BELS+ PROFESSIONAL TRAINING PROGRAM

GNSS Data Processing: Theory and Practical Exercises
July 11-13, 2018

Universitat Politècnica de Catalunya, Barcelona, Spain

- **Professionals working in EGNSS and related fields of science and engineering from Europe and SEA are be invited to professional trainings in Europe and SEA. The training courses are delivered over a period 3-days in one location in Europe and in SEA and are free-of-charge.**

- **This program is supported by the European Commission and the European GNSS Agency (GSA) through the BELS+ project under the grant agreement 776369.**

▶ OBJECTIVES

This is a practical course on GNSS data processing, with more than 40% of content dedicated to practical exercises.

The course enters in detail in the study of the concepts and techniques used in the positioning by means of the Global Navigation Satellite Systems (GNSS). The theoretical foundations for Standard and Precise Point Positioning (SPP, PPP) are presented focusing in the instrumental use of the concepts and techniques of GNSS navigation. It is intended to include all the elements need to understand how the system works and how to work with it. The processing algorithms are discussed in detail and implemented through guided exercises in laboratory sessions.

The different terms involved in modelling the pseudoranges (relativistic effects, atmospheric troposphere/ionosphere and instrumental delays, clock synchronism, etc.), arise and navigation equations are solved by Least Squares estimation and by Kalman filtering.

The practical sessions are made with different programs designed specifically for the course to implement different processing modules.

▶ INSTRUCTORS

Jaume Sanz Subirana is teaching at the Technical University of Catalonia (UPC), Barcelona, Spain, since 1983, receiving accreditation for Full Professor in 2010. He has been Principal Investigator in several international R+D projects. He is co-authoring more than 70 papers in peer-reviewed journals and about 200 works in meeting proceedings. He is co-authoring 5 patents on GNSS and 4 books on GNSS.

Adrià Rovira García received his Aerospace Engineering degree in 2010 and the Ph.D. in Aerospace Science and Technology in 2016 from the UPC, Spain. He is currently a post-doctoral researcher with a Marie Sklodowska Curie Individual Fellow titled "High Accuracy Navigation under Scintillation Conditions (NAVSCIN)". He co-authors 9 papers in peer-reviewed journals, 2 book chapters and 25 works in meeting proceedings, with 1 best presentation award from the US Institute of Navigation.

Gabriella Povero received her Master Degree in Electronics Engineering at Politecnico di Torino. She is currently responsible of International Cooperation in the Satellite Navigation Research Area of Istituto Superiore Mario Boella. Since 1997 she has been contract professor at Politecnico di Torino for courses on Signal Processing and Satellite Navigation Systems. She is in the Scientific Committee of the Master on Navigation and Related Applications of Politecnico di Torino.

THE PROJECT| BELS+ proposes a set of coordinated actions to foster collaboration between Europe and Asia in the field of GNSS. In this context, the project proposes activities to raise awareness on European GNSS initiatives in South East Asia, such as organisation of events in collaboration with relevant stakeholders. In addition, some capacity building activities such as training for professionals in Europe and South East Asia are envisaged.

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▶ TOPICS COVERED

Fundamentals of GNSS Positioning

Overview of GNSS Positioning techniques
- GNSS Standalone positioning
- Code based differential positioning (DGNSS)
- Carrier based differential positioning (RTK, PPP)
- Commercial services

Code Pseudorange Modelling
- Linear model and prefit-residuals
- Code measurements modelling
- Example of computation of modelled pseudorange.

Solving Navigation Equations
- Navigation equations system
- Predicted accuracy (DOP)
- Parameter estimation: LS and Kalman Filter

Precise Point Positioning (PPP)
- Precise Satellite Orbits and Clocks
- Precise modelling for PPP
- Carrier phase ambiguities: Floating vs Fixing

Practical Lectures
- GNSS Data Processing Laboratory Exercises: the gLAB tool suite
- Model components Analysis
- Detailed measurements modelling
- Solving Navigation Equations: WLS and Kalman filter
- Kinematic satellite LEO orbit estimation
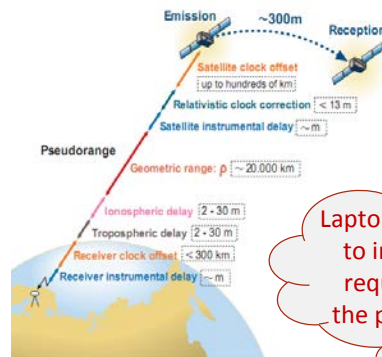
Laptop with permissions to install software is required to conduct the practical exercises
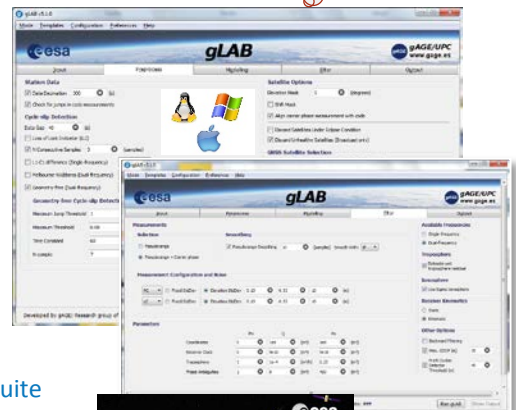
▶ Level of Difficulty: Intermediate
The participants should have a scientific or engineering background

▶ CONTACT INFORMATION
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▶ REGISTER NOW
The Professional training will be held in English. The participation **free of charge** (coffee breaks and lunches are included). Travel costs, hotel and living expenses have to be covered by the participant. **The number of participants is limited**. Early registration is recommended.

REGISTER NOW TO THIS LINK: **Professional Training registration**