

International Doctorate in Civil and Environmental Engineering

CORSO DI DOTTORATO

Seminari di Geomatica

Docenti: Prof. **Mattia Crespi**, Prof. **Augusto Mazzoni**, Dr. **Roberta Ravanelli**

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Calendario delle lezioni

Venerdì 8 Marzo 2019 ore 10,00-13,00 - 14,00-17,00 Sala Caminetto, Scuola di Ingegneria, Via di S. Marta 3, Firenze	Roberta Ravanelli, Mattia Crespi Google Earth Engine: a Cloud Computing Platform for Geospatial Analysis (6 ore)
Venerdì 15 Marzo 2019 ore 10,00-13,00 - 14,00-17,00 Sala Caminetto, Scuola di Ingegneria, Via di S. Marta 3, Firenze	Augusto Mazzoni, Mattia Crespi GNSS Static and Dynamic Monitoring: Theory and Applications to Ground and Structures (6 ore)
Durata totale del corso	12 ore

Programma

Roberta Ravanelli, Mattia Crespi

Google Earth Engine: a Cloud Computing Platform for Geospatial Analysis

According to the well-known sentence "80% of data is geographic", much of the data in the world can be geo-referenced. Geospatial data describe objects and things with location given in a spatial reference frame, now mostly the global one (often called WGS84) connected to the Global Navigation Satellite Systems. Geospatial data can be collected and analyzed using a variety of geomatic sensors and methodologies (GNSS and terrestrial surveying, photogrammetry and remote sensing, laser scanning, mobile mapping, geo-located sensors, geo-tagged web contents, volunteered geographic information - VGI).

Anyway, among them, those related to remote sensing play a pivotal role. This is the why the efficient geospatial big data handling, with particular focus on remote sensing data, has a key importance. In this respect, it is necessary to make them truly available to the wide community of non-remote sensing experts, who indeed need remote sensing big data to investigate, monitor and model a large and continuously growing variety of Earth system, social and economic processes. Google Earth Engine (GEE) is a cloud-based platform that makes it easy to access both to multi-temporal remote sensing big data and to high-performance computing resources for processing these datasets. Also, GEE users can upload their own non-public data in reserved areas and process them together the public ones, performing a synergic data fusion and integration. GEE is also designed to help researchers easily disseminate their results to other researchers, policy makers, and even the general public, to support a variety of management decisions or simply to share scientific results.

The seminar illustrates the main features of GEE, showing also some relevant applications developed by the Authors.

Practical exercises will be developed in the second part of the seminar, and the Students are kindly requested to come with their own portable PC.

Augusto Mazzoni, Mattia Crespi

GNSS Static and Dynamic Monitoring: Theory and Applications to Ground and Structures

The detection and estimation of displacements and related deformation of ground and structures is an evergreen topic, thanks to the continuous technological evolution, improvement and widening of the variety of sensors which can be used for monitoring purposes.

The classical and still fully appropriate Geomatic approach to monitoring has its foundation in the functional and stochastic modeling of the observations which can be supplied by the sensors with respect to the interesting unknown parameters (displacements, deformations), in the testing of the statistical significance of the results, and in their modeling and interpretation.

Within the mentioned variety of the available sensors, GNSS (Global Navigation Satellite Systems) receivers play a key role for outdoors applications to ground and structures monitoring.

The seminar, starting from some recalls on GNSS theory (with focus on GPS and some nods to Galileo) illustrates what is now possible with standard geodetic class and low-cost receivers, both for long-term static monitoring and real-time dynamic monitoring, with some focus on the patented VADASE approach.

Practical exercises will be developed in the second part of the seminar, and the Students are kindly requested to come with their own portable PC.