

# Digital Earth Australia

**Katrina Johnson - Environmental Intern**

Satellites orbit the Earth, providing different services, such as communications and navigation (Wu, 2023). Some contain specialised cameras and sensors that collect images of the Earth's surface at different spatial resolutions (image and pixel size) and temporal (how often images are taken) scales, depending on the satellite (Geoimage, 2022; Wu, 2023). These images are sent back to make observations about the Earth at a singular point in time or over many years, such as how coastlines have changed. Earth observation data has historically been difficult and time-consuming to use due to the large amount of information it generates (Tordesillas & Qian, 2022). Geoscience Australia has been developing Digital Earth Australia, a platform to make it easier to access and use the satellite information.

This Insight outlines what Digital Earth Australia is, provides examples of how its products can be used, how it can be accessed, and things to keep in mind when using Digital Earth Australia data.

## What is Digital Earth Australia?

Digital Earth Australia is an online platform that makes three decades of Australian-specific Earth observation data freely available (Digital Earth Australia, 2023c). It processes and manages satellite imagery to provide analysis-ready data products that users can quickly and easily use. This information is derived from imagery obtained from two sources, the United States Geological Survey's Landsat program and the European Space Agency's Sentinel program (Digital Earth Australia, 2021).



Figure 1: Satellite orbiting Earth (Source: Pixabay)

Digital Earth Australia delivers data products across several categories, including baseline satellite data, land and vegetation, inland water, sea, ocean and coast, and hazards (Table 1), with several more in development.

Table 1: Digital Earth Australia's released data products (at the time of publication)

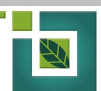
Category	Products Available
Baseline Satellite Data	<ul style="list-style-type: none"> <li>Surface Reflectance: images created from the light reflected from the Earth's surface, validated and calibrated for Australian conditions.</li> <li>Used to develop data products.</li> </ul>



Photo Source:  
<https://www.spatialsource.com.au/a-new-growth-path-for-space-and-spatial/>

## Summary

This Insight details what Digital Earth Australia is about and how it is used for data mapping.



<b>Land and Vegetation</b>	<ul style="list-style-type: none"> <li>• Land Cover: a collection of annual land cover maps of Australia that show a basic or detailed observation of what is occurring on the Earth’s surface (e.g. vegetation or artificial structures).</li> <li>• Fractional Cover: divides the landscape into three parts to measure the amount of green, brown and bare ground on the Earth’s surface.</li> <li>• Mangroves: tracks changes in extent and canopy density of mangroves.</li> <li>• Geometric Median and Mean Absolute Deviation: uses statistical analysis tools to show variance in the landscape over a given year to understand “average” conditions in that year and the amount of variability around that average.</li> </ul>
<b>Inland Water</b>	<ul style="list-style-type: none"> <li>• Water Observations: classifies each satellite image pixel as 'wet', 'dry', or 'invalid.'</li> <li>• Waterbodies: defines the boundaries of waterbodies over 2,700 sq. m and present more than 10% of the time. It also reveals their estimated wet surface area over time.</li> <li>• Wetlands Insight Tools (Ramsar wetlands and QLD): highlights changes to the amount of water, green and dry vegetation and bare soil in Australia’s Ramsar</li> </ul>
<b>Sea, ocean and coast</b>	<ul style="list-style-type: none"> <li>• Coastlines: models typical annual mean sea level since 1988</li> <li>• High and Low Tide Imagery: calculates the geometric median of the highest and lowest 20% of tides seen by Landsat satellites</li> <li>• Intertidal Elevation: intertidal zone is mapped in 3D</li> <li>• Intertidal Extents: low and high tides reveal the satellite-observed tidal range</li> </ul>
<b>Hazards</b>	<ul style="list-style-type: none"> <li>• Hotspots: detects areas with high levels of infrared radiation to identify potential fire locations</li> </ul>

Some examples of the data products include:

- Tracking the changes in the presence/absence of water or monitor drought conditions using the inland water category data (Digital Earth Australia, 2024a).

