National Geospatial Advisory Committee – Landsat Advisory Group
Sentinel Data Use Policies

The 2015 guidance from the U.S. Geological Survey (USGS) to the National Geospatial Advisory Committee's (NGAC) Landsat Advisory Group (LAG) for Study Question 2 reads in part:

> "Regarding the Sentinel 1 (radar), Sentinel 2 (land-imaging) satellites, and new commercial smallsats and microsats, the USGS is interested in learning what success non-Federal users are having with data access and delivery mechanisms, data-use policies, and data applications. The USGS would also be interested in hearing what recommendations the LAG may have for USGS actions associated with these systems. This project could be a white paper assembled in the fall of 2015 to highlight initial user experiences and recommendations."

Comments on Guidance

1. On the subject of non-Federal success with new commercial smallsats and microsats related to data access, delivery mechanism etc., it was determined the current industry status was insufficiently mature to make any meaningful assessment at this time. While early entrants such as SkyBox, UrtheCast, and Planet Labs had operational satellites, none had firm offerings of commercial data access. SkyBox and Planet Labs have been releasing limited data for public good and research. Planet Labs is still trying to determine the best distribution and pricing model. At the time of writing at least 8 new smallsat constellations are in advanced planning for launch within 3 years. It was recommended the smallsat component of Question 2 be postponed until CY2016. The impact of smallsats will be significant and complex. It is further recommended that the USGS consider how the LAG can provide input in formulating the 2016 LAG guidance to produce a meaningful and achievable response.

2. The Study Team did pursue data access and delivery mechanisms, data-use policies, and data applications relative to Sentinel 1 (radar) and Sentinel 2 EO non-Federal use. Also pending US legislation is being monitored.

Sentinel Data

Both the Sentinel 1 radar and Sentinel 2 EO provide a useful complement to Landsat data. In particular the Sentinel 2 EO has been specifically designed with spectral bands that are similar to those used by Landsat. Appendix 1 is a short summary comparison of the Sentinel 2 and Landsat specifications. Sentinel 2 comprises 2 satellites: S2a launched on June 23, 2015 and Sentinel 2b slated to launch in mid-2016. Together the two satellites will provide a 5-day revisit, which will provide the long needed increased temporal resolution required for famine and agricultural monitoring. Sentinel 2 has improved spatial, spectral, and temporal resolution compared to Landsat 7 and 8. With the exception of Landsat's thermal infrared capability, Sentinel 2 imagery addresses almost all the same applications. Sentinel 2 has improved spatial, spectral, and temporal resolution, as well as collection extent compared to Landsat 8. Sentinel 2 imagery addresses almost all the same applications as Landsat. Collectively, the Sentinel 2a,b and Landsat 7,8 satellites provide considerable value to the existing Landsat community of use. Assuring access to Sentinel 2 on terms comparable to those of the Landsat program is critical. This document will describe the potential differences and deficiencies of Sentinel access.

Data access and delivery mechanisms

Public access to Sentinel data comes through the web based Sentinel Scientific Data Hub (SSDH). The SSDH operates in a manner similar to Earth Explorer at the USGS EROS. Users log on and select data for direct download at full resolution. The SSDH has been distributing Sentinel 1 radar data since going operational on October 3, 2014. Sentinel 2 EO data is now being operationally distributed starting with imagery captured on December 1, 2015. ESA plans to negotiate Sentinel International Data Hubs with various countries. The US State Department recently signed an agreement with the European Commission for Data Hub access, which will be from the NASA Alaska Satellite Facility (ASF) for the ingest and redistribution of Sentinel 1 radar data and at USGS/EROS for ingest and redistribution of Sentinel 2 EO data. NASA, USGS and ESA are still negotiating a technical operating arrangements document describing the operational procedures for these new Data Hubs. The technical document target completion date is January 2016. At this time neither of the US Hubs is operational for user access.

