Lithosphere dynamics: interplays between models and data

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Thermo-mechanical geodynamic multi-process modelling is a large, growing, important scientific field that has become an independent branch of Earth Sciences, which is naturally cross-disciplinary and highly integrative. The role of physically-consistent thermo-mechanical modeling has evolved from simple illustration of first-order geological and geodynamic concepts to in-depth integration of geological and geophysical data in a physically consistent framework allowing not only for explanation of the existing data but also for formulation of new concepts, guidance for future field observations and laboratory experiments. The state-of-the art models can pinpoint internal inconsistencies in the input data thus orienting field and laboratory research towards verification and acquisition of new data. Modeling thus has also become a versatile tool for validation and interpretation of geophysical and laboratory data and geological observations, specifically of "data models" such as seismic tomography, geodesy, petrology, rheology models and concepts. Current challenges of geodynamic and small-scale modelling are therefore multifold, going from better understanding of physics of the geodynamic and geological processes to bridging the gaps between different spatial and temporal scales of observation and different, cross-disciplinary types of observations and elaboration of new geodynamic hypotheses and concepts. Of particular importance will be also discussion on input parameters for dynamic models, that is, also on the ways of parameterization and validation of data coming from laboratory experiments and field observations that are often subject to uncertainties inducing non-uniqueness of model results .

The goals and potential benefits of the project:

1. International integration and cooperation for multi-disciplinary research in a frontier of science and strengthening the relationship with other Task Forces of the International Lithosphere Program.
2. Promotion of quantitative physical solid Earth's sciences for understanding fundamental questions of lithosphere dynamics and mantle-lithosphere interactions and implementation of this knowledge to the needs of society.
3. Discussion, evaluation and dissemination of new numerical concepts that can be used to address the key questions of the project.
4. Educational outreach: The project might bring together scientists and students from ~ 25 countries: Australia, Austria, Canada, China, France, Germany, Italy, the Netherlands, Norway, Russia, Switzerland, UK, Ireland and USA...

Non-exclusive list of Core Participants

1. UPMC Paris ; 2. ETH Zurich ; 3. U. Utrecht ; 4. U. Lausanne ; 5. U. Durham ; 6. DIAS Dublin ; 7. GFZ Potsdam ; 8. U. Munich /U . Mainz ; 9. U. Rome II ; 10. U. Frankfurt ; 11. U. Oxford ; 12. R. Imperial College ; 13. Leeds University ; 14. U. Orleans ; 15. U. Toronto ; 16. IPGP ; 17. ENS Paris & Lyon ; 18. U.Nice ; 19. U. Montpellier ; 20. Geological Survey of Norway in Trondheim and Bergen; 21. U. Bergen ; 22. Monach U.; 23. U. Rennes; 24. MIT Boston; 25. U. Texas; 26. U. Karlsruhe