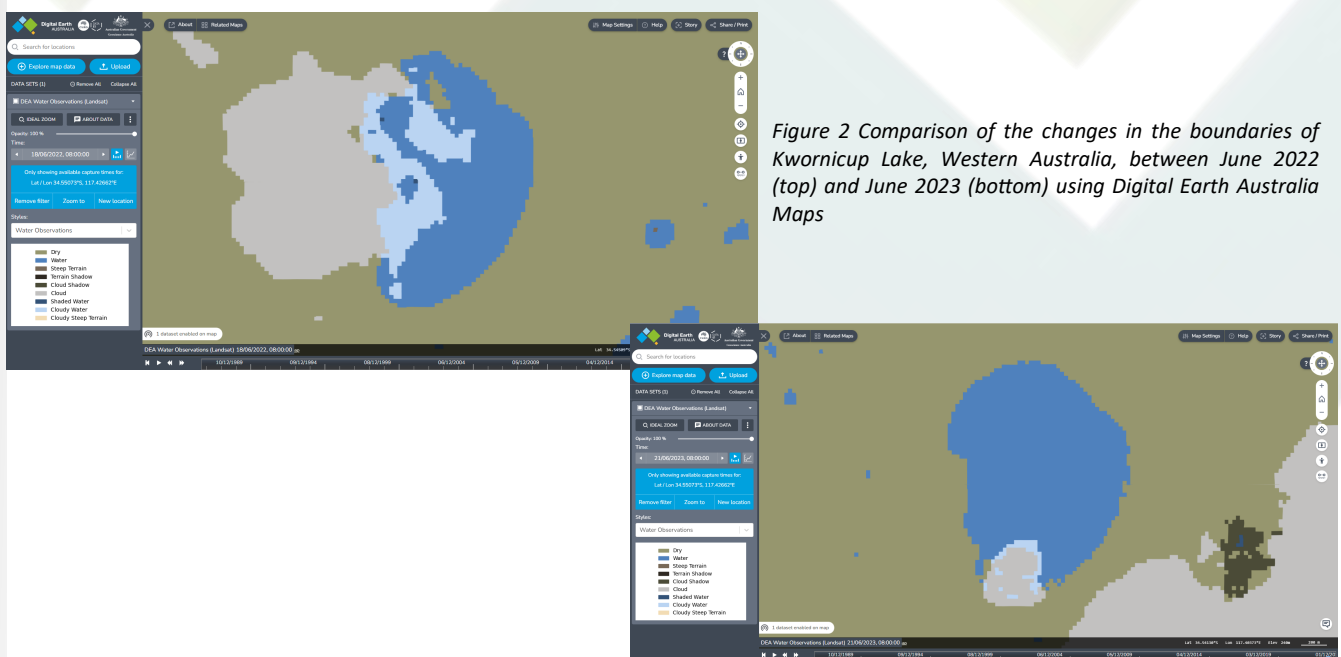


Figure 2 Comparison of the changes in the boundaries of Kwoornicup Lake, Western Australia, between June 2022 (top) and June 2023 (bottom) using Digital Earth Australia Maps



- Combining Hotspots, Waterbodies, and Land Cover to model high-risk fire locations, nearby water sources, and at-risk infrastructure to assist with bushfire planning and management (Digital Earth Australia, 2024e).

