

## Project Summary

It has been 35 years since the acceptance of plate tectonics theory, but no definitive agreement has yet been reached among geoscientists on the fundamental nature of the global dynamic processes that drive plate motions. There are still vigorous debates about the proportion of heat coming from the core, about the degree to which the 670 km discontinuity impedes whole mantle circulation, about the origin of mantle plumes, the chemical/thermal nature of heterogeneity in the deepest mantle, or the nature and importance of coupling between the mantle and the core. In the meantime, tremendous progress has been made in the quality and quantity of data collected, for example, in the US, through the IRIS program in seismology, through state of the art analytic facilities in geochemistry, advances in computational technology in geodynamics, or through access to advanced accelerator facilities in mineral physics. It is becoming increasingly clear that significant progress in our understanding of the fundamental global scale dynamic processes of the Earth's interior can only be achieved through an integrated, multi-disciplinary approach, combining knowledge and latest achievements in each of the relevant disciplines. Yet, truly interdisciplinary work remains a formidable challenge in solid Earth geosciences.

We propose to take the first step towards the establishment of a long-range intellectual framework that will allow a more effective cross-fertilization of the different disciplines. A related goal is to try and attract more numerous talented undergraduates to consider graduate studies in geosciences. We believe that such a framework can best be achieved through the creation of a Cooperative Institute for Deep Earth Research (CIDER).

In the present proposal, we do not request support for the Institute. That can only be defined and established through an extensive planning process, involving a wide cross section of the geoscience community. We specifically propose to hold a series of 4 workshops over a period of one to two years, whose goal will be to define the scope and activities of the future CIDER. All four workshops will address the question of global earth structure, evolution and dynamics, but from the point of view of a particular field, with the goal of educating colleagues in other fields. Participation will be open to the community. The direct product of each workshop will be a report listing the key questions identified during the workshop, whose resolution requires an interdisciplinary approach, as well as recommendations for the activities and structure of the future CIDER. These documents will then be used as the basis for the preparation of a detailed proposal for the establishment of CIDER.

Further down the line, we envision that the proposed institute would have minimum permanent staff, and would be dedicated to providing a stimulating environment for a critical mass of visiting senior scientists, resident post-doctoral fellows and visiting graduate students, selected at any given time to represent the various disciplines around a selected theme. The main on-going activity of the Institute would be to organize workshops and short courses on focused topics/themes of multi-disciplinary interest, not excluding disciplinary topics that might be perceived as relevant to further the collective education of the corresponding community. In addition, the institute could provide a useful framework for community activities such as, for example, the on-going development of the new Reference Earth Model, or the development of modeling codes required in geodynamics or in theoretical mineral physics. The scope of the institute may eventually be expanded beyond the "deep earth" focus.