

Institute of Earth Science

THE HEBREW UNIVERSITY OF JERUSALEM

Report of the Review Committee

14-17 November 2005

Presented to Prof. Haim D. Rabinowitch, Rector

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EXECUTIVE SUMMARY

**Institute of Earth Science
The Hebrew University of Jerusalem**

**Report by Review Committee
Executive Summary
December 13, 2005**

The Review Committee's overall evaluation is that the IES is in good health. Both individually and collectively, the quality and standing of the faculty is high, and several faculty members are international leaders in their disciplines. In view of these strengths, which provide a strong platform for future development, the Review Committee believes that by focusing on a few critical issues and by defining for itself distinctive areas of research, the Institute can improve its already high national and international standing. The Committee specifically recommends that the IES faculty embark on a planning process that will map out a strategy of appointments and in particular that they deliberate carefully and collectively in the production of a report on their vision for the Institute on a ten-year time scale.

Environmental Sciences are a critical part of the future of ISE. The Institute already has considerable activities in this area and the two central and complementary questions are those of the coherence of its own activities in this field and of its role in the variety of such activities at the Hebrew University. The Committee recommends that the University launch a review of all activities involving environmental topics, including relevant research and teaching in all its faculties. Such a review should prove extremely useful to the University at large and help define the central role of IES in the environmental field at HU.

The committee interpreted its charter to include evaluation of the existing or potential interactions of the IES with other groups or institutions within and outside the University. In this context the Committee is making the following recommendations:

- The Committee strongly recommends that all the physical geographers now in the Department of Geography in the Faculty of Social Science be moved to the Faculty of Science and the IES and relocated to the IES facilities. We emphasize, however, that this will need to be done with proper attention to the needs, desires, and sensitivities of the physical geographers.
- The Committee recommends that the IES maintain its commitment to the IUI enterprise, since the ocean sciences are a critical element of any modern earth science program and the IUI allows the IES to participate in ocean science without having to maintain its own oceanographic institute.
- The Committee has learned about the possibility of relocating the Geological Survey to the periphery of the Givat Ram campus and it strongly endorses such an evolution and recommends that the University administration facilitates this move.
- The Committee learned that the Geophysical Institute, previously a governmental agency but recently privatized, is in the danger of having to close down. The Committee recommends that IES finds a way to provide oversight of the seismic array operated by the Geological Institute. The data provided would be the source of numerous research projects and studies. Moreover, the overall seismotectonics of the Dead Sea Rift and transform fault system is seen by the Committee as one of the distinctive topics in which the IES could play a significant role, and close connection to the seismic array could further enhance the IES's opportunities.

The Committee recommends that IES consider taking steps that would simultaneously serve to stimulate research at sub-disciplinary boundaries and to add cohesion to the Institute. While the Committee did not wish to be too specific on what such steps might be, it proposed several options as examples.

The Committee recommends that the IES and HU launch a program of visiting scientists, both at the post-doctoral and senior scientist levels, in order to attract top quality scientists for stays of one up to a few years but who may not necessarily (at least at the onset) be considering a permanent appointment in IES. Such a program of visitors could be a potentially important component of carrying out the long-range plan that the Institute will hopefully develop.

The Committee was impressed with the level of and commitment to teaching within IES, yet, it identified two areas for potential improvement. In this context the Committee recommends that IES insures adequate access of second and third year undergraduate and the beginning graduate students to more advanced courses in mathematics and physics. The Committee also recommends that IES enhances its teaching program in atmospheric studies, either by elevating it into a full major or by supplementing it with a specially tailored program in physics, mathematics, chemistry and biology.

The Committee was impressed with the quality of recent appointments to the faculty. It suggests that that IES consider appointing a faculty mentor, or mentor group, responsible for shepherding the new faculty member through the system. It also strongly encourages IES to assign new faculty as light a teaching load as feasible (while still getting them involved in teaching) and every effort should be made not to assign them to teach introductory service classes.

In conclusion, the members of the Committee wish to point out that the meetings with faculty and students during the three days of their presence have already generated lively discussions within the IES on the topics outlined above. In this sense, the presence of the Committee has already started a positive process.

