

RadCalNet Quick Start Guide



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1. Scope of the document

This document provides a quick start guide to the use of the Radiometric Calibration Network (RadCalNet) data.

2. How to access the RadCalNet data?

The RadCalNet data are available through the website: www.radcalnet.org

Access to the website can be requested from admin-radcalnet@magellium.fr

The RadCalNet data can be downloaded individually for each site (after accessing each site webpage) or all data for all sites in one go (from the welcome webpage).

3. RadCalNet: which data for which purpose?

RadCalNet provides reference top-of-atmosphere reflectance spectra over several instrumented sites for the radiometric calibration and radiometric monitoring of optical sensors onboard Earth Observation satellites. These RadCalNet top-of-atmosphere reference spectra are derived from both *in-situ* surface and atmosphere measurements. They are available from the RadCalNet portal (www.radcalnet.org):

- Every 30 minutes between 09:00 and 15:00 local standard time (cloud data free only)
- Over at least a spectral range 400 nm to 1000 nm (and up to 2500 nm depending on each site instrumentation) at a 10 nm spectral sampling interval and convolved in 20 nm FWHM triangle slit functions.

In addition to the top-of-atmosphere reference spectra, the following data are also provided at the same time sampling interval:

- Surface reflectance at nadir over at least a spectral range 400 nm to 1000 nm (and up to 2500 nm depending on each site instrumentation) at a 10 nm spectral resolution
- Aerosol optical properties: Angstrom exponent and aerosol optical thickness at 550 nm



- Meteorological data: surface pressure, surface temperature, water vapour content, ozone column.

These additional data could be used for various purposes, e.g.: a) to alternatively simulate top-of-atmosphere reflectance over the RadCalNet site with (radiative transfer) tools differing from the MODTRAN model used for the RadCalNet processing or b) to validate surface reflectance / aerosol retrieval schemes over the sites.

More data are available from each site on demand from the individual site owners, such as the hyperspectral surface reflectance measurements (at different spectral resolution/sampling the data provided by RadCalNet) or the Bi-directional Reflectance Distribution Function measurements.

4. How to use the data?

4.1. Data format

The RadCalNet data format is described in a document R2-RadCalNetRequirements-DataFormatSpecification_VXX.pdf under the “RadCalNet Documents” section and subsection “RadCalNet Processing” on the portal homepage.

Read carefully the document before using the data.

Note on the RadCalNet convention for reporting times:

Times are reported both in UTC and in local standard time (not to be mistaken with the local time which can be influenced by daylight savings).

4.2. Data representativity

The RadCalNet data are provided only at a limited number of spectral samples and geometry of observation/illumination.

In the following sections the representativity of the RadCalNet top-of-atmosphere reflectance spectra is discussed in terms of their:

- Spatial representativity
- Spectral representativity
- Geometric representativity

4.2.1. Spatial representativity of the top-of-atmosphere RadCalNet simulations

4.2.1.1. Railroad Valley Playa

The RadCalNet top-of-atmosphere reflectance spectra are representative of a square of 1 km x 1km centred on latitude 38.497 degrees and longitude -115.690 degrees.