Issues related to Sentinel access for non-Federal users

The LAG Q2 Study team has identified the following issues that impact access to Sentinel data by non-Federal users:

1. While S1 data was available free from the SSDH for the past year, the ESA policy is retain only 2 months in the archive. In practice ESA is retaining 1 year before removing from the archive. This rolling archive meant users who desired access to the full archive had to download every scene and create their own archive. As a consequence, significant duplication of data holdings on many different user servers exists. Conversations with officials at the ASF indicate they have been downloading the entire daily take for the past year. The plan is once the ASF Sentinel 1 Data Hub is operational, the entire archive since October 2014 will be accessible for download as needed. As of November 23, 2015 ASF has not indicated when they will have an operational S1 archive. Until the ASF is operational, new non-Federal users will not have access to the full archive.

2. USGS has a multi-tiered plan to host and serve the entire Sentinel 2 archive. The first tier for basic redistribution is funded. A number of technical processing issues remain. It is not known when USGS will go operational. At this time, the ESA Data Hub is experiencing significant difficulties just distributing S1 with slow downloads and occasional outages. With the imminent addition of S2 there is significant concern that Data Hub will be totally overwhelmed. A possible reaction by ESA might be restricting access to only ESA approved users. Lack of access would have a significant impact on both Federal and non-Federal S2 users. It is imperative the US S2 Data Hub become operational as soon as possible. The LAG Q2 Study Team recommends USGS examine the feasibility of expediting the US S2 Data Hub.

3. The current collection plan for S2 favors ESA project areas, and some special interest areas over North America. While there have been discussions to try to obtain monthly acquisitions of Sentinel 2a imagery in 2016 over the Americas, the LAG Q2 Study Team is concerned about the informality of that current S2 collection plan and urges USGS to find a more strategic and tactical approach. As but one example, the current Landsat revisit is not adequate for in-season agriculture growing decisions such as where and when to irrigate. The revisit time with 4 satellites, S2a, S2b and Landsat 7 and 8, would substantially improve agriculture applications.

Possible commitments between USGS and ESA could include incentivizing ESA, as well as establishing a US ground station for direct downlink.

4. Previously, the ESA Copernicus Sentinel distribution policy offered free and open access to everyone, however the ESA End User License/ Data Use contained very restrictive terms for all users but especially for non-scientific users. In July 2015 the terms were substantially improved to the following:

   "EU law grants free access to Copernicus Sentinel Data and Service Information for the purpose of the following use in so far as it is lawful:
   (a) Reproduction
   (b) Distribution
   (c) Communication to the public
   (d) Adaptation, modification and combination with other data and information
   (e) Any combination of points (a) to (d)."

   https://sentinel.esa.int/documents/247904/690755/Sentinel_Data_Terms_and_Conditions

   There is a requirement to attribute the source as "Copernicus Sentinel data [Year]"

   The Sentinel website still retains a few components of the older policy language that may have not been cleaned up yet. Those will be monitored.

   It is the LAG Q2 Study Team's assessment that the terms of the current Sentinel Data License are sufficiently open as to be comparable with the USGS Landsat data license.

Legislative Activity

On Nov. 25, 2015 the President signed H.R.2262, *The U.S. Commercial Space Launch Competitiveness Act* into law.[1] The Bill has a provision requiring the Department of Commerce, the agency that issues commercial remote sensing licenses, to report to Congress "on the statutory updates necessary to protect national security, protect privacy, protect the U.S. industrial base, and reflect state of the art remote sensing systems, instruments, or technologies". [2] The effect, if any, of this on new commercial systems is yet to be known.[1]

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[1] Congress.gov, https://www.congress.gov/bill/114th-congress/house-bill/2262/all-actions, last visited Nov. 28, 2015.
[2] H.R. 2262 U.S. Commercial Space Launch Competitiveness Act, Sec. 302.

