

# Australian National Spectral Database

## Australian National Spectral Database

**Version**

3.3.0

**Program**

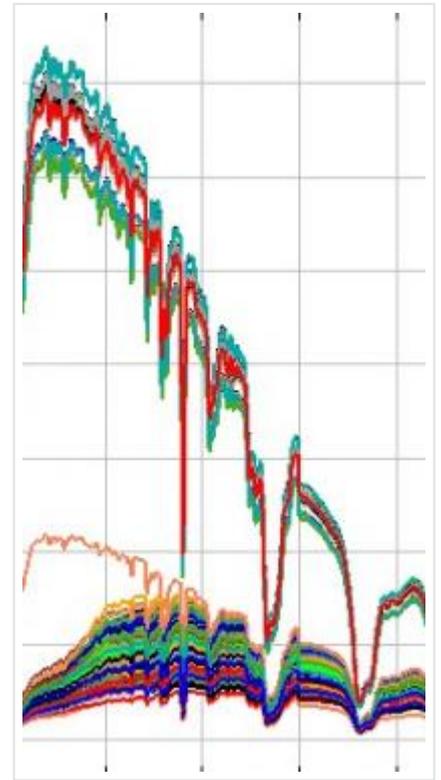
Digital Earth Australia

**Resource type**

Data service

**Published Date**

09/06/2021



View the [original metadata page](#) for the most up-to-date information on this product.

## Basics

### Background

The Australian National Spectral Database (NSD) supports best practice management of reference spectral data collections by providing an extensive suite of standardised metadata for international use. The database has been designed to be consistent with other nationally significant datasets and is a curated repository that will evolve to meet the needs of the Earth observation community.

The NSD is accessed via the application Specchio, initially developed by the University of Zurich, and customised by the University of Wollongong. It represents the collective efforts of many individuals from multiple organisations and is hosted by Geoscience Australia as the custodian of nationally significant geoscientific data. See Hueni et al. (2020) below for further background information.

### What this product offers

The National Spectral Database (NSD) houses spectral data collected by Australian remote sensing scientists. It includes spectra covering targets as diverse as mineralogy, soils, vegetation, waterbodies, and land surfaces.

The database also includes field-based data routinely collected by Geoscience Australia's Digital Earth Australia program for calibration and validation measurements, as well as spectral data previously hosted by the University of Wollongong.

Additionally, the NSD features the Aquatic Substrate Library, a dataset covering aquatic spectra collected from 1994 to the present, consisting primarily of end-member and substratum measurements from around Australia.

## Applications

- Comparison of reflectance measurements from satellite observations e.g. by Landsat 8 and Sentinel 2, to near-coincident ground reference measurements, to verify fitness for purpose of satellite derived data products.
- Development and testing of models describing the relationships between directional spectral reflectance of target surfaces and their biophysical attributes.
- Spectral feature matching for mineralogy applications.
- Application of spectral data to plant physiology studies, geological sciences, soil sciences, limnology, oceanography and atmospheric chemistry, and other research.

## Publications

Hueni, A., Chisholm, L.A., Ong, C., Malthus, T.J., Wyatt, M., Trim, S.A., Schaepman, M.E., Thankappan, M. 2021. The SPECCHIO Spectral Information System, IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, vol. 13, pp. 5789-5799, 2020, doi: 10.1109/JSTARS.2020.3025117.

Byrne, G., Walsh, A., Thankappan, M., Broomhall, M., Hay, E. 2021. DEA Analysis Ready Data Phase 1 Validation Project: Data Summary. Geoscience Australia, Canberra. <https://doi.org/10.26186/145101>

Malthus, T.J., Ong, C., Lau, I., Fearn, P., Byrne G., Thankappan, M., Chisholm, L., Suarez, L., Clarke, K., Scarth, P., Phinn, S. (2018) A community approach to the standardised validation of surface reflectance data. A technical handbook to support the collection of field reflectance data. Release version 1.0. CSIRO, Australia. ISBN: 978-1-4863-0991-7

# Access

## Data access

<b>CMI RESTful node ID</b>	643
<b>Use constraints</b>	Use of the NSD is subject to <a href="#">NSD Terms of Service</a> . Please read the Terms before accessing the Service.
<b>Security classification</b>	Unclassified
<b>Update frequency</b>	asNeeded