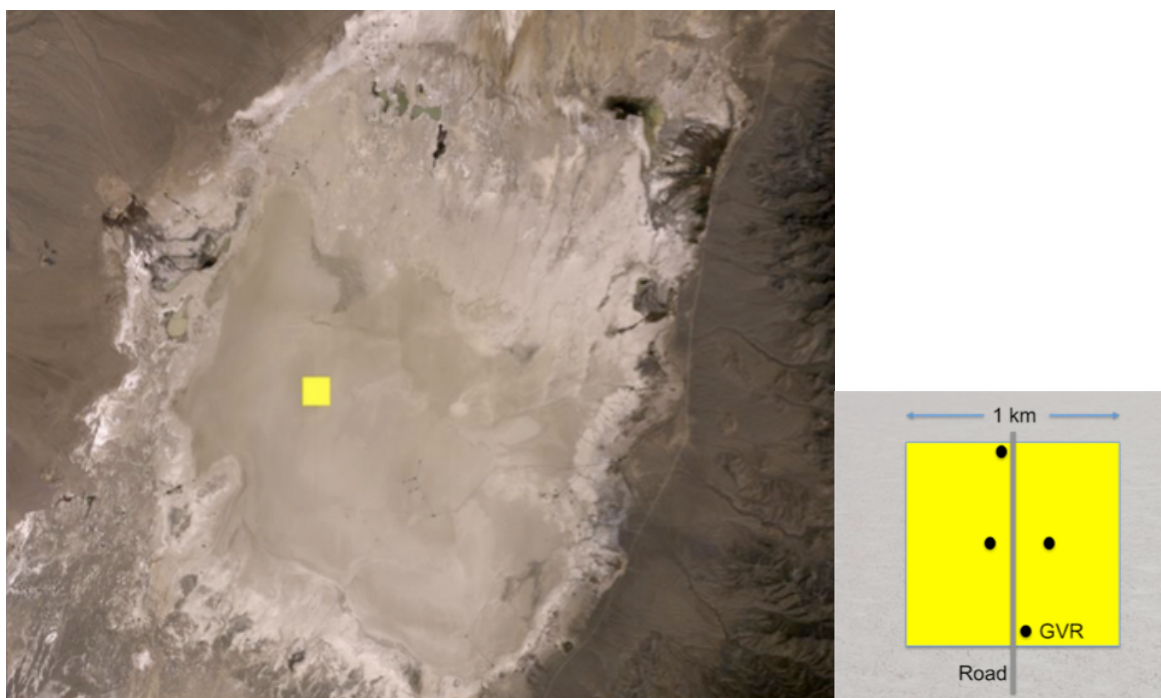


Figure 1: The Railroad Valley Playa and the target for which the RadCalNet top-of-atmosphere reflectance spectra are representative (yellow).

4.2.1.2. Baotou

Baotou artificial gravel target is a chessboard pattern target with three different shades: 2 white squares, 1 black square and 1 grey square). The RadCalNet top-of-atmosphere reflectance spectra are ONLY representative of the grey gravel square (so-called *instrument 2* data) on this target centred on latitude 40.8514 degrees and longitude 109.6291 degrees and of dimension of about 48 m across. The



Figure 2: The Baotou artificial target highlighted in blue is composed of 4 square areas of different shades (2x white, 1 x black and 1 x grey). The RadCalNet TOA simulations are representative ONLY of the bottom right grey square within this artificial target.

4.2.1.3. La Crau

The RadCalNet top-of-atmosphere reflectance spectra are representative of a disk of 30 m radius on latitude 43.55885 degrees and longitude 4.864472 degrees.