COMMITTEE'S REPORT

**Institute of Earth Science
The Hebrew University of Jerusalem**

Report by Review Committee

1) Introduction

Upon the recommendation of the President, Rector, and Standing Committee of the Hebrew University, a Review Committee was established to review the research and teaching programs of the Institute of Earth Sciences (IES). The Review Committee comprises (in alphabetical order) Prof. Vincent Courtillot (Institut de Physique du Globe, Paris), Prof. Kerry Emanuel (Dept. of Earth, Atmospheric and Planetary Sciences, MIT), Prof. Hanoah Gutfreund (Hebrew University, Jerusalem, Chair), Prof. François Morel (Dept. of Geosciences, Princeton), and Prof. Edward Stolper (Div. of Geological and Planetary Sciences, Caltech). The Committee interpreted its charter to include an evaluation of the interactions of the IES with other groups or institutions, both internal and external to the University. The Committee met for three days (November 14-16, 2005), and during this time discussed a report prepared by the director and faculty of the IES; interviewed the director; met with most of the faculty individually or in small groups; met with the four untenured members of the faculty; met with a representative of the Physical Geography program; met with Dr. Benny Begin, Director of the Geological Survey; met with small groups of undergraduate students and graduate students; finally met with and presented orally its report to the President, Rector and Vice Rector.

2) Overall Assessment

The Review Committee's overall evaluation is that the IES is in good health. Both individually and collectively, the quality and standing of the faculty is high, and several faculty members are international leaders in their disciplines. The Institute is particularly strong in the broad area of geochemistry, where it has a large number of faculty members spanning low- to high-temperature geochemistry and applications to a range of important problems in oceanography, biogeochemistry, petrology, and tectonic geomorphology. In addition, the existing nucleus of faculty in the Atmospheric and Ocean Sciences program provides important opportunities for growth in important areas. Finally, the small nucleus in geophysics is both high quality and essential to the rest of the department. It is particularly notable that all faculty members IES are active and productive regardless of

their career stage. Moreover, over the past five years, the Institute has been creative in making four high-quality junior appointments. It is also notable and important for the Institute and the university as a whole that three of these junior faculty members are women.

The Review Committee judged that the Institute is intellectually rich and carries out innovative research programs. We also concluded that the Institute attracts strong students at both the undergraduate and graduate levels (a measure of its strength) and provides excellent teaching and mentoring to these students. Moreover, as the Committee talked to faculty and students, it became clear that there is a strong spirit of collegiality in IES: faculty members generally collaborate effectively with each other, and students get strong intellectual support from each other as well as from the faculty. However, there is still room for greater thematic cohesiveness, which will be discussed in section 6.

In view of these strengths, which provide a strong platform for future development, the Review Committee believes that by focusing on a few critical issues and by defining for itself distinctive areas of research, the Institute can improve its already high national and international standing.

3) Long-range Planning – Future Directions

Earth science is a diverse and complex intellectual endeavor aimed at understanding processes on and within the solid earth, oceans and atmosphere. This is an especially challenging task because the behavior of the dynamic natural earth system involves interactions between the atmosphere, oceans, solid earth, and living systems over time scales from microseconds to billions of years and on length scales from molecules to continents; and while understanding any of these components of the natural system is challenging in its own right, understanding their interactions and how they led to the history of the earth is at the very forefront of the capabilities of modern science. Moreover, study of the earth system is fundamentally interdisciplinary, involving physics, fluid dynamics, biology, traditional earth, atmospheric, and oceanic sciences, and chemistry.

Given the scale, scope, and technical expertise needed to embrace fully modern earth science, the challenge for universities is how to develop and sustain a robust and innovative program given available resources. Translated to the specific situation of the Hebrew University, the question becomes how should the IES go about trying to achieve and

maintain excellence and leadership in these difficult yet important topics given the highly competitive environment of international earth science and given its optimum size?¹

Our committee feels strongly that the proper approach is for the Institute not to try to do everything or even necessarily to compete head-on with the rest of the world, but rather to think carefully about how to build a distinctive program that will give it a unique identity. **We specifically recommend that the IES faculty embark on a planning process that will map out a strategy of appointments and in particular that they deliberate carefully and collectively in the production of a report on their vision for the Institute on a ten-year time scale.** Such a report would include identification of areas in which future faculty appointments could or should be made and how these would contribute to what the Institute aspires to as its research and intellectual focus. Although we do not wish to specify the process by which the plan is developed, this process should be agreed upon and should include deliberations within subgroups and across the entire Institute, including as equal partners junior and senior faculty. We further urge that the Institute not simply think about replacements that would shore up existing programs and strengths, but rather think about what they want to invest in that will make the program special. If the faculty can agree upon an innovative, realistic plan, it should be supported by the administration.