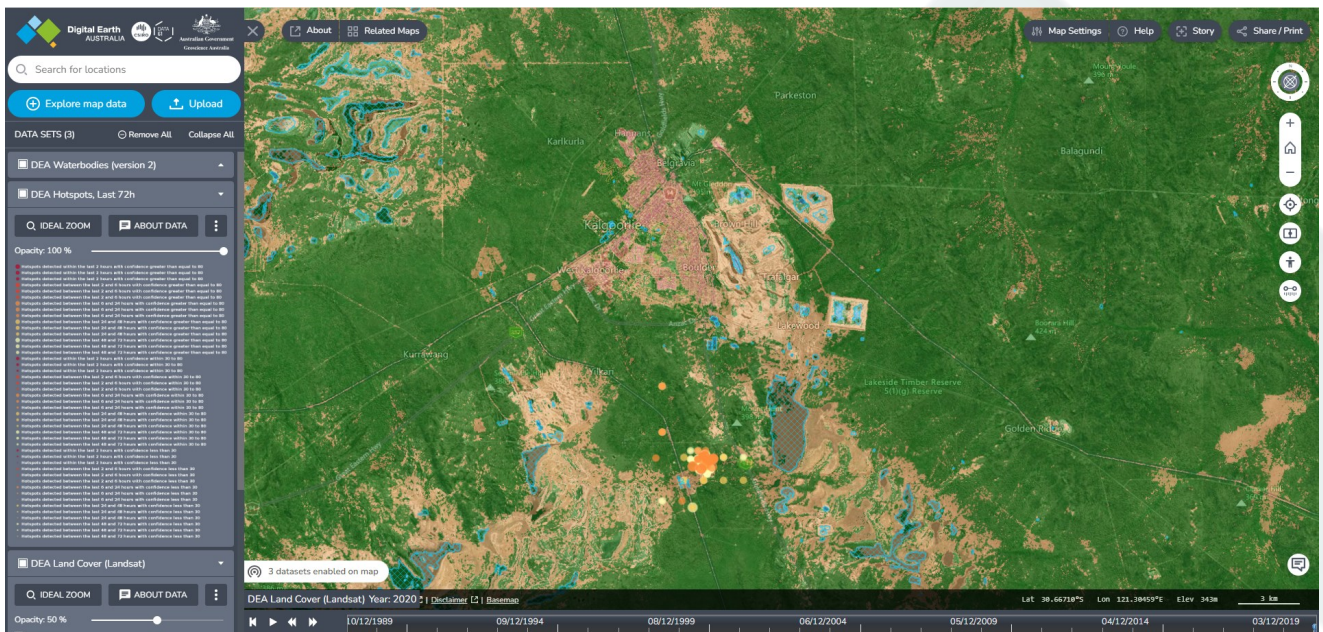


Figure 3 Examining the environment and location of waterbodies surrounding an identified fire hotspot near Kalgoorlie, Western Australia

## Accessing the Data

Two options exist for accessing the data from Digital Earth Australia: either online at Digital Earth Australia Maps or via linking to a GIS Application.

To access online, go to [Digital Earth Australia Maps](#) (DEA Maps), an interactive map platform where you can browse and explore the data catalogue (except the Wetlands Insight Tool for Queensland, which can be found [here](#)) and upload your data for analysis. The platform also provides a short tutorial to assist users in getting started. This platform makes different analytical tools available for the different products and allows you to export the required data extent (except for Waterbodies, Coastlines and Hotspots data).

To access the data products via a GIS application, such as QGIS or ArcGIS, occurs via a Web Map Service (WMS) URL connection (Digital Earth Australia, 2024f). WMS links enable GIS users to access georeferenced map images from their desktop applications over the internet, so no downloads are required (Digital Earth Australia, 2024f). A tutorial on how to do this is available [here](#) from Digital Earth Australia. The different products can be linked via different URL connections. The Water Observations and Coastlines data can be connected using URL: <https://geoserver.dea.ga.gov.au/geoserver/dea/wms>. While Hotspots can be connected using URL: <https://hotspots.dea.ga.gov.au/geoserver/ows>. The rest of the data products, including the land and vegetation and tidal data, use URL: <https://ows.dea.ga.gov.au/>. These links can also be found in the data descriptions of each product in the data catalogue on DEA Maps (Figure 4 shows an example of this).

Some information such as Water Observations and Coastlines data are available as shapefiles, (a spatial data file format). These products can be downloaded from their respective data pages on the DEA Knowledge Hub, [Water Observations](#) and [Coastlines](#).

