TRANSMIT: Training Research and Applications Network to Support the Mitigation of Ionospheric Threats

Marcio Aquino[(1)], Yannik Beniguel[(2)], Giorgiana De Franceschi[(3)], Alan Dodson[(1)], Fabio Dovis[(9)], Biagio Forte[(4)], Roman Galas[(5)], Norbert Jakowski[(6)], Tomislav Kos[(7)], Cathryn N. Mitchell[(8)], Riccardo Notarpietro[(9)], Andrzej W. Wernik[(10)].

(1) Institute of Engineering Surveying and Space Geodesy (IESSG), University of Nottingham, United Kingdom; (2) IEEA (France); (3) Istituto Nazionale di Geofisica e Vulcanologia (INGV), Rome, Italy; (4) University of Nova Gorica (Slovenia); (5) University of Berlin (Germany); (6) DLR (Germany); (7) University of Zagabria (Croatia); (8) University of Bath (UK); (9) Politecnico di Torino (Italy); (10) Space Research Center (Poland)

TRANSMIT is an initiative funded by the European Commission through a Marie Curie Initial Training Network (ITN). Main aim of such networks is to improve the career perspectives of researchers who are in the first five years of their research career in both public and private sectors. In particular TRANSMIT will provide a coordinated program of academic and industrial training, focused on atmospheric phenomena that can significantly impair a wide range of systems and applications that are at the core of several activities embedded in our daily life. TRANSMIT deals with the harmful effects of the ionosphere on these systems, which will become increasingly significant as we approach the next solar maximum, predicted for 2013. Main aim of the project is to develop real time integrated state of the art tools to mitigate ionospheric threats to Global Navigation Satellite Systems (GNSS) and several related applications, such as civil aviation, marine navigation and land transportation. The project will provide Europe with the next generation of researchers in this field, equipping them with skills developed through a comprehensive and coordinated training program. Theirs research projects will develop real time integrated state of the art tools to mitigate these ionospheric threats to GNSS and several applications that rely on these systems.

The main threat to the reliable and safe operation of GNSS is the variable propagation conditions encountered by GNSS signals as they pass through the ionosphere. At a COST 296 MIERS (Mitigation of Ionospheric Effects on Radio Systems) workshop held at the University of Nottingham in 2008, the establishment of a sophisticated **Ionospheric Perturbation Detection and Monitoring (IPDM) network** (http://ipdm.nottingham.ac.uk/) was proposed by European experts and supported by the European Space Agency (ESA) as the way forward to deliver the state of the art to protect the range of essential systems vulnerable to these ionospheric threats. Through a set of carefully designed research work packages TRANSMIT will be the enabler of the **IPDM** network.

The goal of TRANSMIT is therefore to provide a concerted training programme including taught courses, research training projects, secondments at the leading European institutions, and a set of network wide events, with summer schools, workshops and a conference, which will arm the researchers of tomorrow with the necessary skills and knowledge to set up and run the proposed service. TRANSMIT will count on an exceptional set of partners, encompassing both academia and end users, including the aerospace and satellite communications sectors, as well as GNSS system designers and service providers, major user operators and receiver manufacturers.

TRANSMIT's objectives are:

A. Develop new techniques to detect and monitor ionospheric threats, with the introduction of new prediction and forecasting models, mitigation tools and improved system design;

B. Advance the physical modeling of the underlying processes associated with the ionospheric plasma environment and the knowledge of its influences on human activity;

C. Establish a prototype of a real time system to monitor the ionosphere, capable of providing useful assistance to users, which exploits all available resources and adds value for European services and products;

D. Incorporate solutions to this system that respond to all end user needs and that are applicable in all geographical regions of European interest (polar, high and mid-latitudes, equatorial region).

TRANSMIT will pave the way to establish in Europe a system capable of mitigating ionospheric threats on GNSS signals in real time.