We want to emphasize that in our opinion there is no single or necessarily best approach to the development of a distinctive program and that one of the Institute's challenges will be to debate and agree upon how they might do so. For example, while always insisting on high academic standards and quality, the faculty might choose a small number of innovative foci that they feel other institutions have overlooked, or they might choose to go in larger numbers into fields in which most institutions only have one or two faculty members (the current focus on geochemistry in the Institute is an example). Alternatively, there may be areas that bridge between existing strengths in the Institute that would lead to the definition of novel approaches to existing problems. Or there may be areas in which, because of existing strengths in other parts of the Hebrew University (e.g., molecular biology or chemistry), cross-disciplinary programs might thrive here better than elsewhere. Or perhaps there are external factors such as the proximity to the Israel

¹ The Review Committee takes the target size of the IES to be 25 faculty members. This is based on an expectation of 22 faculty members given the current organization of the Institute, and the hope of the committee that the three faculty members in the physical geography program will be reunited with the Institute (see section 5b below).

Geological Survey that would provide significant competitive advantages around which the IES could build. Another approach, which is sometimes particularly attractive for earth science departments, is to take advantage of a particular set of features or processes that exist locally (e.g., the Dead Sea rift zone) that give entry into a large number of important, large-scale problems in earth science; this approach also has the advantage of allowing the university to engage and serve the nation while also doing important science (especially regarding resources and hazards in the particular example of the Dead Sea rift).

There are surely other examples of how to think about and design an exciting and distinctive program, and the items in this list are not mutually exclusive. We wish neither to constrain how the faculty goes about defining an original and exciting plan, nor to restrict the fields that they might identify as most promising, and we have confidence that they can produce such a plan and will do so creatively. We do note, however, that the approach we recommend differs significantly from the one that has guided appointments in the IES over the past decade or so, which we perceive as largely opportunistic (i.e., based on current interests and the faculty's perception of a relatively small pool of candidates potentially interested in academic careers in Israel). While we do not disagree that the pool of potential candidates is small and while we commend the Institute for the high quality of its faculty and programs, **we nevertheless foresee several critical advantages of the process we advocate:**

- It will help to focus the Institute faculty on what they need in terms of resources and in particular in terms of faculty appointments. Although the pool of high-quality candidates may indeed be small, the experiences of the members of our committee from our own universities is that without some communal foci, it can in fact be difficult to identify faculty candidates, and the development of the department can be somewhat haphazard. Moreover, although patience will be necessary, as emphasized below there are actions that the Institute can take to optimize its chances to find and recruit people in fields that it has identified.
- Such a planning exercise can be a powerful vehicle for building respect and consensus within a diverse faculty. This also can help to engage the junior faculty in understanding the expectations and ambitions of the Institute and thereby to build and sustain a shared vision and a communal goal of achieving and maintaining excellence into the future. Moreover, if a plan exists, it can give the various components of the Institute confidence that even if it takes years to find just the right people to hire, there is a shared understanding that their goals will not be lost or forgotten.

- We also feel that there can be no better vehicle for engaging the administration and gaining its confidence than an interesting and exciting document that lays out the Institute's vision of its role in the university and its plans for achieving and maintaining scholarly leadership and excellence.
- We want to emphasize that once a plan has been developed, there is no need to hold too closely to it, and targets of opportunity should always be possible. On the other hand, the faculty may be surprised how after going through such an exercise, even without referring to the plan explicitly, the shared vision that has been built nevertheless provides a framework for the development of the program.
- Once the faculty has defined its priorities, it can develop various strategies for identifying and nurturing potential faculty candidates and thereby optimize its chances for achieving the goals of the plan despite the small pool of potential candidates. In addition to the ideas developed below (see section 6), we want to emphasize particularly that by identifying and nurturing students and postdocs in the targeted areas (and in particular in emerging interdisciplinary areas and encouraging students – including students from other Hebrew University institutes – to work in these areas) and encouraging appropriate IES graduates to take up postdoctoral positions that will position them to work in the targeted areas, the chances of achieving the innovative plans will be enhanced. A possible example of such interdisciplinary area is the application of the tools and concepts of molecular biology to geoscience. This could be especially important if the trend that most of the best potential faculty candidates will come from the Hebrew University continues.

