

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 and tectonics, how the crust is put together and deformed; 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, six graduate students and two postdoctoral scholars have offices. For 1989/90, support was requested for over 20 graduate research assistants on grant applications submitted through ICS. For 1989/90, ten research assistants, and five postgraduate researchers were being supported on ICS projects. The Vadose Zone Monitoring Lab was occupied in June of 1988. This activity includes five graduate students.

For 1989/90 eight undergraduate students were supported as lab assistants on ICS projects. These positions range from routine assistance to conducting independent research. ICS has one undergraduate volunteer in the Vadose Zone Monitoring Laboratory.

Our unit has instituted a monthly seminar series where both on campus and off campus scientists lecture. During the past year we held 23 seminars and workshops at ICS. Both seminars and workshops were well attended by graduate students, faculty, researchers, staff, and the community.

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 from earthquakes is being studied at several locations in California, sponsored by the Nuclear Regulatory Commission and the USGS. The movement of hydrocarbons in soils and sediments 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.

During 1988/89, we organized an Earthquake Advisory Group (EAG) within ICS. This is a group of Principal Investigators who can interface with the public and media on earthquake related issues. We are also preparing maps and displays for use in media interviews. Within the campus phone directory are listed the names and phone numbers of the EAG under the heading "Earthquakes."

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

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.

Increasing the multidisciplinary character of our research will require more people and projects which cross traditional academic department boundaries. Projects involving Geological Sciences, Geography, Engineering, Materials Science, Environmental Studies and the Institute for Theoretical Physics are specifically targeted. ICS is hoping to attract new members and new research in cross-disciplinary fields. Remote sensing and geology is one of our current research activities which we plan to build upon. Also, our program in vadose zone monitoring is expected to grow significantly.

Building ties with other research organizations can be accomplished in several ways. We are cooperating in an initiative to form an NSF Science and Technology Center. This center is named the "Southern California Earthquake Center". It was proposed to NSF in August, 1989 through the University of Southern California. ICS is a major partner along with UCLA, CalTech, and the U.S. Geological Survey. This project proposes studies by ICS in the areas of regional seismicity, subsurface imaging of earthquake zones, fault zone geology, seismic hazards analysis, and geologic (tectonic) history. At present, this center has been approved by NSF and is awaiting final review by Congress. Another opportunity for increasing our ties with UC campuses and labs comes from Orson Anderson, Statewide Director for the Institute for Geophysics and Planetary Physics (IGPP). He suggested that ICS affiliate with IGPP as a UCSB branch, and at the same time retain its independent status. A clear advantage to ICS is the opportunity for communication and interaction with one of the world's most prestigious geophysical research organizations. We consider his overture to be a great compliment. In the next few years ICS will focus its efforts in

two major areas; earthquakes and hazardous waste disposal. In the earthquake research area we of course are still hoping for award of the SCEC. Once the UCSB portion of the SCEC is functioning there is a good chance that we will be a top candidate for the next PASSCAL Instrument Center (PIC). This center would comprise about 25 portable seismic stations as part of a national facility. The other PIC is at Lamont-Doherty Geological Observatory of Columbia University. The role of the UCSB PIC would be rapid response to significant earthquakes, such as Loma Prieta. With the SCEC and PIC we would be expanding our professional staff of seismologists. ICS will become a major center for earthquake research. In the area of hazardous waste disposal, we are poised to begin major new projects with EPA sponsorship. These include a passive remediation research project, and development of nine new national monitoring standards. In addition, we are in discussions with EPA to be named as a National Center of Excellence. Such a step would mean a significant expansion of activity at our Vadose Zone Monitoring Laboratory (VZML), and increased international visibility. Beginning 1990/91 the VZML is involved in an exchange research program with scientists from the Soviet Union. The first soviet scientist will arrive at UCSB in March 1991.

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 worlds 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 1.7 million dollars, including projected support. We expect to double this over the next 3 years.

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. Recently we initiated a project in the COSO geothermal area of Eastern California; this research involves close cooperation of the California Energy Group, an industry consortium. A project in Antarctica is cooperative with faculty at San Diego State University.