Digital Earth Australia is also accessible via the Sandbox, a platform that provides sample data and example analyses to assist new users in getting started with using and analysing the data (Digital Earth Australia, 2022). The [DEA Knowledge Hub](#) provides all the information about the data products and Digital Earth Australia's services in one place (Digital Earth Australia, 2023a).



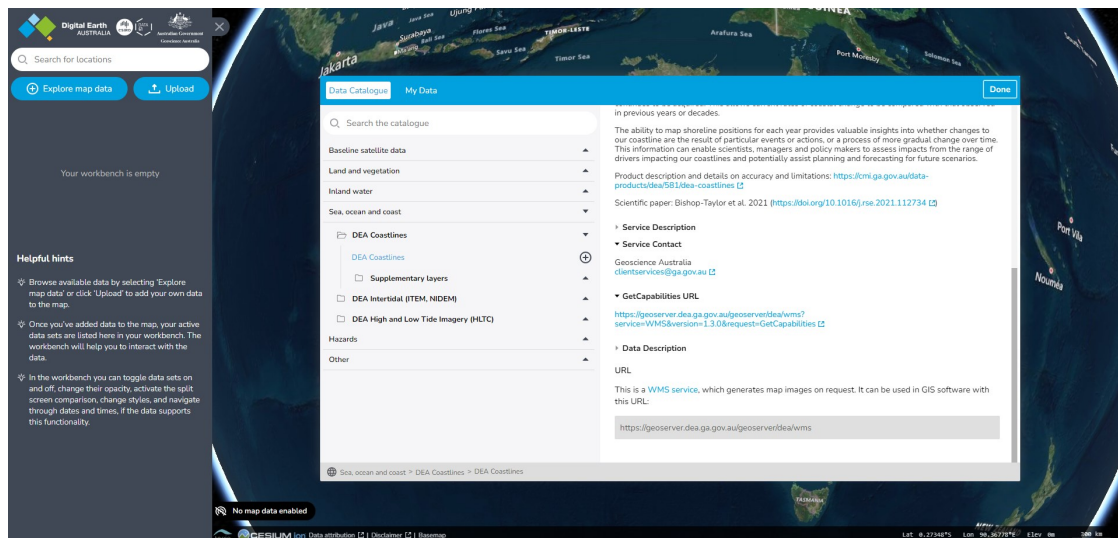


Figure 4 Coastlines data description in the data catalogue on DEA Maps

## Things To Keep In Mind

Some things to keep in mind when using the Digital Earth Australia information:

- Most products rely on Landsat imagery, including land cover, water bodies and coastlines (Digital Earth Australia, 2024b). Landsat data is not always accurate or reliable as it is affected by cloud cover, relies on ageing technology and takes several days to capture the Australian landscape (Digital Earth Australia, 2023b). Many of the data products, however, are undergoing development to combine Sentinel and Landsat information (Digital Earth Australia, 2023d).
- The models used to classify the satellite images to create the derivative data products rely on a satellite spatial resolution that may not be able to distinguish the Earth's surface clearly or on evaluating dynamic natural processes that cannot easily be captured and understood (Digital Earth Australia, 2024d; Digital Earth Australia, 2024c). This can create inconsistencies between the data products and data collected in the field.
- The availability of historical information for certain data products varies in desktop GIS applications as the data products are updated at different frequencies. For example, only the most recent satellite observation (one to two north-south strips of Australia's surface) is available for Water Observations using the live connection in QGIS. Meanwhile, in DEA Maps, you can use the tools to examine all the available Water Observation data over time.

The Digital Earth Australia platform makes it easier to access and use the Earth observation information produced from satellites. The Integrate Sustainability Pty Ltd team has extensive experience in creating, interpreting, and analysing spatial data. If you are interested in exploring the use of spatial data for your business, call us at 08 9468 0338 or email [enquiries@integratesustainability.com.au](mailto:enquiries@integratesustainability.com.au).