4) Environmental Sciences

Environmental Sciences are a critical part of the future of IES. The Institute already has considerable activities in this area for many, and perhaps most, of the ongoing research and teaching activities of IES can, in fact, be broadly classified as “environmental”. The two central and complementary questions regarding Environmental Sciences in IES are those of the coherence and quality of its own activities in this field and of its role in the concert of environmental activities at the Hebrew University.

Although much first rate Environmental Science teaching and research is being carried out by IES faculty, the committee did not get the sense that those activities were being particularly well coordinated or even yet conceived by the faculty as forming an

intellectually coherent set. We believe that developing a plan for coordinating and enhancing its Environmental Sciences program - particularly its Environmental Sciences teaching program - should be an important part of the long term planning of IES.

Once a coherent internal program in Environmental Sciences is developed within IES, the Institute will be in a strong position to play a critical, probably leading role in the University-wide programs dealing with the environment. We believe that indeed the field of Geosciences provides a natural intellectual center for environmental activities. This has been recognized de facto by the University through the choice of ISE faculty members as previous and present Directors of the Center for Environmental Research.

The Committee recommends that the University launch a review of all activities involving environmental topics, whether they be research or teaching oriented, whether they be performed in the faculties of Humanities, Law, Medicine, Agriculture or Social Sciences. This is a very relevant element for the Earth Sciences and the role they should play in this area, and is therefore in the purview of the Committee. It is actually essential both to IES development and to the University in general.

5) Relations with Groups/Institutions external to IES

As explained above, in addition to its own internal resources, the IES has several opportunities stemming from current or potential relationships with other academic and research units in Israel. In this section, we review these relationships and our perceptions of the issues and opportunities associated with maintaining and/or strengthening them.

Relations to « internal » groups

5a) The oceanographic laboratory at Eilat (IUI)

The Inter-University Institute (IUI) for Marine Sciences at Eilat is a resource that provides significant opportunities for IES. The location of IUI on the Gulf of Aqaba gives it ready access to deep (or so-called “blue”) water and thus to physical, chemical, and biological conditions that are normally found only in the open ocean. The HU manages the IUI for the Israeli academic community and many of the permanent faculty members at Eilat have their faculty appointments through the Hebrew University (although at present most of these are not associated with the IES).

From the viewpoint of the IES, IUI presents opportunities for teaching and research in ocean sciences, and since they are critical for robust programs in the earth sciences and

in environmental science, access and association with IUI are important components of the IES portfolio. Despite the distance between Eilat and Jerusalem, one junior faculty member will be in residence at the IUI and her laboratory facilities will be located there; in addition, several IES senior faculty also have laboratory facilities at the IUI. Although we judge that, through these interactions, the IES is well positioned to take advantage of the opportunities presented by the IUI, there are nevertheless inevitable tensions between the IUI and the universities associated with it, including the Hebrew University. For example, the IUI rightly aspires to be a successful inter-university and multidisciplinary research center with its own research agenda, and while the IES faculty members associated with the IUI must share this goal, they nevertheless owe their primary allegiance to the Hebrew University, and the IES tends to view the Eilat facility as a field station for their ocean-related research. In addition, even within the Hebrew University, the ocean science interests of several other institutes, namely those of chemistry and of life sciences, need to be coordinated with those of IES.