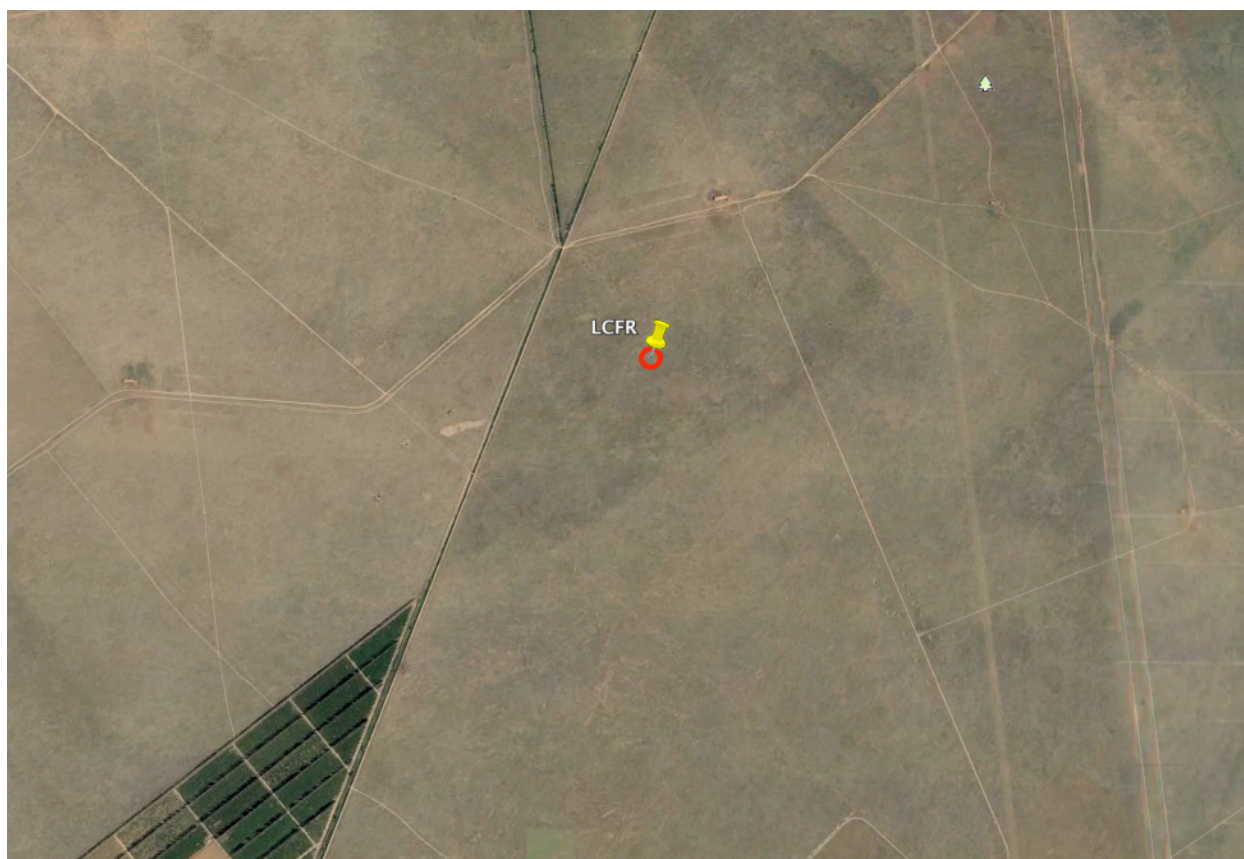


Figure 3: The La Crau site and the target for which the RadCalNet top-of-atmosphere reflectance spectra are representative (in red).

4.2.1.4. Gobabeb

The RadCalNet top-of-atmosphere reflectance spectra are representative of a disk of 30 m radius on latitude -23.6002 degrees and longitude 15.11956 degrees

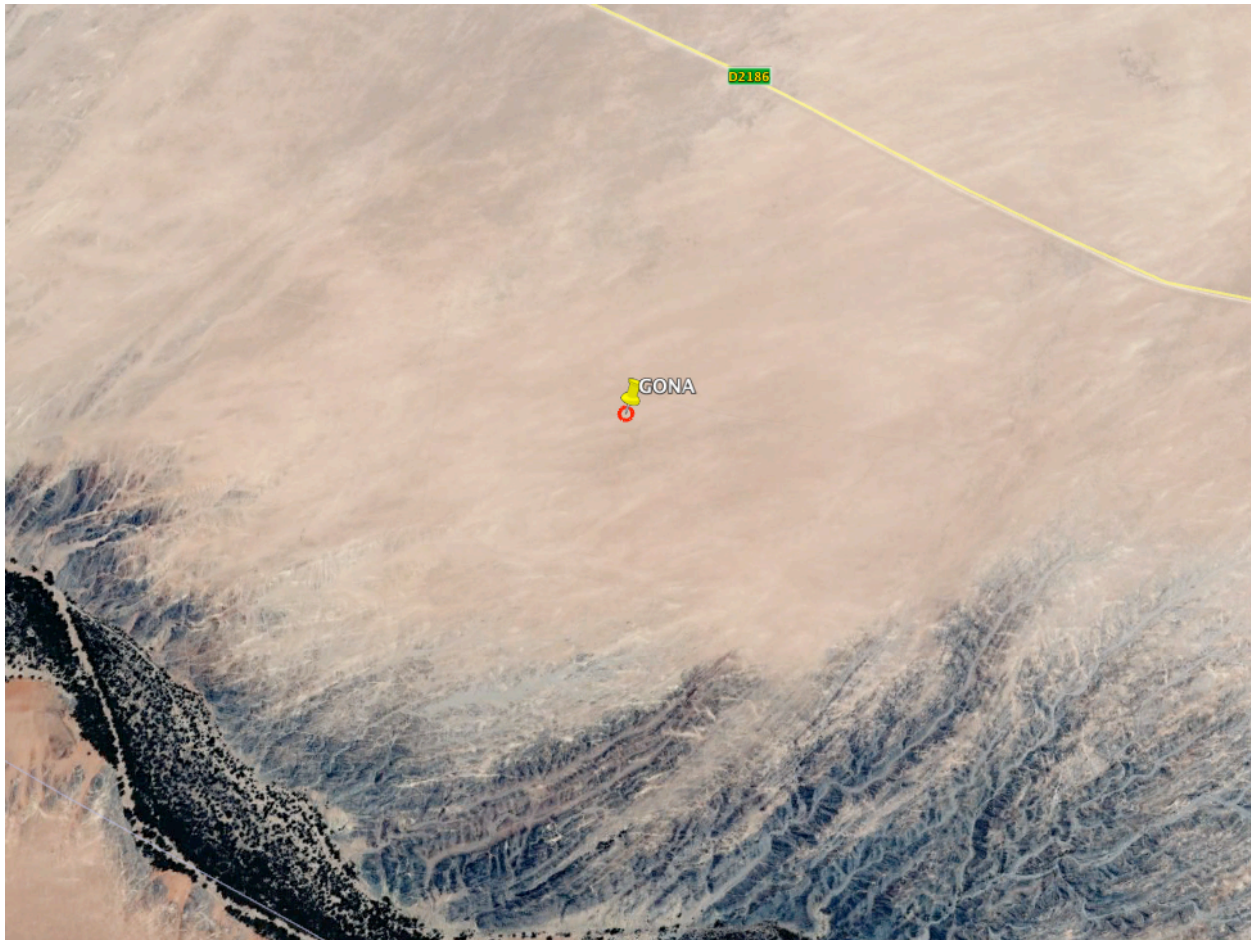


Figure 4: The Gobabeb site and the target for which the RadCalNet top-of-atmosphere reflectance spectra are representative (red circle).