## Access notes

### How to access the National Spectral Database

- 1) Read the **Terms of Service** above. These terms outline your responsibilities and conditions of use.
- 2) Download the Specchio application. Direct download links are here: [Specchio client zip file](#) or [jar installer package](#). For further download options see the Specchio website [Downloads page](#).
- 3) Run the application. Launch the Specchio client from your install directory or command line, it is called "specchio-client.jar".
- 4) Get started with the NSD:

Select "Database" from the top left-hand corner of the client, then "Create a user account". See below:

**Create user account** [X]

**Server Details**

Web Application Server: [ ]

Port: [ ]

Application Path: [ ] **Connect**

Data Source Name: [ ]

Trust Store:  Use default JVM trust store

**User Account Details**

Title: [v]

First name: [ ]

Last name: [ ]

Institute: [v]

**Add new institute...**

E-mail: [ ]

WWW: [ ]

Description: [ ]

**Create** **Cancel**

To access the service enter the following information:

**Web Application Server:** app-public.specchio.sandbox.dea.ga.gov.au

**Port:** 443

**Application Path:** /specchio\_service

**Data Source Name:** jdbc/specchio

**Tick the box "Use default JVM trust store".**

Enter information about yourself, including contact email and intended use of the database in the Description field. If your institute is not listed, please add your institute. If you are not from an institute, such as a research body or private company, please create a new institute as your name, i.e. "First Name Last Name".

See the Details tab above for further information on navigation through the Specchio client and NSD.

## Known issues

Click here to view [Known Issues](#). There is current work underway to fix functionality around Ocean Optics datasets. If you encounter an issue please contact [NSDB\\_Manager@ga.gov.au](mailto:NSDB_Manager@ga.gov.au).

## Contribute your data to the NSD

1) Ensure you adhere to the Metadata Standard and that your dataset meets minimum requirements. If your data does not meet minimum metadata requirements it cannot be hosted by the service.

2) Contact the NSD manager: [NSDB\\_Manager@ga.gov.au](mailto:NSDB_Manager@ga.gov.au)

In your email include the size of the dataset you wish to ingest and confirm that you meet the [Metadata Standard](#), and have read the [Technical usage guide](#) & [Write access guide](#). This is to help you to ingest data most efficiently and understand the process of uploading your data. If you have further queries please enquire via email.

The public server will allow you to view & download data, not upload it. The NSD manager will provide access information to enable uploading new data campaigns.

**Use of the NSD service is subject to [NSD Terms of Service](#). Data contributed must meet the NSD [Metadata Standard](#).**

## Digital Object Identifier (DOI) Minting

DOI minting is offered for new datasets that meet the metadata standard, and are new or existing datasets not previously published elsewhere. Your dataset will get a unique DOI that the database manager will append to your dataset metadata within the NSD. The DOI will be stored separately as a Geoscience Australia metadata record. The DOI record can also provide links to further publications from your dataset, and can easily be updated if needed, or further publications stem from your work. The aim of the DOI is to credit those involved in collecting the dataset, and to provide links to further science stemming from the work.

For a DOI to be minted, sufficient metadata is required for the dataset including names of team members involved, location and timestamps of the study (GPS and UTC time associated with measurements), and links to any associated publications such as journal articles. These should be included as metadata for your dataset when ingesting new data.

Please contact the NSD manager if you would like to contribute or update data: [NSDB\\_Manager@ga.gov.au](mailto:NSDB_Manager@ga.gov.au)

# Details

## Technical information

Requirements: Java Runtime Environment (JRE) 8.0 or higher

Documentation for the Specchio client: [Specchio website](#).