Our main recommendation in this area is that the IES maintain its commitment to the IUI enterprise, since the ocean sciences are a critical element of any modern earth science program and the IUI allows the IES to participate in ocean science without having to maintain its own oceanographic institute. Through this commitment (which will manifest itself primarily in the appointment of faculty members for whom the IUI is a critical resources, and in providing adequate material and intellectual support to these faculty), the IES will have a place at the table as the future programs and management issues associated with this facility are debated. Without such a role, the programs and policies of the IUI could well drift away from needs of the earth science stakeholders in the facility. The committee also believes that it will be in the best interests of the IES and Hebrew University to resist pressures to have the leadership and management of the IUI removed to the auspices of another university rather than the Hebrew University. We urge the Institute and the central administration to support vigorously the current arrangements.

5b) Physical Geography

For historical reasons, several IES faculty members moved to the Department of Geography in the Faculty of Social Sciences on the Mt. Scopus campus in the early 1990s, and in addition one faculty member, Yehuda Enzel, moved there half-time, retaining a half-time position in IES. Around the time of this transition, Amos Frumkin was appointed to a

position in the physical geography group. Since then, several of the physical geographers retired, and Uri Dayan and Efrat Morin were appointed. The current size of this group is 3.5 positions.

There are several reasons why we believe the physical geography program should move back to IES. The overriding reason is that IES is their natural intellectual home: surficial processes, hydrology, climatology, etc. – the areas of enquiry represented by the physical geography group – are unambiguously within the earth sciences, and by having the two programs separated, the Hebrew University diminishes the potential of its larger endeavors in the earth sciences. This affects both the faculty in the development of their research programs and the students trying to span modern earth sciences in their training. We emphasize that in our view both groups are hampered by this split: the physical geography group is small and relatively isolated and they need easy access to IES students; the IES has insufficient faculty in the areas covered by the physical geography program and its students and research programs suffer accordingly. Reassembling the physical geographers and the IES into a single unit and relocating the physical geographers to the science campus would largely correct these problems.

For these reasons, the Committee strongly recommends that all the physical geographers now in the Department of Geography be moved to the faculty of science and the IES and relocated to the IES facilities. We emphasize, however, that this will need to be done with proper attention to the needs, desires, and sensitivities of the physical geographers – they must not feel that they are being moved “from pillar to post” without due regard for their professional and programmatic ambitions.

Relations to « external » groups

5c) Relationship with the Geological Survey

During our meetings with IES faculty, we learned that the Geological Survey of Israel, located in Jerusalem, with approximately 70 scientists mainly in the solid earth sciences, is considering moving to a new location. If they do move, one possibility is that the Geological Survey could move onto or adjacent to the Givat Ram campus. We were very impressed with the amount and quality of current interactions between many groups and individuals at the IES and the Geological Survey: approximately 10 MSc and 10 PhD students are working part or full time at the Survey under joint supervision of an IES faculty and a Survey scientist. This close interaction clearly benefits both groups (“the

whole is greater than the sum of the parts”), and we strongly encourage continuation and even significant expansion of that collaboration. In this context, having the Survey move closer to the campus would further strengthen the ties (including development of new projects and joint seminars) and facilitate joint work. We note that the GS operates a multiple collector ICP-MS where the IES is entitled to a one day use because the HU contributed to its purchase. Access to this essential facility would improve and probably exceed the present use if it were much closer.

Although the benefits of the collaboration and the potential advantages of locating the Geological Survey on or near the Givat Ram campus are clear, we were mindful of possible political or logistical issues from the Survey’s standpoint. Consequently, the Review Committee met one evening with Dr. Benny Begin, director of the Survey. His reaction to the possibility of location of the Survey on or near the Givat Ram campus (specifically in the University’s research park at the periphery of the Givat Ram Campus) was very positive. Indeed, Dr. Begin had already been proactive in promoting such a solution and obtaining support from scientists in the Survey. Most IES faculty also envision such a move as a major asset and **the Committee strongly endorses such an evolution. This is an opportunity not to be missed.** We emphasize, however, that there will likely be issues associated with optimizing the impedance match between the IES and Geological Survey, which will continue to be two distinct organizations with different missions in some respects, and the University, the IES, and the Geological Survey should define carefully the details of their relationships and interactions.

