

Ionosphere monitoring for L-band satellite signal correction



Background and Topic: Understanding the ionosphere behavior is of critical interest for satellite communication, navigation control, radars, especially for satellite onboard systems and low frequency ground-based radars. Ionosphere plasma irregularities cause severe problems to communication, navigation systems and satellite radar (L-band SAR for instance) by interfering with surveillance operations as well as disrupting the target detection and tracking. Such problems originating from the northern sub-auroral zone can be observed at mid-latitudes in the European region, but particularly in the equatorial ionosphere, which is a bed for a variety of plasma instabilities that can cause such perturbations and irregularities.

Long-term view/goal: (i) Development of new techniques to monitor the ionosphere behavior for propagation applications and satellite remote sensing (ii) Development of correction techniques to compensate ionospheric effects for L-band propagation and SAR satellite imaging.

Mission: It is proposed to use GNSS signals to collect and to analyze data in L-band. The objective is to observe and to identify ionospheric effects which could affect the L band propagation. The monitoring of TEC computed from GNSS observations will thus give information about the disturbance phenomena of the ionosphere. Once the effects observed and identified, they could be classified and modeled for an application on simulated signals, especially for SAR data. The simulation could be done from one ionosphere-unaffected real SAR image. Then, the SAR data will be fed with modeling of the observed effects and a new SAR image could be computed. In a third time, the outputs of this simulation based on real observed effects would help to investigate correction techniques.

Your profile: You hold a Ph.D. degree, with full abilities in RADAR/electromagnetism and wave propagation physics, Synthetic Aperture Radar, RF electronic and microwave engineering, applied mathematics, skills in programming (Python or MATLAB), microwave measurement (VNA), good communication skills (oral and written).

We offer: You will join a diverse research team with interdisciplinary expertise in RADAR, SAR image analysis, experimental and computational electromagnetism. You will be hosted at the SONDRALABORATORY at CentraleSupélec with strong collaborations with ONERA and NUS (National University of Singapore).

Starting date: Negotiable, **February 2022** if possible.

Duration and Salary: **24 months**, Gross salary (depending on experience): 2800 - 3000 €/month

Application material: Applications should include: (i) a cover letter, (ii) a CV including a list of publications (please highlight the two publications that are most relevant to the project) and (iii) the contact information of 2 referees. Information about Sondra laboratory (France – Singapore lab): <https://sondra.fr/>

The application folder should be sent to:

- S. Saillant (stephane.saillant@centralesupelec.fr)
- I. Hinostroza (israel.hinostroza@centralesupelec.fr)
- M. Serhir (mohammed.serhir@centralesupelec.fr)

Contact: Interested candidates are encouraged to contact S. Saillant, I. Hinostroza or M. Serhir