University of Genova

Department of Earth, Environmental and Life Sciences

Doctorate Course in Earth and Environmental Science and Technology

Università degli Studi di Genova

STAT

Dottorato in Scienze e Tecnologie per l'Ambiente e il Territorio

Curriculum in Earth science

Research Theme n 4

Titolo **Accrescere la conoscenza dei sistemi naturali attraverso la valutazione dell'incertezza dei dati ambientali: teoria e applicazione operazionale** Title **Increase the knowledge of natural systems through the evaluation of the uncertainty of environmental data: operational theory and application**
Tutor and co-tutor Marino Vetuschi Zuccolini (marino.zuccolini@unige.it), Michela Mortara (CNR-IMATI)
To fully represent a 3D view of an environmental variable's distribution in a geometrically complex geological system, or more generally in a Natural System, is a difficult task. The complexity is due to a scarcity of samples in space (e.g. logs in a reservoir, soil samples, fixed acquisition sampling stations), or to implied difficulty in the in situ measurement of labile parameters. To this it must be considered that measures are generally considered error-free, although not being so. As a consequence of this, algorithms used routinely produce only one possible scenario, among all, without assessing the embedded uncertainty. The integration of spatial uncertainty affecting any real data-based modelling, which is the subject of the Research program, leads to an increase in the level of knowledge available for decision-makers in an epoch of rapid environment adaptation to climate change. The aim is achieved through the development of a generalized universal multi-scale, parallel and distributed code applicable to situations found among others in the geology of reservoir, in hydrogeochemistry, in oceanography or in infrastructure engineering. Thanks to the support of DIGIMAT Group, a leading company in SW development for the digital management of the environment, we intend to expand the operative knowledge developing an Open Source stochastic tool released under TRL 5-9. DIGIMAT is the high-level platform for evaluating the computational products developed, thanks to the different situations faced in the wide range of international projects.
PON research line: Green. PNR: Security of Natural Systems – Art. 1.2, 1.4, 2.5, 4.
Company hosting the PhD: DIGIMAT Group www.digimat.it
Financial support: **100022-2017-MV- ALTRI-EP-N_001**
Tutor's publications (max 3) M. Miola, D. Cabiddu, S. Pittaluga, M. Mortara, M. Spagnuolo, M. Vetuschi Zuccolini (2021) 3D modeling and integration of heterogeneous geo-data in P. Frosini, D. Giorgi, S. Melzi, and E. Rodolà (Editors) STAG: Smart Tools and Applications in Graphics, pp. 1–11 (in revision) M. Caccia, R.Ferretti, A. Odetti, G. Bruzzone, M. Spagnuolo, M. Mortara, S. Berretta, D. Cabiddu, S. Pittaluga, Marino Vetuschi Zuccolini, Lorenzo Brignone (2019) Robotics and adaptive sampling techniques for harbor waters monitoring: the MATRAC-ACP project OCEANS 2019, Marseille 1-8. S. Berretta, D. Cabiddu, S. Pittaluga, M. Mortara, M. Spagnuolo, M. Vetuschi Zuccolini (2018) Adaptive environmental sampling: The interplay between geostatistics and geometry. In M. Livesu, G. Pintore and A. Signoroni (Editors) STAG: Smart Tools and Applications in Graphics. 1-8.