5d) Relationship with the Geophysical Institute

During our meetings, we learned that the Geophysical Institute, previously a governmental agency but recently privatized, is in danger of having to close down. The future of the Geophysical Institute is obviously not the responsibility of the HU, but the IES does exist within the framework of the geoscience resources of Israel as a whole and the fate of the Geophysical Institute would have consequences for the IES and the Hebrew University. The Geophysical Institute comprises (among other subject areas) the national array of seismic stations, facilities for seismic refraction and reflection work, and geoelectricity. A key conclusion of our committee is that the discipline of geophysics in Israel is distributed between various institutions, with sub-critical size in each one of them: And in particular, while we leave it to the IES to develop in its long-range plan its own ideas of how to build a strong and distinctive program, our committee noted that the

geophysics program in the IES is particularly small (both as far as research and teaching curricula are concerned) relative to the importance of this discipline for a balanced earth science program and the specific current needs of the Institute. In this context, further weakening or even disappearance of the seismic array would both be problematic for the IES as well as a national failure.

One possibility is to find a way to provide oversight of the seismic array operated the Geophysical Institute by the IES. The data provided would be the source of numerous research projects and studies and would clearly blend with and even significantly enrich current studies of tectonics, seismicity, and paleoseismicity in and around Israel. **Moreover, the overall seismotectonics of the Dead Sea Rift and transform fault system is seen by the Committee as one of the distinctive topics in which the IES could play a significant role, and close connection to the seismic array could further enhance the IES's opportunities.**

Although we emphasized in the previous paragraph the seismic array, the other capabilities of the Geophysical Institute are also essential to proper knowledge of crustal structure in Israel, with applications ranging from oil exploration to subsurface hydrology. One possibility is that the Geophysical Institute could be associated somehow with the Geological Survey, which together with the above recommendation could turn the Jerusalem campus, with IES as a key core, into a leading, major international center of excellence in geophysics. Other reorganizations of the existing Geophysical Institute are, of course, possible and we are sensitive to the realities of major reorganizations of the sort we are rather casually suggesting. Nevertheless, from the point of view of optimizing the opportunities of the IES, the Hebrew University, and Israel for a comprehensive and cohesive program in geophysics (and in the earth sciences more broadly), we hope that discussion among the various parties can begin to see if there are creative opportunities that would benefit all.

5e) Hydrology and Meteorology

Some of the same considerations discussed above in relation to the Geophysical Institute and the Geological Survey might also pertain to Hydrological and Meteorological Services in Israel. While we are not aware of the status of these services, if an opportunity arises to re-locate one or both of them near IES, this might provide some benefit to those services and to IES, by, on the one hand, providing IES with easy access to data and services that would enhance their research and education activities, and on the other, by

providing those services with access to students and to faculty expertise. We note that in some nations, such as Japan, all the traditional hydrological, seismological, oceanographic, and meteorological services are provided by a single government agency, with attendant cost savings.

6) Enhanced cohesiveness and interactions

The unusual intellectual breadth of IES is reflected in the diversity of research areas within the Institute, ranging from solid earth physics to geochemistry, biological oceanography and to the physics and dynamics of atmospheres and oceans. This affords special opportunities but at the same time requires special efforts to insure cohesion and unity of purpose.

Many of the intellectual developments in the earth sciences take place along boundaries between traditional sub-disciplines. Examples of this are too numerous to list, but one that relates to the previous section on environmental sciences is that many of the most interesting and important problems in understanding the earth's climate draw on multiple sub-disciplines within the earth sciences. It is our sense that many examples of exciting interdisciplinary research are already in place within IES, but the opportunities that might result from even more interactions between these sub-disciplines have not yet all been realized. **Our Committee recommends that IES consider taking steps that would simultaneously serve to stimulate research at sub-disciplinary boundaries and to add cohesion to the Institute. While we do not wish to specify what such steps might be, examples might include the following:**

- When the opportunity affords, the Institute should consider making a "bridging" appointment that would span two or more sub-disciplines in the geosciences. Possible specific examples include appointments in paleoclimate or geobiology.
- Design introductory graduate-level courses that span disciplines and involve multiple faculty. One example of such a course might be a broad introduction to climate physics and chemistry. In general, curricular reform often leads to changes in research strategies.
- Initiate a faculty lunch seminar (with lunch provided by the Institute), held on a regular schedule, in which individual faculty members present their current research to the rest of the faculty. If done properly, this could become a tradition in the Institute and could bring the faculty together, both socially and intellectually.