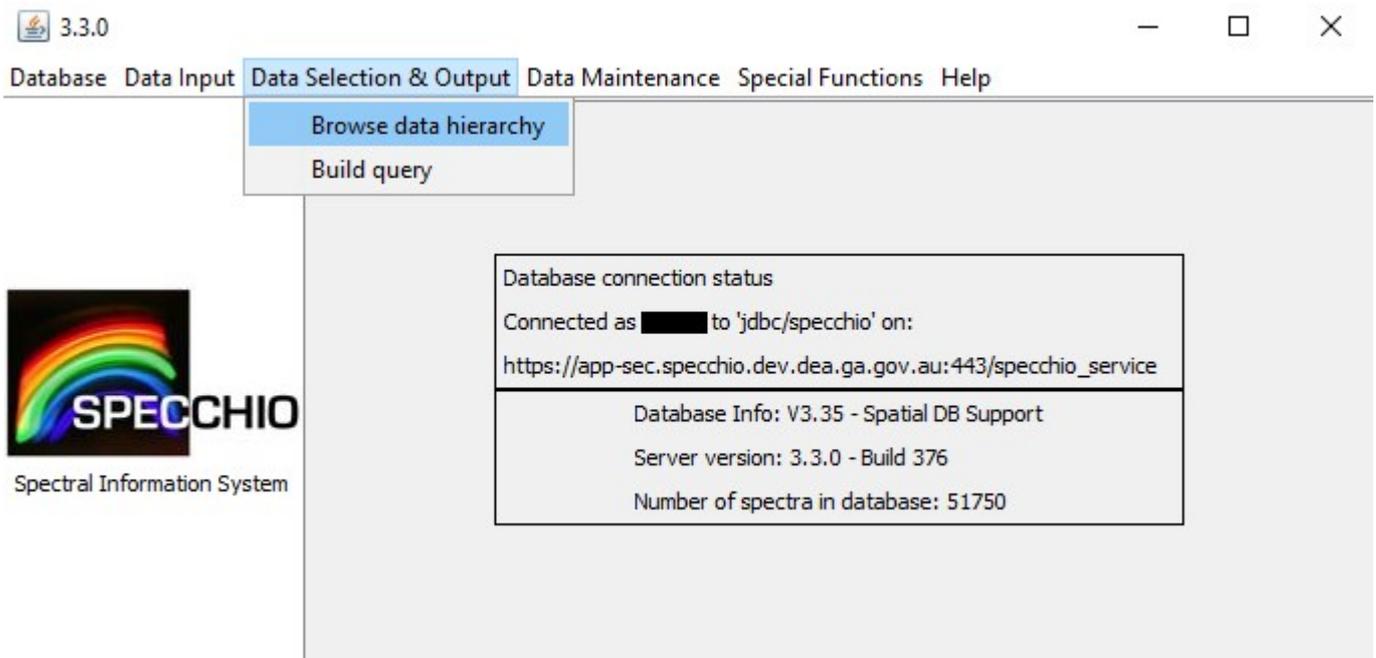
Technical information on use of the Specchio application, such as connecting to the NSD and downloading data: [Technical usage guide](#).

Information for uploading data (write-access users only): [Write access guide](#).

## Navigating the client

The NSD contains datasets or campaigns of data that can be viewed in two ways.

1) View the NSD folder structure via the data browser:



The screenshot displays the Data Browser (V3) interface, which is divided into several sections:

- Browser:** A tree view on the left showing a hierarchy of folders under 'spechtro'. The 'Phase 1 field data' folder is expanded, showing sub-folders like 'Blanchetown', 'Dharawal', 'Dookie', 'Fowlers\_Gap', 'Lake\_George', 'Lake\_Leffroy', 'Litchfield', 'Mitchell\_Downs', and 'Milton'. The 'Radiance' folder is selected, displaying a list of 11 .asd files.
- Matching Spectrum Identifiers:** A box showing a list of 11 numerical identifiers: 313634, 313635, 313636, 313637, 313638, 313639, 313640, 313641, 313642, 313643, 313644.
- Number of results:** A box showing the count '11'.
- Actions:** Buttons for 'Show report', 'File export', 'Spectral Plot', 'Process', 'Ref.Calc', and 'Publish Collection'.
- Splitting rules for file export and plotting:** Radio buttons for 'Split spaces by sensor', 'Split spaces by sensor and unit' (selected), and 'Split spaces by sensor, instrument, calbr\_no and unit'.
- Spectral Plot:** A line graph at the top right showing 'Radiance' on the y-axis (0.00 to 0.10) and 'Wavelength (nm) x10<sup>3</sup>' on the x-axis (0.5 to 2.5). The plot shows a red line with several peaks, with the highest peak around 0.8 x 10<sup>3</sup> nm.
- Metadata Report:** A detailed report on the right side of the interface, including:
  - Campaign Details:** Campaign Name: GA ASD Phase 1 Field Data
  - Data Links:** Link to Workflow: <https://github.com/GeoscienceAustralia/DEA-CalVal-Phase1>
  - Data Portal:** Digital Earth Australia data is licensed under the Creative Commons by Attribution 4.0 license. <https://creativecommons.org/licenses/by/4.0/>
  - Environmental Conditions:** Sampling Environment: Field
  - General:** Acquisition Time (UTC): 2021-03-04 00:12:02; File Comments: mul line1 following flame; File Format: ASD Binary; File Name: mul\_line100011.asd
- Checklist:** A vertical list of checkboxes on the far right, including 'Aquatic Ecosystem Biophysical Variables', 'Associated Campaigns', 'Campaign Details', 'Data Links', 'Data Portal', 'Environmental Conditions', 'General', 'Generic Target Properties', 'Geochemistry', 'Illumination', 'Instrument', 'Instrument Settings', 'Instrumentation', 'Keywords', 'Location', 'Names', 'Options', 'PDFs', 'Personnel', 'Pictures', 'Processing', and 'RPA Variables'.

