

## THE DIRECTOR'S STATEMENT

### 1. Goals of the Unit

The ICS was approved by the UC Regents in May 1987. The mission of the ICS is an increased understanding of the crust and lithosphere of the earth, both on the continents and under the oceans, by utilizing the approaches of many disciplines and the expertise of scientists in academia, government, and industry.

At present the research agenda of the ICS comprises the study of crustal structure, how the crust is put together, crustal materials, what the crust is made of and what are its physical properties, earthquakes, how, when and where they occur in the crust and how strong they are, and, hazardous waste disposal, how industrial and nuclear materials can be safely disposed of in the crust.

The function of the ICS is to provide the research leadership, organizational structure and facilities to promote the cooperation of scientists from various research groups and organizations on problems concerning the earth's crust which are on a scale greater than those which can be studied by one investigator, or one group of investigators.

### 2. Integration of university educational and research functions

Graduate students and postdoctorals are heavily involved in research activities of the ICS. At the ICS/Hollister Research Center, four graduate students and three postdoctoral scholars have offices. For 1987/88, support was requested for over 20 graduate research assistants on grant applications submitted through ICS. For 1987/88, three research assistants were being supported on ICS projects. The ICS sought and received administration funding for a postdoctoral scholar this past year.

The Vadose Zone Monitoring Lab was occupied in June of 1988. This activity includes three graduate students.

Our unit has instituted a monthly seminar series where both on campus and off campus scientists lecture. These are well attended by graduate students.

The ICS hosted an all day workshop on crustal drilling on the San Andreas fault which was attended by scientists from several universities and government agencies. This workshop was open to graduate students and several attended.

For 1987/88, three undergraduate students were employed as lab assistants on ICS projects. These positions range from routine assistance to conducting independent research.

### **3. Role of ICS in Responding to Needs of the Public**

The research agenda of the ICS impacts directly three areas of social concern: energy and mineral resources, public safety, and environmental quality.

Studies in crustal structure and materials concern the makeup of the crust which is the reservoir for oil, gas and mineral deposits. One ICS project is focusing on the deep structure at the south end of the San Joaquin Valley which is a rich petroleum province. Research in earthquakes concerns both earthquake prediction and ground motion from earthquakes. We have a prediction project on the San Andreas fault near Parkfield, California, which is cooperative with the U.S. Geological Survey. Expected strong ground motion is being studied at several locations in California, sponsored by the Nuclear Regulatory Commission and the USGS. The movement of hydrocarbons in soils is being studied in our Vadose Zone Monitoring Lab. At present, this project is attempting to define controlling parameters on the migration of liquid and gas hydrocarbons in the soil above the water table (vadose zone). This is applicable to the mitigation of the problems from leaking underground gasoline storage tanks. The project is funded by the Environmental Protection Agency.

The research agenda interconnects in unexpected ways in response to the needs of the public. For example, our hazardous materials scientists have been asked to evaluate the likelihood of an earthquake contributing to the rupture of an underground gasoline storage tank. This question was subsequently evaluated jointly between them and our earthquake strong motion experts.

### **4. Goals of the ICS for the next 3 year period**

One of our major goals is to relocate the main ICS facility onto the main UCSB campus. I feel that our isolation significantly restricts our efforts to achieve success in our research agenda.

We have three broad categories of goals for our research agenda: to increase the multidisciplinary character of our research programs; to build and strengthen research ties with departments, other universities, industry and government agencies; and to strengthen the ICS infrastructure so that we may begin several large research projects.

Increasing the multidisciplinary character of our research will require more people and projects which cross traditional academic department boundaries. Projects involving Geological Sciences, Engineering, Materials Science, and Environmental Studies are specifically targeted.

Building ties with off-campus research organizations means having scientific visitors at ICS. We also hope to attract a small subunit of the US Geological Survey to permanently locate at ICS.

Research projects we hope to initiate include crustal drilling at Parkfield, California on the San Andreas fault, a seismic instrumentation facility through the PASSCAL program, and a seismic reflection data processing research facility.

New FTE will be needed to increase the multidisciplinary character of ICS research. I suggest that ICS sponsor joint faculty appointments in Materials and Geological Sciences, and Engineering and Geological Sciences. FTE for postdoctoral scholars in cross department fields will also be needed.

Ties with off campus researchers will require facilities to house them here and funds to assist their research. A USGS presence here will require an additional 1500 to 3000 ASF. I suggest a \$5,000 research grant to be made available to a scientist visiting here for at least 9 months - this would be competitively awarded.

The research projects we are pursuing will require space and hardware. The PASSCAL seismic instrumentation facility will require several thousand ASF. The seismic data processing facility will require computing hardware purchases of \$150K to \$300K over three years.

Extramural funding will be sought for seismic reflection processing hardware and software, visitor support, and new science initiatives. University support will be needed for new space and new faculty and postdoctoral FTE.

The CALCRUST seismic reflection project has already invested about \$45K for seismic computing hardware. ICS committed \$17K for seismic software in 1987/88 and 1988/89. We will continue to request funds from the Continental Lithosphere program of NSF through CALCRUST for the remainder of \$150K - 300K.

The NSF PASSCAL seismic instrumentation program has issued an RFP for an instrument facility to be operational in Spring, 1989. We have responded to that.

The NSF DOSECC drilling program has asked us for a preliminary proposal to drill an array of holes at Parkfield - Gold Hill on the San Andreas fault. A proposal will be developed during 1988/89 with the US Geological Survey.

Pending legislation in Sacramento includes the California Earthquake Hazards Reduction Program. Seismic instrumentation and facilities will be requested from this program if it is passed in the 1989 session.

## 5. Concluding Remarks

The ICS is a new UC initiative. The rationale for its formation is to provide a multidisciplinary research unit which can bring together scientists from academia, government and industry to work on several pressing problems in earth sciences. The ICS has focused its research agenda on the earth's crust for several simple reasons. The crust contains our oil and mineral resources, it holds our water supply, mankind disposes its industrial and nuclear waste in the crust, most of the world's earthquakes occur within the crust, and the crust contains our most tangible record of earth's history. Given the intellectual and social importance of these issues, it is imperative that UC seriously partake in this research enterprise.

Our current funding level for our research agenda is roughly one million dollars. We expect to easily double this over the next 3 years.

Documentation exists to demonstrate that government funding growth will take place in these research areas. NSF support in Earth Science is expected to grow from a current \$50.1M in 1988 to \$277.9M in 1995. The Continental Lithosphere program alone will jump 40% to \$15M

next year and to 107.2M in 1995.<sup>1</sup> This program includes crustal drilling and seismology. The ICS fully expects to participate in this funding growth.

ICS is well on its way in achieving its goals on several fronts. We have built strong ties between off-campus research agencies and the petroleum industry. We have a cooperative research agreement with the EPA where they have ranked us third out of 100 programs in quality. One of our research projects involves collaboration with the Jet Propulsion Laboratory, Pasadena. Our San Andreas fault experiment at Parkfield includes close cooperation with the US Geological Survey. The CALCRUST project includes the exchange of information and data with the oil industry, and also graduate student support. Companies we have strong ties with include ARCO, AMOCO, Chevron, and Unocal. The CALCRUST project also involves collaboration of ICS scientists with researchers from UC Berkeley, San Diego State University and the University of Southern California.

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<sup>1</sup> draft report of NSF-EAR Advisory Committee, June 1988