

# Proposal of Scientific Project for validating Benke

**Title :**

**Detection and localisation of Radio frequency interference in SMOS data**

**Supervisors :** Karim Abed-Meraim, Rodolphe Weber

**Laboratory :** PRISME, <http://www.univ-orleans.fr/prisme/signal>

**Internship period :** From February till May 2014

**Abstract :**

Soil Moisture and Ocean Salinity, or SMOS, is a satellite which provides new insights into Earth's water cycle and climate. It is based on 69 antenna interferometer which delivers averaged correlation matrices. From these Correlation matrices, images of radiation emitted in the microwave L-band (1.4 GHz) are created. The frequency band used for the observations is protected. However a lot of ground based interferers (RFI) can be seen on the received data. The objective of the study is to define algorithms able to detect and localise these RFI.



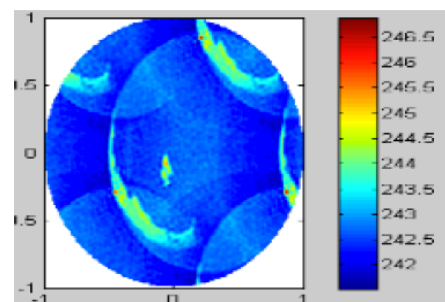
*Illustration 1: SMOS satellite*

Current approaches are based on images computed from the correlation matrices. We propose to bypass the imaging step and to detect the RFI through the correlation matrices directly. A first approach could be based on subspace decomposition. The work will consist on :

- comparing the classical imaging process based on Fourier transform and the beamforming imager
- understanding the current detection and localisation approaches (bibliography)
- develop algorithm based on subspace decomposition
- evaluate and compare localisation performances between all these approaches

**Required skill**

- Signal processing
- Spatial processing
- Matrix Algebra
- Matlab



*Illustration 2: SMOS Image (Part of South America and Falkland Islands). The red spots are potential RFI. The image presents some aliasings.*