SOLID EARTH GEOPHYSICS

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The research of the Solid Earth Geophysics group is mainly devoted to the development of physical forward predictive and inverse modeling, at different spatial and time scales, and the analysis of geodetic data (GNSS, InSAR, GOCE, GRACE and GRACE-Follow on), with the aim of gaining insight into the physics of earthquakes and of lithosphere dynamics.

The potentialities of the joint use of geodetic (crustal displacement and gravity) data and geophysical modeling has been widely exploited by the research group within the frame *of ASI- and ESA-funded projects being one of the main objectives the assessment of the gravity signatures of Solid Earth processes leading to the enucleation of earthquakes.*

Research is particularly focused is on the Calabrian Arc and surrounding regions where one of the primary Solid Earth tectonic process, subduction, induces important perturbation on the strain and stress fields, contributing to define the background tectonic environment of the inter-seismic loading phase. Subduction is also responsible of a huge shallow and deep mass redistribution, that can be seen as a peculiar signature on the observed gravitational data.

The PhD students may develop their research within the following topics.

1. Numerical geophysical modeling of slow tectonic processes in different geodynamic context, such as subduction, collision, post-collision, extension, intra-plate deformation.
2. Analytical and numerical modelling of earthquakes, post-glacial rebound and true polar wander.
3. Geodetic data inversion for estimating stress changes within the lithosphere, its rheological properties, as well as the fault slip and creep or any other forcings.
4. Analysis of the thermo-rheological structure of the crust-mantle system.
5. Assimilation of statistical methodologies into geophysical forward models aimed to defining model uncertainty.
6. Integration between geological data and numerical geophysical forward models to reduce the ambiguity among different geodynamic hypotheses.
7. Integration between gravitational and GNSS data and numerical and analytical geophysical modeling.
8. Analysis of space gravity data from GRACE (Gravity Recovery and Climate Experiment) and GOCE (Gravity and steady state Ocean Circulation Explorer) missions.

The PhD students benefit of laboratories and equipment available at the Department of Earth Sciences "A. Desio" of the University of Milan. In particular, the PhD students will be able to use the high performing computer laboratory and the Unitech calculation infrastructure for processing complex data, INDACO.