The Internal Advisory Committee (IAC) and its Review Process

IAC Meeting: 12 – 13 July, 2010
I*AC Committee Members*:
Sierd Cloetingh (Netherlands Research Center for Integrated Solid Earth Science)
Michael Bevis (School of Earth Sciences, Ohio State University)

1) Review Procedure

The committee received the following documentation:
•The IDL Annual Report for 2009
• IDL Research and Outreach for 2001/2015 (version 1.0)
• The 2010 External Evaluation of Associated Laboratories report on IDL sponsored by the Portuguese Foundation for Science a.d Technology (FCT)
• A checklist of 2009 recommendations made by the IAC, actions taken, and related achievements.

Committee members Cloetingh and Bevis visited. Committee member ****** could not attend, but contributed to the report in writing.

Day 1 Cloetingh and Bevis attended presentations by the Director of IDL, and each of the ten research groups, and individual presentations by seven of the new researchers. These formal presentations were followed by an open discussion and a poster session by Ph.D. students presenting their recent research. In the afternoon the committee met with eight of the ten research groups one at a time for an in-depth discussion of past and present performance, group strategy and scientific planning. During this the committee explicitly addressed issues related to the synergies between research groups, opportunities for the generation of added value, the optimal use of existing resources, and the need for new initiatives to attract funding.

In the evening the committee attended an informal dinner organized by IDL which was attended by 25 IDL researchers.

Day 2. The committee interviewed the two remaining research groups, and then attended 12 short presentations by Ph.D. students on their ongoing research within IDL. These presentations were enthusiastic and quite impressive. At the end of this session the committee and the graduate students discussed the formation of an IDL association of graduate student researchers, to provide IDL leadership with a different perspective and the students with a mechanism to voice their concerns about issues that cut across the needs of individual research groups and affect many students.

The committee noted with pleasure that most of our previous recommendations had been partially or fully implemented with the encouragement of IDL's leadership. Most of these recommendations were endorsed by the external committee in its

2010 report, with the notable exception of our recommendation to incorporate additional expertise in hydrology within IDL. We understand that IDL did attempt to hire an hydrologist, but a suitable candidate did not appear. The IAC persists in its recommendation to hire a hydrologist, if possible, because this expertise would help integrate atmospheric, solid earth and land use activities within IDL.

The scope of this report:

The Internal Structure of IDL

The committee feels that IDL has made excellent progress in consolidating itself in the aftermath of a major and sometimes stressful restructuring. We think that IDL is lucky to be directed by a fair and insightful leader, Miguel Miranda, and to enjoy the high-level administrative support of the incomparable Celia Lee.

The internal organization or structure of IDL, in terms of its various research groups, etc., is working remarkably well given the recent birth of the organization. But just as any great earthquake is followed by aftershocks, it would be unrealistic for IDL to expect that it could immediately crystallize into an optimal organizational structure. Some readjustment or iteration would probably be beneficial, and indeed such readjustments should probably continue throughout the lifetime of the institution, though presumably with a decreasing rate of change. In our opinion this fine-tuning of the internal structure of IDL should be openly discussed so as to promote self-organization rather than a structure largely imposed from above, or on the basis of historical associations.

The committee is somewhat concerned to see that some natural groupings of talent have divided into different research groups, e.g. paleomag/geomag specialists are now split between RG2 and RG5. In some cases, these apparently illogical arrangements seem to be motivated more by personality conflicts than any rational scientific or programmatic agenda. The committee recognizes that sometimes personal antipathies can be so strong as to justify *ad hoc* reassignments of individuals within the research group structure, but we would like to point out that (i) such accommodations or indulgences tend to randomize the logic of institutional structure and therefore harm its efficiency and sense of purpose, and (ii) schisms between senior researchers working in the same or massively overlapping areas tend to do damage to graduate students, and are therefore unprofessional. We believe that is desirable but not actually necessary to like people in order to work with them in a professional manner, and that an organization tends to move in a positive direction when it has a shared and coherent sense of purpose.