The Committee was asked by the IES and its director about the opportunity of changing their name to “Institute of Earth and Environmental Sciences”. The suggestion was considered as a valid one, and the very idea of a name change to reflect a new orientation and impetus were endorsed. But it was suggested that other options could be studied before a final decision was taken. One problem in using “Environmental Sciences” in the title of the Institute is that it might interfere with the future development of University-wide activities. The alternate name “Institute of Earth, Atmosphere and Ocean Sciences” was put forward as a possibility to be considered.

7) Visiting Program

The balance of disciplines within IES and the teaching curricula imply a heavy load on most faculty, and we identified the need for expanding courses offered in the physical and mathematical sciences, and the need for graduate students (some of whom stay in the department up to 9 years if they complete their undergraduate, MSc, and PhD degrees there, which is far from being an exception) to be offered a more complete and broader spectrum of courses. Also, a comparison of the list of potential priorities for recruitments voiced by faculty members for the coming years (ten were mentioned during meetings of the Committee with faculty members) and the target size of the IES implies that several useful or even vital disciplines will not be fully represented within the Institute in the near future. Finally, the faculty emphasized repeatedly to our committee the difficulty of attracting non-Israeli candidates to open positions within the university, with the result that the amount of “new blood” available to enrich the Institute is not as high as the faculty would like. In order to alleviate this situation, **the Committee recommends that the IES and HU launch a program of visiting scientists, both at the post-doctoral and senior scientist levels, in order to attract top quality scientists for stays of one up to a few years but who may not necessarily (at least at the onset) be considering a permanent appointment in IES.** Such a program would publicize the programs of the IES by forming bonds with the visiting faculty that would continue after they returned to their home institutions, enhance these programs by adding diversity beyond what is offered by the permanent faculty, and bring promising young scholars to the IES who might in the long run be potential faculty members. We regard such a program of visitors as a potentially important component of carrying out the long-range plan that we hope the Institute will develop.

Funding for such a visiting program could be generated by donations in order to create (temporary) named chairs. It has been pointed out to the Committee that a promising route might be funding from foreign countries in the frame of joint chairs (or exchanges) between a foreign university and HU.

8) Teaching

The Committee was impressed with the level of and commitment to teaching within IES. In our interviews with students, they made it clear that they are happy to be part of IES and that they find the quality of teaching to be high, at both graduate and undergraduate levels. Quite a few of the students have friends and relatives associated with other departments at HU, and in the resulting comparisons, IES invariably appears to come out ahead.

However, we did pick up on two areas for potential improvement based on our conversations with the students. The first pertains both to students at the graduate and undergraduate levels. It is clear to us that many students – particularly those in geophysics and atmosphere and ocean sciences – feel that they do not receive an adequate background in physics and in associated mathematical skills. It is our impression that this problem may span several institutes at HU (e.g. chemistry) and that it stems ultimately from the fact that first-year students in the IES are directed toward a physics and mathematics curriculum for geology and chemistry students that is aimed at too low a level for the full range of IES students. We do not know the solution to this problem, especially since the current curriculum is probably appropriate for some of the first year students, and the students do not know in advance if their interests will point them in a direction (e.g. the atmospheres and oceans program) in which the higher mathematics and physics curriculum makes sense. One possibility is that the IES could offer more advanced courses in physics and mathematics for second and third year undergraduates and the beginning graduate students; these could either be strictly remedial, or they could use pedagogy in the earth sciences to provide opportunities for students to improve their physics and math skills. Alternatively, it may be that the needed courses already exist elsewhere at HU and all that is required is an effort to build them into the IES curriculum in an appropriate way.

The second issue that arose in conversations with students is a level of dissatisfaction with the fact that the undergraduate major in atmospheric sciences is only a half course. One possibility would be to upgrade this to a full major. We note that not only will this

serve the students, but bringing the faculty together around the development and staffing of such an undergraduate program could be a very important component of building the coherence, commitment, and leadership in the environmental science that we feel is important for the future of the IES and the environmental sciences at Hebrew University more generally. Moreover, such a more physically and chemically based environmental science teaching program would, as we understand it, mesh well with and complement the more biologically focused undergraduate program in environmental sciences that currently exists in the university. However, it is generally recognized that graduate studies in many branches of atmospheric science and oceanography require an unusually strong background in applied mathematics, physics and/or chemistry, and perhaps biology for those going into oceanography. Many top graduate programs in these fields take most if not all of their applications from undergraduate physics, math and chemistry programs. For this reason, an alternative to a full major might be the existing or upgraded half major in atmospheric science coupled with a well-designed half major in physics, mathematics, biology or chemistry. This could provide an exceptionally strong background for those students wishing to continue into graduate school in these fields.