Expand folders to the desired level, then view (show report), plot spectra, and export data. You may also manually subset data from folders by selecting multiple individual files, shown above. The report applies to the selected spectra: either at the folder or individual file level.

2) Query the NSD for specific metadata parameters:

Query Builder

Visualisations Test

Aquatic Ecosystem Biophysical Variables  
 Associated Campaigns  
 Campaign Details  
 Data Links  
 Data Portal  
 Environmental Conditions  
 General  
 Generic Target Properties  
 Geochemistry  
 Illumination  
 Instrument  
 Instrument Settings  
 Instrumentation  
 Keywords  
 Location  
 Names  
 Optics  
 PDFs  
 Personnel  
 Pictures  
 Processing  
 RPA Variables  
 Sampling Design  
 Sampling Geometry  
 Sampling Scheme  
 Scientific References  
 Soil Parameters  
 Spectral Indices  
 System  
 Vegetation Biophysical Variables

Select All  
Select None  
App. Domain: ---

Browser Query conditions

Show only my data.:

Order by: Sampling Date

- specchio
  - Geoscience Australia
  - University of Wollongong Backup
  - Aquatic Substratum
  - test

Refresh

Run Query

Matching Spectrum Identifiers

```

141961, 141962, 141963,
141964, 141965, 141966,
141967, 141968, 141969,
141970, 141971, 141972,
141973, 141974, 141975,
141976, 141977, 141978,
141979, 141980 ... (Displayed
ID list is truncated)
  
```

Number of results

47630

Show report File export Spectral Plot

Process Refl.Calc Publish Collection

Splitting rules for file export and plotting:

Split spaces by sensor  
 Split spaces by sensor and unit  
 Split spaces by sensor, instrument, calibr\_no and unit

Select the metadata category you wish to filter by on the left-hand side. For example, to retrieve all entries for NSW, select the Location category on the left, then add "NSW" to the "State/Territory" field and hit Run Query on the right:

Query Builder

Visualisations Test

Aquatic Ecosystem Biophysical Variables  
 Associated Campaigns  
 Campaign Details  
 Data Links  
 Data Portal  
 Environmental Conditions  
 General  
 Generic Target Properties  
 Geochemistry  
 Illumination  
 Instrument  
 Instrument Settings  
 Instrumentation  
 Keywords  
 Location  
 Names  
 Optics  
 PDFs  
 Personnel  
 Pictures  
 Processing  
 RPA Variables  
 Sampling Design  
 Sampling Geometry  
 Sampling Scheme  
 Scientific References  
 Soil Parameters  
 Spectral Indices  
 System  
 Vegetation Biophysical Variables

Select All  
 Select None  
 App. Domain: ---

Browser Query conditions

Location

Altitude  -

Depth  -

Location Name

Position Approximated  -

Spatial Extent

Corners	Latitude	Longitude
Upper Left	90	180
Lower Right	-90	-180

Spatial Position

Corners	Latitude	Longitude
Upper Left	90	180
Lower Right	-90	-180

Spatial Transect

Corners	Latitude	Longitude
Upper Left	90	180
Lower Right	-90	-180

State/Territory

Waypoint ID

Run Query

Matching Spectrum Identifiers

```
157151, 142384, 197416,
283988, 291198, 153071,
157167, 142400, 197432,
284004, 291214, 153087,
157183, 142416, 197448,
284020, 291230, 153103,
157199, 142432 ... (Displayed
ID list is truncated)
```