Discussion of individual research groups

RG1. The committee is very impressed by the vitality, ingenuity and productivity of this research group. They have initiated many new projects, and they have published 25 papers in peer reviewed journal. It has been successful in acquiring

research funding, but now needs to be careful to deliver on all of its promises. We note the incorporation of 19 th and 20 th century meteorological observations from Portugal and its former colonies into international reanalysis projects. The move into dendrochronology and paleoclimatology seems to use an useful extension of their historical approach. Like several other groups RG1 badly needs more technician support, and, at least in terms of a computer technician, this need is more likely to filled if the technician could support more than one research group. RG 1, 6 and 10 are collaborating and synergizing in a way that might serve as a model for some of the other research groups within IDL.

The committee shares RG1's concern about the importance of the conventional meteorological stations that it maintains, particularly while new Automatic Weather Stations are producing data of sometimes questionable quality. There is something attractive about maintaining the continuity of an observational times series that began in Lisbon in 1853.

RG2. This applied geophysics group is dominated by shallow and deep electromagnetic (EM) surveying technology and applications. The group has published 27 papers in ISI journals which is a very significant achievement. Despite the loss of its MT specialist, the EM group is highly productive and well funded. Its links to hydrology seem very promising. Its activity in geothermal system characterization could be a major component of the emerging Energy theme within IDL. It seems rather unfortunate that volcanologists in RG8 are entirely disconnected from this important activity. The instrumentation lab needs to be upgraded. The group has very high individual workloads, and would probably benefit from additional personnel. RG2 is well positioned for industrial funding, which is strategically important for IDL.

The paleomagnetic group within RG2 seems anomalous, and probably serves as a distraction to the EM group. We address the split of the paleomag/geomag specialists between RG2 and RG5 in another section of this report.

RG3. This coastal hazards group is quite small, but it is remarkably positive and extremely well focused, and has been able to identify and implement some well thought out strategies for building its importance and external funding levels. The committee is very impressed by its web presence and the progress it has been making towards becoming an operational entity with a significant user community. Some of the other groups could benefit by studying RG3's approach to user community building. We are delighted by IDL's acquisition of a tripod LIDAR, and with RG3's determination to exploit this powerful and flexible tool. Like most groups, RG3 has a need for technician support, and we hope that IDL can find some means for providing it. This group's contribution to IDL's overarching Natural Hazards theme is large in comparison to its size. The group has been able to attract a relatively large number of students for its size which helped them to publish 12 ISI papers in the 2009. We note they are attracting funding from local authorities as

well as European agencies. We congratulate RG3 on their participation in the outreach brochure on climate change.

RG4. This seismology group is fairly but does excellent work in seismic structure and seismicity studies, and has established a high international profile. It is well embedded in major European research initiatives, including TOPOEUROPE and the European Plate Observing System (EPOS). The group noted the difficulty it has had deploying its OBS systems without access to ship time, which is a problem they have on common with RG9. The group's research has a strong regional flavor, even while addressing problems of great international interest such as the detection of volcanic plumes in the Azores and Cape Verde islands. They also investigate the connection between deep earth structure and processes in West Iberia and the Gulf of Cadiz. This means that they contribute in a very significant way to IDL's overarching theme in Natural Hazards. This group would benefit from a pool of portable land-based broad band stations. This would require a significant investment, but one that the committee feels is warranted on the basis of their past activities and accomplishments.

RG5. This is a highly productive group that published 27 papers in high quality journals. The overall research porfolio is rather incoherent, and though this has not hurt their productivity in the short term, we agree with them that it is desirable to generate a better sense of shared goals, priorities and strategies for future growth. Present research foci include tectonics and geodynamics of Iberia up to 83 Ma, ultra-slow spreading in the Azores, geochronology, analog/numerical modeling. As noted above, we find the split of paleomag/geomag talent between RG2 and RG5, despite the fact that they share laboratory facilities, rather difficult to understand. The same might be said about the split of analog modeling talent between RG5 and RG9. These anomalies suggest to use that the internal structure of IDL has yet to be perfected. RG5 has submitted 6 applications to FCT, is planning acquisition of a computer cluster, and has developed a new course in geodynamics and modeling. A novel development in the analog modeling area has been the modeling of gravity currents. We view RG5 as a collection of extremely talented individuals who have yet to arrive at a sense of common purpose. A good place to start might be a re-examination of the group's name.

