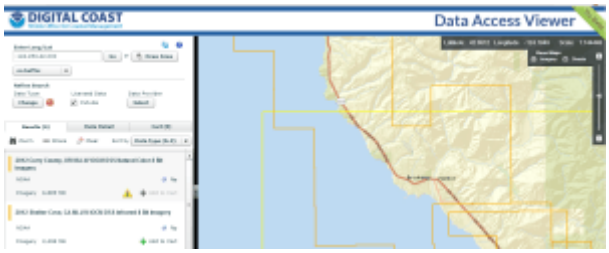
10. VITO Vision – Coarse Vegetation Data

The VITO Vision website offers PROBA-V, SPOT-Vegetation and METOP free satellite imagery. These coarse resolution satellites carves out vegetation patterns of the Earth's surface.

It takes some time and effort to create an account for VITO Vision. The interface is easy-to-use and delivers free low resolution satellite data at your fingertips.

This type of data is a good for large-scale applications that doesn't need the finer details.

11. NOAA Digital Coast – Snorkel the Seashore



It's all about the beautiful seashore, when you're exploring for data on NOAA's Digital Coast. Coastal data is all you're going to get.

To download data, select your area of interest. Define your data set to download. And sift through the results. You have benthic, elevation, imagery, land cover and socio-economic data. You get a range of free satellite imagery to choose from such as radar, infrared and true color composites.

12. Global Land Cover Facility – Derived Satellite Data

Landcover.org is your location for derived global land cover data from Landsat, MODIS and AVHRR satellite imagery.

Using Global Land Cover Facility (GLCF) land cover, research efforts can quantify land cover and land cover change around the world. This includes vegetation, geologic, agriculture, hydrologic and urban areas on the Earth's surface.

We have never had this good of a perspective of our changing

planet because of satellite imagery. Some of the biggest challenges that our planet faces can be better understood because remote sensing cover that much ground.

13. DigitalGlobe Free Product Samples

DigitalGlobe is the THE largest commercial satellite data supplier in the world… If you want to play with some of the sharpest satellite data in the world, these free satellite imagery samples are just for you.

You can **almost see license plates** with the 30 cm spatial resolution data from the newly launched WorldView-3 satellite.

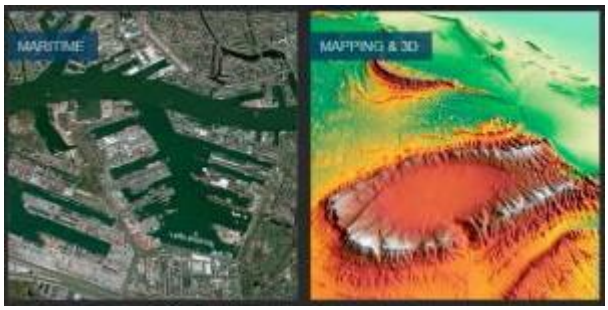
The spectacular Advanced Elevation Series shines in fields such as exploration, engineering, land management and simulation.

Test high spatial resolution short-wave infrared (SWIR) bands and see the invisible range that can't be seen with the human eye.

DigitalGlobe always delivers on their promise on *seeing a better world.*

See DigitalGlobe's product samples and find out exactly what you are missing out on.

14. BlackBridge/Geo-Airbus – Tag Team Champions of Satellite Imagery



The BlackBridge/Geo Airbus Defense System is your provider for SPOT, Pleiades, RapidEye and TerraSAR data. Timely and accurate satellite data from these satellites are being used in a variety of fields like security, oil & gas, mining & energy, agriculture, environment and disaster mapping.

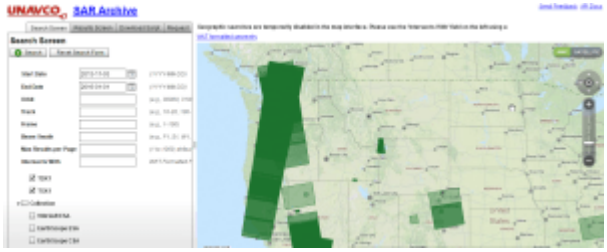
Both companies offer sample products for you to experiment with. And there's a lot to work with here, with beautiful satellite imagery of places around the world.

Just to set it straight. For Canadians, Blackbridge is for you. For the rest of the world, Geo Airbus Defense Systems is your provider for these specific satellites. There are a couple of locations to download sample data . See below:

- Airbus Defense & Space Sample Imagery Web Viewer

- Free RapidEye Data from BlackBridge A
- irbus Defense and Space Gallery Home
- Unrivaled pole-to-pole DEM for any spot on Earth

15. UNAVCO Research Data



If you don't know who UNAVCO is, here's a quick and help ful 3 minute video to learn what UNAVCO is all about – UN AVCO Explained in 3 Minutes.

University NAVSTAR Consortium (UNAVCO) is an organization of universities who support scientific research using geodesy technology. Flooding, plate tectonics, earthquakes – our world is all connected. UNAV CO promotes research by providing access to geodesy data . They do this with their own UNAVCO SAR Archive Search User Interface.

This website is flooded with Synthetic Aperture Radar satellites sources – and that's a good thing. But you'll need a username and password to get your hands on your very own SAR data. This could be a big hurdle in the process.