Number of results

26502

Show report File export Spectral Plot

Process Refl.Calc Publish Collection

Splitting rules for file export and plotting:

Split spaces by sensor

Split spaces by sensor and unit

Split spaces by sensor, instrument, calibr\_no and unit

As in the Data Browser, spectra found from the Query Builder can be viewed and exported in the same way.

For a full guide on the use of the Specchio application, please see the [Specchio website](#).

## Software

Direct download links: [Specchio client zip file](#) or [jar installer package](#). For further download options see the Specchio website [Downloads page](#)

Specchio is an open source application. The code base is available at the [Specchio GitHub repository](#).

## Relevant websites

- [Specchio application website](#)
- [National Spectral Database supporting documentation, terms of service and usage...](#)
- [USGS Spectral Library](#)
- [ESA PANGAEA Mineralogical Database](#)
- [NASA ECOSTRESS spectral library \(formerly ASTER spectral library\)](#)
- [National Geochemical Survey of Australia Project](#)
- [National Geochemical Survey of Australia reflectance spectroscopy measurements](#)

## References

Byrne, G., Walsh, A., Thankappan, M., Broomhall, M., Hay, E. 2021. DEA Analysis Ready Data Phase 1 Validation Project: Data Summary. Geoscience Australia, Canberra. <https://doi.org/10.26186/145101>

Hueni, A., Chisholm, L.A., Ong, C., Malthus, T.J., Wyatt, M., Trim, S.A., Schaepman, M.E., Thankappan, M. 2021. The SPECCHIO Spectral Information System, IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, vol. 13, pp. 5789-5799, 2020, doi: 10.1109/JSTARS.2020.3025117.

Aasen, H.; Hueni, A.; Machwitz, M.; Malenovský, Z.; Mallick, K.; Paul-Limoges, E.; Schlerf, M.; Schneider, F.D.; Suárez, L.; Van Wittenberghe, S.; Wieneke, S.; Wolf, S. Ecosystem specific Metadata. 2017, 10.13140/RG.2.2.14986.77761

Held, A., Phinn, S., Soto-Berelev, M., & Jones, S. (Eds.). AusCover Good Practice Guidelines: A technical handbook supporting calibration and validation activities of remotely sensed data products. 2015. Version 1.1. TERN AusCover, ISBN 978-0-646-94137-0

Rasaiah, B.A.; Jones, S.D.; Bellman, C.; Malthus, T.J.; Hueni, A. Assessing Field Spectroscopy Metadata Quality. *Remote Sens.* 2015, 7, 4499-4526

Milton, E.; Schaepman, M.E.; Anderson, K.; Kneubuehler, M.; Fox, N. Progress in field spectroscopy. *Remote Sensing of Environment* 113 Suppl. 2009, 1. 113. 10.1016/j.rse.2007.08.001

# Processing

## Lineage

### Datasets

- Geoscience Australia field data campaigns: From the ARD Cal/Val team, DEA, GA
- Aquatic Substrate Library: Compiled by Dr Arnold Dekker (SatDek)
- University of Wollongong Spectral Datasets: Provided by Dr Laurie Chisolm (UoW)

### Data types

- Spectral data: raw digital numbers (DN), radiance and reflectance.
- From spectral range VIS-NIR, SWIR1 & SWIR2, wavelengths from 350nm - 2500nm collected with instruments in the field or lab setting.

### Data Collection

- NSD spectral data has been collected by remote sensing scientists in Australia, both in field and lab environments

### Processing

- Where applicable, post-processing is indicated in the relevant metadata field

# Media

# Credits

## Owner

Commonwealth of Australia (Geoscience Australia)

## Principal contributors

Eric Hay

## Subject matter experts

Eric Hay, Guy Byrne

## License

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## Acknowledgments

Specchio Developer: Dr Andreas Hueni

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DEA ARD Cal/Val team

Aquatic Substrate Project