4.2.2. Spectral representativity of the top-of-atmosphere RadCalNet simulations

The RadCalNet data are provided at a 10 nm spectral interval. In order to compare these top-of-atmosphere simulations to actual space sensor measurements, the simulated spectra might need to be interpolated and convolved with the spectral response function of each individual space sensor.

The spectral variations of the top-of-atmosphere reflectance in the spectral domain ranging from 400 nm to 2500 nm can be strongly affected by gaseous absorption. The comparison of RadCalNet simulated top-of-atmosphere reflectance to space sensor reflectance should thus be cautiously exercised in space sensor spectral bands affected by gaseous absorption.



4.2.3. Geometric representativity of the top-of-atmosphere RadCalNet simulations

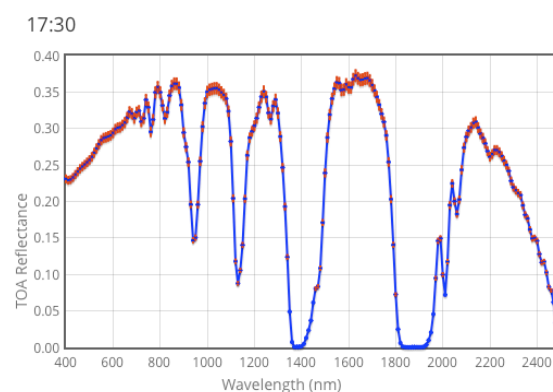
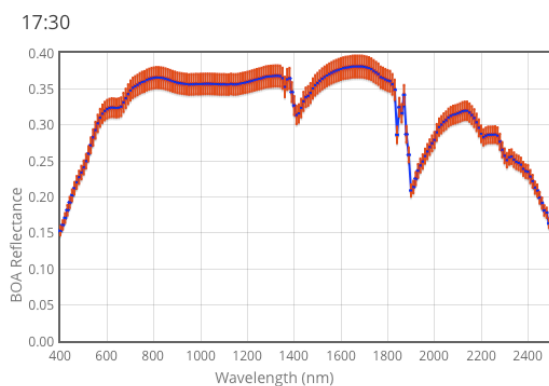
The RadCalNet simulated top-of-atmosphere reflectance spectra are representative nadir view observations only. Comparison to space sensor reflectance measurements should be exercised with caution when the sensor viewing zenith angle deviates significantly from nadir as both atmospheric and surface non-Lambertian behaviour can lead to significant deviation from at – nadir simulated signal.

Similarly, the overpass time of a space sensor which observation are to be compared to RadCalNet top-of-atmosphere reflectance spectra might not exactly coincide with the times for which the RadCalNet top-of-atmosphere reflectance spectra are provided. This implies that the solar zenith angle corresponding to the sensor acquisition time might differ significantly from the solar zenith angle input value used for the RadCalNet simulation. Again comparison between measured and simulated top-of-atmosphere reflectance should then be exercised cautiously.

As a rule of thumb it is not advised to match simulated spectra and space instrument measurements when the differences in both viewing zenith angles and sun zenith angles are larger than few degrees. When viewing zenith angle differences and sun zenith angle differences become larger, the uncertainty provided with the RadCalNet top-of-atmosphere simulations are not applicable anymore.

4.3. Uncertainties

All RadCalNet data are provided with associated uncertainties. The following figure illustrates the uncertainty associated to the bottom-of-atmosphere (BOA) and top-of-atmosphere (TOA) reflectance provided on the RadCalNet portal for each site.



5. Proposing a new RadCalNet site

New sites can be proposed for inclusion in RadCalNet. The following document gives an overview of the process (document available on the RadCalNet portal under ‘RadCalNet documentation’):

- G0 - RadCalNet Guidance - Becoming a RadCalNet site - Overview.pdf

More in depth information is available in the following documents also available from the RadCalNet portal under the documentation section:

- G1 - RadCalNet Guidance - Site Selection.docx
- G2 - RadCalNet Guidance - Site Characterisation.docx
- G3 - RadCalNet Guidance - Instrumentation and Data Processing.docx
- G4 - RadCalNet Guidance - Uncertainty Analysis.docx
- G5 - RadCalNet Guidance - Peer-Review and Comparison.docx
- R1 - RadCalNet Requirements - RadCalNet Membership Criteria.docx
- R2 - RadCalNet Requirements - RadCalNet_File_Spec.pdf

6. Contact

To more information or data from each individual site owner, please contact them through the contact details provided at each site webpage on the RadCalNet website.

For any issue related to the RadCalNet website, please contact: admin-radcalnet@magellium.fr