The Committee recommends that IES insures adequate access of second and third year undergraduate and the beginning graduate students to more advanced courses in mathematics and physics. The Committee also recommends that IES enhances its teaching program in atmospheric studies, either by elevating it into a full major or by supplementing it with a specially tailored program in physics, mathematics, chemistry and biology.

9) Junior Faculty

The Committee was impressed with the quality of recent appointments to the faculty. In conversations with junior faculty, we also came away with the impression that they are quite happy at IES. Although experiences naturally varied, most of the junior faculty found it relatively easy to adjust to academic life in the Institute; this also becomes progressively easier when there is a stream of new faculty members who can be mutually supportive, and this has indeed developed with the several recent appointments. Nevertheless, to ease the transitions of future junior faculty members, **we suggest that IES consider appointing a faculty mentor, or mentor group, responsible for shepherding the new faculty member through the system. We also strongly encourage IES to assign new faculty as**

light a teaching load as feasible (while still getting them involved in teaching) and every effort should be made not to assign them to teach introductory service classes.

One further issue arose concerning overly long times required for construction of office space for new faculty members. Although perhaps only an irritant, there is obviously no excuse for this, and the Institute should continue its vigilance in this regard, and the administration of the University should send the message to the appropriate places in its management structure that this is not acceptable (and it is not a good way to build satisfaction and loyalty among new faculty members or to allow them begin their research and teaching activities efficiently).

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APPENDICES

APPENDIX A

RESUMES OF COMMITTEE MEMBERS

1. Prof. Hanoch Gutfreund, Hebrew University of Jerusalem (Chair)
2. Prof. Vincent Courtillot, Institut de Physique du Globe, Paris
3. Prof. Kerry Emanuel, MIT
4. Prof. Francois Morel, Princeton University
5. Prof. Edward Stolper, California Institute of Technology

APPENDIX B

List of People who Met with the Committee

The President, Prof. Menachem Magidor
The Rector, Prof. Haim Rabinowitch
The Vice-Rector, Prof. Sarah Stroumsa

Head of Academic Review for the Sciences, Prof. Eliahu Friedman
Head of Academic Review for the Humanities, Prof. Jacob Metzger

Dean of the Faculty of Sciences, Prof. Hermona Soreq

Chairman of the Institute, Prof. Alan Matthews (Petrology)

Members of the Academic Committee:

Prof. Nathan Paldor (Atmospheric Sciences)
Prof. Jonathan Erez (Biogeochemistry)
Prof. Menachem Luria (Hydrology & Environmental Geochemistry)
Prof. Oded Navon (Petrology)
Prof. Haim Gvirtzman (Hydrology & Environmental Geochemistry)
Prof. Dov Avigad (Tectonics)
Prof. Boaz Lazar (Biogeochemistry)

Director of the Multi-Disciplinary Center for Environmental Research, Prof. Haim Gvirtzman

Director of the Geological Survey, Dr. Benny Begin

Senior Faculty:

Prof. Yehoshua Kolodny (Emeritus Professor)
Prof. Yigal Erel (Hydrology & Environmental Geochemistry)
Prof. Boaz Luz (Biogeochemistry)
Prof. Amotz Agnon (Tectonics)

Junior Faculty:

Dr. Caryn Erlick (Atmospheric Sciences)
Dr. Ari Matmon (Surface Processes)
Dr. Ronit Kessel (Petrology)
Dr. Yeala Shaked (Biogeochemistry)

Other Faculty from IES:

Prof. Alexander Khain (Atmospheric Sciences)
Prof. Garfunkel (Tectonics)

Other Faculty:

Prof. Uri Dayan (Physical Geography)

Undergraduates of the Program

Graduates of the Program