RG6. This atmosphere and climate modeling team is a coherent and strongly-motivated team with high international visibility. It has attracted a very talented group of Ph.D. students, many of whom are shared to some extent with RG 1 and RG10. This group drove the development of the Atmosphere and Oceans seminar series which has been highly successful and could serve as a role model for other special focus seminar series. RG6 operates a computer cluster, but is rather burdened by the lack of technical support. They are highly networked with European and US research groups, and has an excellent program of student exchanges. We hope this group will be able to exploit these many positive features so as to increase its external funding, and therefore overcome some of its resource problems. We think its interest in solar and wind energy is a very good idea,

especially wind energy since it involves an *ongoing* requirement for specialized weather predictions.

RG7. This geodesy group is divided into InSAR and remote sensing group and a GPS geodesy group. Their publication rate is rather modest, but apparently improving. The InSAR group is engaged in an ambitious and interdisciplinary effort to monitor atmospheric water vapor. The GPS group has been analyzing the national CGPS network, which is a welcome development, but, as we address below, has not been building and maintaining survey GPS networks within Portugal, which limits its contributions to IDLs Natural Hazards theme. The group has been more effective at developing crustal motion networks in the Atlantic islands. Although RG7 is beginning to work the meteorologists of RG6 and RG10, they would probably benefit from closer cooperation with RG4 and RG8.

RG8. The committee noted that the seismic and volcanic hazards group have submitted a large number of project proposals, and seem to be gathering momentum. They have expanded their regional scope to include the northern Andes and Turkey. They are engaged in traditional but world class field geology, and also trenching and tectonic geomorphology. They maintain a strong focus on neotectonics and paleoseismology, and they have produced a very high quality geological map of Madeira Island. We hope that both the paleoseismology and volcanology projects can take advantage of IDL's new tripod LIDAR. The volcanology group has expertise which is highly relevant to geothermal investigations, and the assessment of tsunami risk and tsunami warning systems. They need access to a high quality and large format plotter which would allow IDL to publish their valuable geological maps, and support a more intense outreach effort which might benefit their group and IDL because of the extremely photogenic nature of much of their research, especially in the volcanic islands. We recommend that they build stronger links to analog and numerical modeling studies, and continue their efforts to embed themselves in large European projects. We also suggest, that several of the geophysical groups within IDL could take better advantage of RG8's considerable skill in field geology. We address elsewhere, a possible interaction with the GPS group within RG7.

RG9. The sedimentary basins group is relatively new but a well-focused and highly energetic team. It published 14 papers in ISI journals signaling a major increase in its research momentum. The group is well connected internationally, and participates in international projects in marine geology. Their work on the seismotectonics of the continental margins, including the Gulf of Cadiz, is rapidly advancing and allows them to make a significant contribution to IDL's overarching themes in Natural Hazards and Energy Resources. The group is developing excellent relations with some major oil companies, attracting industry funding. It has developed coursels in basin dynamics and related areas with the participation of various industry groups. This should enable this group and IDL to place more students into the oil industry, and further develop an academic-industrial partnership. They are an associate partner of the European BasinMaster program.

They participate in the TOPOEUROPE program and have submitted a IODP proposal for drilling in the Gulf of Cadiz. Like RG4, this group needs access to more ship time. We applaud their application to Eurofleet, but urge FCT to examine this issue in terms of national resources as well. ON the basis of their performance and considerable potential, the committee feels that this group deserves at least one permanent position.

RG10. This Climate and Land Use group is well focused, innovative and highly successful. It synergizes with RG1 and RG6. Its research is diverse but often of great practical interest. It works in areas a diverse as fire risk assessment, drought characterization, the impact of land processes on vegetation, etc. It has potential to drive new synergies with agronomy and even disease analysis. RG10's user driven approach seems to be working very well, and exposes IDL to a broad and important community. RG10 is involved in some long term initiatives such as the LAND SAF project that should provide it with a greater continuity of funding than many of the other research groups enjoy. The committee fully supports their request for a satellite download station which would provide them with important new opportunities at a relatively minor cost. This group reports some difficulty recruiting high quality graduates students despite its considerable successes in the research arena. We suspect that the solution to this problem must be established in cooperation with RG 1 and RG6, and will probably involve an international aspect.