## References

- Digital Earth Australia. (2021, February 01). *What is analysis-ready data?* Retrieved from Digital Earth Australia: <https://www.dea.ga.gov.au/about/analysis-ready-data>
- Digital Earth Australia. (2022). *Introduction to the DEA Sandbox*. Retrieved from Digital Earth Australia: <https://www.dea.ga.gov.au/developers/sandbox>
- Digital Earth Australia. (2023a). *DEA knowledge hub*. Retrieved from Digital Earth Australia Knowledge Hub: <https://docs.dea.ga.gov.au/>
- Digital Earth Australia. (2023b). *Frequently asked questions*. Retrieved from Digital Earth Australia Knowledge Hub: <https://docs.dea.ga.gov.au/guides/about/faq/#how-do-i-download-data-from-dea>
- Digital Earth Australia. (2023c, February 08). *Our mission: Putting satellite data into decisions*. Retrieved from Digital Earth Australia: <https://www.dea.ga.gov.au/about/our-mission>



- Digital Earth Australia. (2023d, February 27). *Significant milestone reached in Sentinel-2 Collection 3 migration*. Retrieved from Digital Earth Australia: <https://www.dea.ga.gov.au/news/sentinel-2-collection-3-migration>
- Digital Earth Australia. (2024a, January). *Agriculture*. Retrieved from Digital Earth Australia: <https://www.dea.ga.gov.au/sector/agriculture>
- Digital Earth Australia. (2024b). *Data products*. Retrieved from Digital Earth Australia: <https://www.dea.ga.gov.au/products>
- Digital Earth Australia. (2024c). *DEA High and Low Tide imagery (Landsat)*. Retrieved from Digital Earth Australia: <https://docs.dea.ga.gov.au/data/product/dea-high-and-low-tide-imagery-landsat/>
- Digital Earth Australia. (2024d). *DEA Waterbodies (Landsat): FAQs*. Retrieved from Digital Earth Australia: <https://docs.dea.ga.gov.au/data/product/dea-waterbodies-landsat/>
- Digital Earth Australia. (2024e, January). *Emergency Management*. Retrieved from Digital Earth Australia: <https://www.dea.ga.gov.au/sector/emergency-management>
- Digital Earth Australia. (2024f, January). *Web map service (WMS)*. Retrieved from Digital Earth Australia: [https://docs.dea.ga.gov.au/guides/setup/gis/web\\_map\\_service/](https://docs.dea.ga.gov.au/guides/setup/gis/web_map_service/)
- FrontierSI. (2021, November). *Digital Earth Australia and the mining and METs industries: Extracting the benefits of Earth observation*. Retrieved from FrontierSI: [https://frontiersi.com.au/wp-content/uploads/2021/11/FrontierSI\\_DigitalEarth\\_ExtractingEarthObservation\\_SECOND\\_RELEASE\\_FINAL.pdf](https://frontiersi.com.au/wp-content/uploads/2021/11/FrontierSI_DigitalEarth_ExtractingEarthObservation_SECOND_RELEASE_FINAL.pdf)
- Geoimage. (2022, October 10). *What is satellite imagery?: A complete guide*. Retrieved from Geoimage: <https://geoimage.com.au/blog/what-satellite-imagery-complete-guide>
- Tordesillas, A., & Qian, G. (2022, December 05). *The satellite data mapping Australia's new climate extremes*. Retrieved from Pursuit: <https://pursuit.unimelb.edu.au/articles/the-satellite-data-mapping-australia-s-new-climate-extremes>
- Wu, Q. (2023, March 14). *How to use free satellite data to monitor natural disasters and environmental changes*. Retrieved from The Conversation: <https://theconversation.com/how-to-use-free-satellite-data-to-monitor-natural-disasters-and-environmental-changes-198140>

## Integrate Sustainability

---

Primary Business Address  
Lower Ground Floor  
3 Richardson St  
West Perth, 6005  
Western Australia

Phone: (+618) 9468 0338  
E-mail: [enquiries@integratesustainability.com.au](mailto:enquiries@integratesustainability.com.au)

