



## Case study: ESA Sentinel-2 Radiometric Uncertainty

### Executive summary:

The ESA Sentinel-2 Radiometric Uncertainty Report (R-UAR) and Tool (S2-RUT) were developed in order to document and characterise the radiometric uncertainty in ESA Sentinel-2 level 1C products (TOA or-thorectified radiance/reflectance). The purpose of this was to allow ESA Sentinel-2 data users to obtain radiometric uncertainty estimates (per pixel) retrospectively, thereby reducing the amount of data trans-mitted to the user.

Gorroño, J. & Gascon, F. Application of the QA4EO guidelines to the Sentinel-2 Radiometric Uncertainty analysis and Radiometric Uncertainty. (e.g.)

To ensure traceability of the final product, knowledge of both the instrument calibration steps and the full processing chain are required to provide a final, cumulative uncertainty.

The problem with providing uncertainty for each pixel is the considerable increase in the amount of data, per band, that is transmitted to the user. The ESA Sentinel-2 Radiometric Uncertainty tool removes this issue by allowing the user to calculate the per-pixel uncertainty themselves using a model of the system. The model uses best practice methodologies set out in the Guide to the expression of Uncertainty in Measurement (GUM) and QA4EO guidelines.

The tool has been developed for the data processors and data users alike, and includes the source code and documentation to ensure transparency. Such an approach allows users to review the system; this type of open access allows suggestions for improvement and other comments from the user commu-nity.

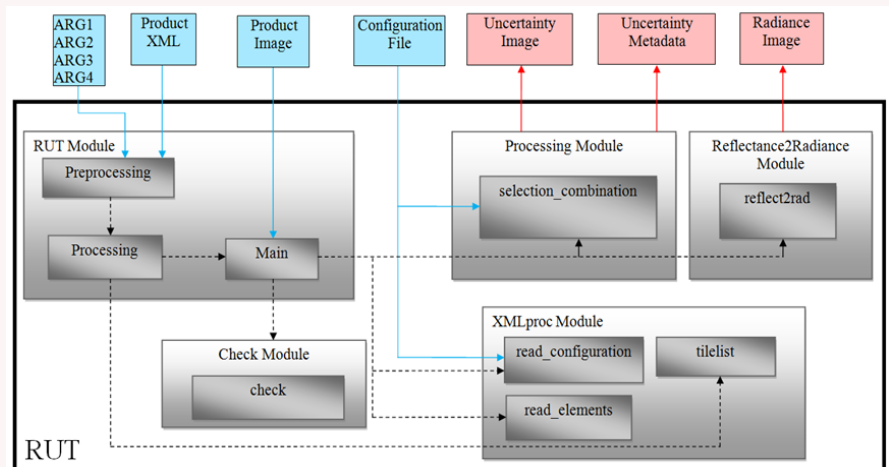


Figure 1. S2-RUT flow diagram.

### Key points:

- ◆ Uses a model of the instrument and processing chain to obtain uncertainty estimates.
- ◆ Provides the source code and transparent documentation, this includes known issues and further work.
- ◆ Reduces the amount of data that needs to be transmitted to the S2 users.

### Useful links: (to respective websites)



### Contact details:

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