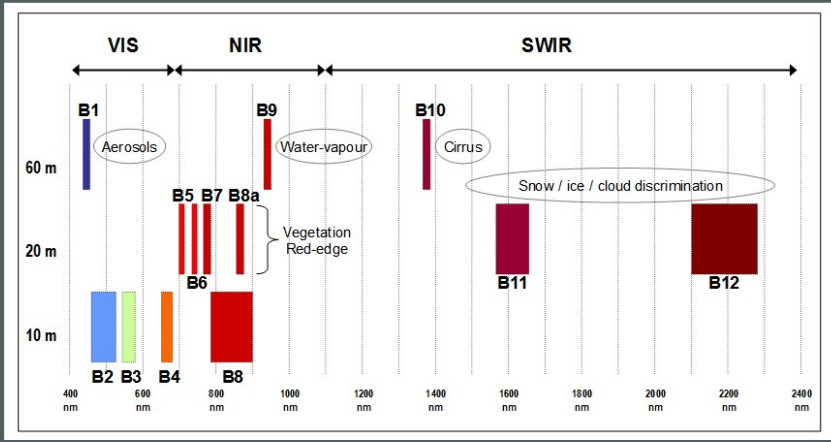
Appendix A Comparison Sentinel 2 and Landsat

Sentinel-2 Mission Overview

- European Space Agency (ESA) Sentinel-2 (S2) will consist of two satellites hosting a Multispectral Imager (MSI) providing global land imagery with 13 spectral bands, 12-bit radiometry, and a swath width of 290km.
- Sun synchronous 786 km orbit with a repeat cycle of ten days at the equator, and six days at mid-latitudes. Two satellites will provide 5-day repeat.
- Mission lifecycle is designed for 7.5 years with consumables for 12 years.
- Systematic collection of data between +84 degrees north and -56 degrees south.

USGS

Sentinel-2 Mission Overview



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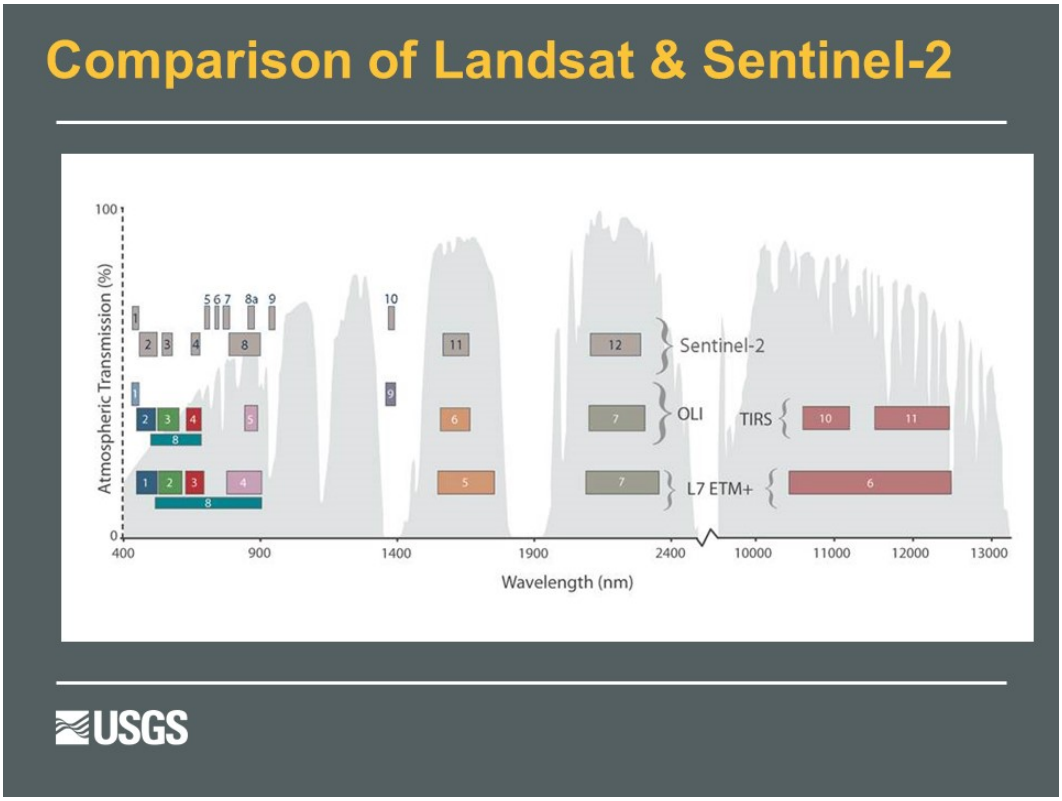

Slides provided by USGS