

Evaluating the interoperability of Sentinel-1 Analysis Ready Data

Project Code: 19/17

Project Description:

It is firmly recognised that the space industry must adapt to meet the ever-growing interest and user requirements for EO data products and services. When considering the exponential growth of EO data availability and wide range of potential users, it becomes quickly apparent that it is simply not technically feasible or financially affordable to consider traditional methods of storing, handling and manipulating EO data. Local processing and data distribution methods currently exploited by industry and government are not suitable to address the challenge of scalability, increases in the size of data volumes, and the growing complexities in preparation, handling, storage, and analysis required to meet user requirements. To access the valuable information contained within EO data, users are required to undertake a series of complex pre-processing steps to turn the data from a 'raw' unprocessed format into a state that can be analysed. Unless the user has the expertise, software and infrastructure to handle and process this information, efficient exploitation of the data is not realised. Therefore, there is an obvious opportunity to accelerate exploitation of this data by non-specialist users across industry and government simply by enabling improved access to EO data in a format and structure that it is ready for analysis. If this is achieved, users will be able to produce solutions with greater efficiency and at reduced cost, opening new markets and use cases.

A solution to this, in part, is through the systematic and regular provision of Analysis Ready Data (ARD). According to the Committee on Earth Observation Satellites (CEOS), this is defined as "satellite data that have been processed to a minimum set of requirements and organised into a form that allows immediate analysis without additional user effort and interoperability with other datasets both through time and space". ARD data for various EO data, both optical and radar (e.g. Landsat, Sentinels, SPOT) exists in various levels of maturity. Radar data and more specifically Sentinel-1 is becoming popular, as many regions have issues with cloud cover and would like increased temporal sampling for applications such as change detection and coastal monitoring. Synthetic Aperture Radar (SAR) has the advantage of operating at wavelengths not impeded by cloud cover or a lack of illumination and can acquire data over a site during day or night time under all weather conditions. This project will assess whether a standardised workflow for processing Sentinel-1 data creates a truly interoperable product that is comparable with itself through space and time, with an application to the monitoring of Small Island Development States (SIDS) in the Pacific.

As part of this research, the successful applicant will statistically evaluate the interoperability of SAR ARD pipelines generated by both open source and proprietary software, including GAMMA, SARscape and ESA SNAP and will assess the impact of

different system parameters. By being supervised by Earth observation specialists and by working in a dynamic and international place, the student will support shaping an important aspect only recently debated in the EO scientific community.

Applicant Specification:

Applicants will need to have working knowledge of remote sensing and/or big raster data sets, preferably with pre-existing knowledge of SAR and/or signal processing, have computing skills, be able to critically evaluate problems, suggest solutions and show initiative in a supervised R&D project.

Target degree courses: Remote Sensing, GIS, Geography, Physics, Engineering, Mathematics, Computer Science and similar.

Minimum Requirements:

Experience in one or more of the following areas: mathematics, physics, computer science, remote sensing, GIS.

Preferred Additional Requirements:

Existing experience in programming, e.g. Python, Bash, MATLAB, IDL (Desired)

Further Details:

Through working in a very dynamic and diverse environment within the Catapult and as part of the Geospatial Intelligence team the successful candidate will gain a variety of soft and technical skills. This are expected to include:

Technical:

- Familiarisation with image processing and/or GIS tools.
- Familiarisation with a variety of SAR EO datasets
- Familiarisation with data analytics tools such as Python.
- Soft:
- User centred design and requirements gathering.
- Communication skills of dealing with a diverse set of technical, operational and sales staff.
- Report writing. Presentation skills.

Start Date:

The Induction Day will be held at Harwell on Monday 17 June, it is intended this will also be the start date.



The Nitty Gritty:

Interviews will start the week commencing the 8 April. 8 weeks fixed term contract to be agreed with successful candidate but nominally with a start date around Monday 17 June which is also the SPIN Induction day at Harwell. With a salary of £1,500 per calendar month.

Closing date: 5pm Friday 22 March