

Review of IDL Application for funding 2019-2022 by the IDL Scientific Advisory Committee (SAC) Meeting of February 5-6, 2018

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Committee Members:

Sierd Cloetingh (Netherlands Research Center for Integrated Solid Earth Science)

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Montserrat Torne (ICTJA-CSIC, Barcelona, Spain), unable to attend, but contacted several times during the meeting by Skype

Proceedings

The IDL SAC committee was invited by the IDL leadership to provide an examination of a near-final draft of IDL's application to FCT for funding for the period 2019-2022. In this context in addition to the draft proposal, a meeting was organized at IDL where the application was presented by the IDL director, followed by presentations of the five Research Groups constitution IDL. Subsequently, seven PhD students presented the results of their research findings in the context of their participation in the EARTHSYSTEMS PhD Program coordinated by IDL. The committee also had an informal meeting with a group of PhD students from the different research groups.

IDL – its mission and positioning as an Earth system program

Although IDL has been in existence for more than 150 years, it has seen tremendous changes in the last 5 years. It was augmented by a number of research teams with complimentary research skills, enabling IDL to address Earth system science on a hitherto unaccomplished level of expertise. In doing so IDL has successfully integrated these groups in its mission, striving for excellence, and providing a platform for training and education to research for a new generation of researchers. It has also ventured into new areas, not covered by its predecessor institute, examples include societally relevant frontier research in the domains of climate change, natural hazards, and energy systems, addressed by large-scale observational programs and multi-scale numerical modeling. It has assembled critical mass vital to be at a forefront of the highly competitive field of integrated Earth system science. It is the largest concentration of Earth system science in Portugal, and a natural partner in major European and global programs. With the current research application, IDL aims to secure its continuity and leadership to an ambitious research program for the period 2019-2022.

Assessment of proposal

Past performance and key achievements

The past performance of the individual research groups has been well documented in the current proposal with numerous examples of scientific breakthroughs such as a new understanding of mega-heatwaves at the subcontinental scale, the use of paleotsunami

deposits as a tool to compute tsunami wave properties, the development high resolution imaging of crustal deformation and seismic clustering, the development of the concept of metallogenic province, and the use of geospatial techniques in support of urban solar energy exploration. A number of innovative cross links were created between the different research groups such as in the research of climate change impacts (RG1, RG2, RG3), wind and solar energy (RG1, RG2, RG5), tsunamis and earthquakes (RG2, RG3, RG4). The committee supports the strategy of IDL to publish in high-impact journals and was favorably impressed by the large number and high quality of the research publications. On average, the 5 research groups have published 192 papers/year in the peer-reviewed scientific literature, mostly in top journals. The societal impact of the research is significant, notably in the domain of climate change, natural hazards, coastal evolution and ocean sciences, geo-energy and the energy transition. IDL plays a key role in large-scale European scientific programs as well in the coordination of large-scale scientific infrastructure such as European Plate Observing System (EPOS), European Multidisciplinary Seafloor and water-column Observatory (EMSO) and Land Surface Analysis Satellite Applications Facility (LSA SAF).

Forward look and future plan, objectives and research strategy

The committee supports the forward look and research strategy for the period 2019-2022 developed by the IDL leadership. IDL has identified a number of overarching goals with a high potential for scientific breakthroughs in Earth system science. After realizing integration within the different research groups, IDL's strategy is now to further develop and harvest at the interfaces of the research groups, achieving an innovative approach to unravel the interactions between solid-earth processes, surface interactions and climate as well as natural hazards. Through its integration of marine research and research covering the continents, a wholly planetary-scale research program is pursued. Through the combination of field studies in carefully selected natural laboratories such as the Central Atlantic Ocean and the Iberian Peninsula and its continental margins, laboratory studies and multi-scale numerical modeling, IDL has become an attractive partner for large-scale ambitious scientific programs in an international context. Examples where major scientific breakthroughs can be expected include: a new approach to geodynamic processes, going beyond classical plate tectonics by addressing the impact of 3D heterogeneous crustal and mantle structures with new modelling techniques; a next generation of environmental prediction systems, incorporating fully coupled earth-system components, and usable for different time ranges; the incorporation of new remote sensing data, namely GNSS and InSAR, in environmental monitoring and prediction.

Governance structure

A compact and efficient governance structure has been set up. It is strongly advised to add more human resources to the high-quality administrative support currently allocated to this program.

Funding

The programmatic funding is dedicated to integrating the research effort of the different components of earth system science components with funds allocated to both numerical modeling and observational studies of the ocean floor and the land surface for overarching objectives in the domains of climate and earth-system modelling, high resolution surface observation, and deep ocean observation. It is noted that FCT funding has a multiplying effect on external funding. The committee notices that the IDL is

conservative in terms of funding to be expected from the EU and industry. IDL, however, should use its full potential to raise significantly the contribution for FP9 and industry research budgets.

IDL has been capable to attract high-quality PhD students, including students from abroad and with a good gender balance. With the further development of the EARTHSYSTEM program, IDL has the potential to further foster an attractive research climate for nurturing young talented researchers.

Programmatic funding for research positions, scientific infrastructure and networks

IDL has been able to keep a competitive flow of young researchers, making good use of research contracts in the past decade, most of whom were able to transit to permanent positions in different places. Programmatic funding for new research positions is vital to guarantee the training of a new generation of independent researchers. The upgrade of the high performance computing is crucial for IDL activities across all research groups. An investment in IDL-developed Ocean-Bottom-Seismometer Systems (OBS) is also highly justified. Finally, IDL is a key Portuguese partner in EPOS and EMSO, two large European infrastructures, benefiting from and contributing to both networks.



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