Seminars

The committee is delighted to see the success of the new IDL Lecture Series. We like the idea of having an overarching theme for each semester, and the number of lectures (about 6/semester) seems reasonable too, because it leads to an emphasis on quality rather than quantity, and it leaves room for parallel lecture series with a more consistent focus, such as the Atmosphere & Oceans seminar series. The latter series also seems to be enjoying considerable success, and we suggest that it might serve as a model for additional 'focused' lecture series. For example, a "Geodynamics" series might attract members of RG 2, 4, 5 and 7 and encourage them to build new synergies. Seminars also help new members of IDL to integrate into the institution.

GENERAL OBSERVATIONS AND RECOMMENDATIONS:

Technicians.
Many groups have expressed an urgent need for more technicians, and the committee recommends that IDL sets up committees on the sharing of technicians and related resources, to maximize the benefits of past and additional investments.

Facilities and Instruments.
Similar consideration to those expressed above apply to the needs associated with computer clusters. There are operational clusters, and needs to additional

computational resources, and the committee feels that IDL needs to invest in multiple use computer facilities to the maximum extent that it can.
Another example of a useful shared resource would be a large format, high quality plotter.

Websites, Outreach and User Communities.
Some groups such as RG3 have developed sophisticated and valuable web presences, and IDL needs to consider if other groups can benefit from this type of expertise, rather than have each group independently develop this class of tool.

Publications.
The steep increase in the annual paper count during the last two years is highly encouraging. We fully endorse the strategy of publishing in high quality, peer reviewed journals.

Attracting Ph.D. Students
The committee is impressed with the quality of the graduate students in IDL, and their research output. We applaud the impact of the new seminar series on the student body, and encourage IDL to find new ways to develop the professional growth of its students. Some groups are already engaged in international student exchange programs, for instance, and we hope that this practice will spread. We continue to urge the students to form their own association both to give themselves a voice in the governance and planning processes of IDL, and to provide IDL leadership with information from a separate and important perspective. The committee encourages the development of short courses, especially those that develop useful professional skills (e.g. scientific communication skills, grant writing skills) or expose students to new classes of opportunity.

Internationalization.
The committee notes an increasing number of international researchers within IDL, and applauds this development. In this context, the rising international profile of IDL can help it engage in greater numbers of international research projects, better pursue European Community funding, and compete for industrial funding from multinational corporations such as the major oil companies. The newly established funding schemes of the European Research Council (ERC) present a new class of opportunity for IDL research scientists, including 'starting grants' for young researchers with 2- 8 years of experience following their Ph.D. The IDL leadership is encouraged to identify potential candidates, to coach them, and encourage them to apply.

SOME SPECIFIC OBSERVATIONS AND RECOMMENDATIONS:

The emerging Energy theme.
We support IDLs emerging theme in Energy, both in conventional hydrocarbon area, and in alternative energy sources such as hydrothermal, solar and wind energy. The committee is particularly intrigued by the idea of adding a new group to IDL with a

specialty in solar energy and energy efficiency technologies. This could provide critical mass to the Energy cluster of activity, and bring new classes of talented students into IDL.

Neotectonics of Portugal and the Hazard Theme

We note with some disappointment that the GPS group within RG7 (Geodesy) has made very little progress on building and observing a network for crustal motion studies within southern Portugal. This is in contrast to RG8 (Geohazards) which is actively studying faults and paleoseismicity within the Portuguese mainland. Either southern Portugal is presently deforming and RG7 is missing an important opportunity of considerable societal importance, or southern Portugal is not deforming at a significant rate, in which case the mainland research agenda of RG8 is largely academic and has less societal importance than they imagine. The committee is inclined to the former view, but urges RG7 and RG8 to study this issue together, to see if they can adopt a more consistent and mutually supportive stance. Natural Hazards constitutes one of the overarching themes of IDL's existence, and while we appreciate the research that both RG7 and RG8 are pursuing in the Atlantic islands, but it seems that the RG7 could be doing much more to support this class of research within the mainland, where the vast majority of the Portuguese people actually live. The committee feels that the GPS group in RG7 should consider closer cooperation with the personnel in RG8 so as to define and pursue a coherent and ambitious mainland strategy. RG8 geologists can help in the design of geodetic network geometry, in site selection, and, eventually, in the interpretation of geodetic results. They might even contribute to the actual geodetic fieldwork.