Improving data discoverability in NASA Worldview for spatiotemporally discontinuous layers

National Aeronautics and Space Administration

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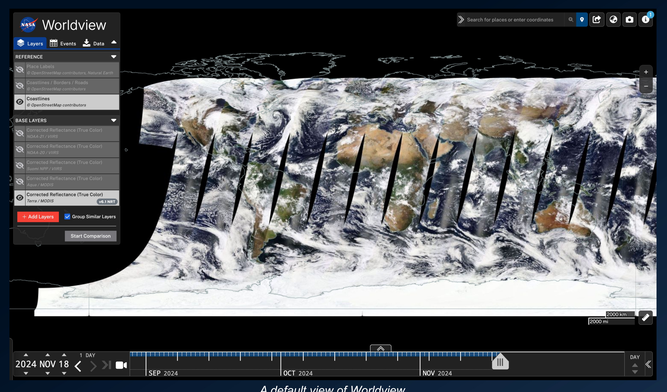
Abstract

Over the past ten years, NASA Worldview has continually evolved to remain an essential data visualization application for NASA's archive of Earth Science data. Hosting over 1000 data layers, each with differing spatial and temporal availability, Worldview has addressed challenges with visualizing this data to ensure that the user interface and user experience remained straightforward to use. At its inception, Worldview was designed to easily browse global, daily satellite imagery from the Moderate Resolution Imaging Spectroradiometer (MODIS) from NASA's Terra and Aqua satellites. In recent years, Worldview has incorporated more diverse data sources including ones which are spatially and temporally sparse. These include spatially high resolution but sparse imagery like imagery from the joint NASA/USGS Landsat 8 and 9 satellites and the European Union's Copernicus Sentinel-2A and Sentinel-2B satellites along with imagery that is temporally sparse and irregular like NASA's Tropospheric Emissions: Monitoring of Pollution (TEMPO). This presentation will showcase how we now guide users to both where and when the data is available for spatiotemporally discontinuous layers. These solutions include a list of dates where data is available for a certain spatial extent, a "data availability bar" which shows on a timeline when data is available, and a granule view which shows where data is available at a certain time. We will also present future improvements and updates that could further improve these interactions.

What is Worldview?

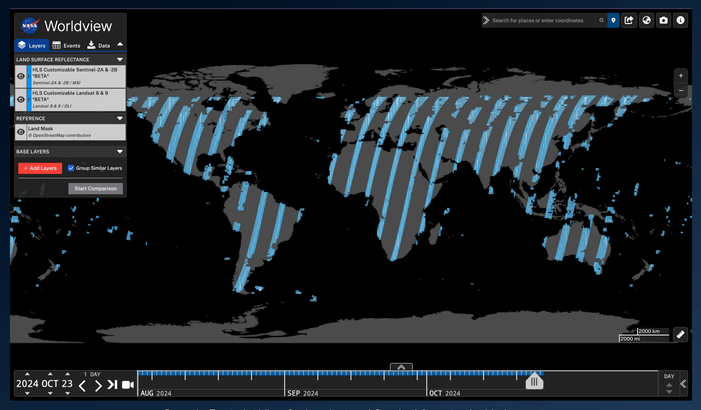


A default view of Worldview

Worldview is a web application that allows users to view and interact with NASA's global satellite imagery in near real time and historically, often to the beginning of each respective mission.

Improving data visibility

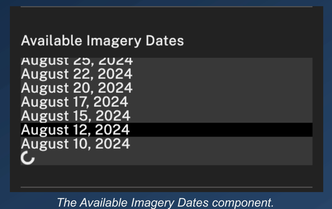
Granule Footprint View has been designed to be simple and intuitive to use. For certain layers which are only displayable when zoomed in, granule footprints from CMR are shown when zoomed out to show where data is available on a global scale.



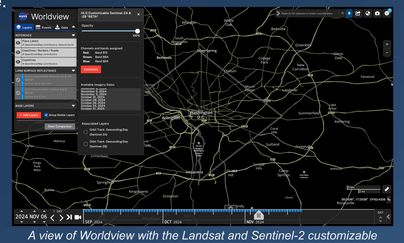
Granule Footprint View for Landsat and Sentinal-2 customizable layers.

Improving access to spatially sparse data

Some layers, such as those derived from Sentinel-2 and Landsat data, have a contiguous temporal availability but are spatially discontinuous in that there are large spatial gaps between satellite overpasses for a given day. This can make finding imagery for a specific spatiotemporal extent difficult which is why we implemented a list of available imagery dates. This list is scrollable, lazy loading, utilizes the NASA Common Metadata Repository (CMR) API, and is clickable. The lazy loading aspect of this list allows the user to easily scroll forward and backward through time.

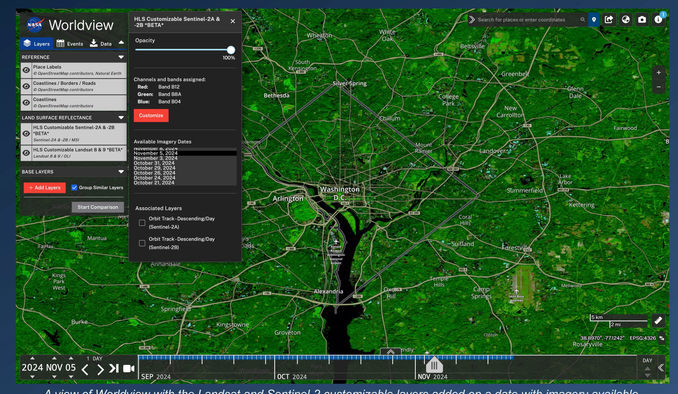


The Available Imagery Dates component.



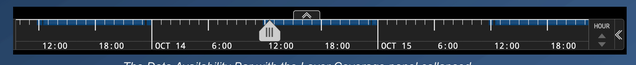
A view of Worldview with the Landsat and Sentinel-2 customizable layers added but with no imagery available on the selected date.

With the new Available Imagery Dates feature, the user can now open the layer settings panel and view a list of dates with available imagery for the current spatial extent. The list initially focuses on the dates closest to the currently selected date. Once the user has identified an acceptable date from the list they can click on the date to load the requested imagery. To ensure that only the best imagery is shown as available, Worldview will only show dates that have a granule within the middle 60% width – 80% height of the screen. This feature can also be used to browse for imagery with specific attributes like low cloud cover.



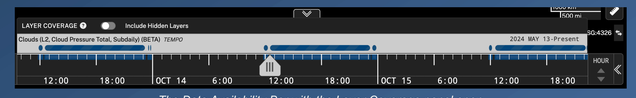
A view of Worldview with the Landsat and Sentinel-2 customizable layers added on a date with imagery available.

Improving access to temporally sparce data



The Data Availability Bar with the Layer Coverage panel collapsed.

When initially implemented, the data availability bar took a layer's start and, if applicable, end date and rendered a single continuous blue bar for the entire span. Products such as the TEMPO level 2 and level 3 layers are only recorded during certain times of day, leaving relatively long stretches of time when no imagery is available. Our approach to this issue is to represent the gaps in the available imagery as gaps in the data availability bar.



The Data Availability Bar with the Layer Coverage panel open.

We use Global Imagery Browse Services (GIBS) DescribeDomains requests - a service which provides detailed temporal availability for each product - to lazy load the relevant time ranges for the current temporal extent of the time slider and process them in a Web Worker to avoid blocking the main thread. This provides the best balance between data availability and scrolling performance.

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Scan the QR code to visit Worldview:
https://worldview.earthdata.nasa.gov/

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