

# Go-ahead for San Andreas drilling project ...

## San Diego

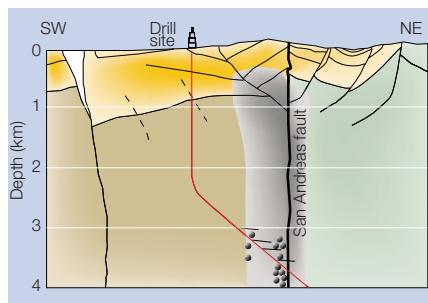
An international group of scientists is set to win support from the US National Science Foundation (NSF) for a long-planned project to drill deep into California's San Andreas fault in search of better data on seismic activity.

The San Andreas Fault Observatory at Depth is designed to give scientists a new insight into the physical and chemical processes controlling the mechanics of the fault.

The observatory project was approved in late July by the influential Programs and Plans Committee of the National Science Board — the NSF's governing body — which approved \$16 million for equipment. The full board will consider the recommendation in November.

If, as is likely, the board accepts the recommendation, the project will move through the congressional funding process, where an estimated additional \$10 million will be sought for six years of associated research. Drilling of the observatory well — at an isolated site in the coastal mountains about halfway between San Francisco and Los Angeles — is due to begin in late 2001.

Stephen Hickman, a co-principal investigator from the US Geological Survey's earthquake hazard team in Menlo Park, California, says: "One of the more exciting aspects will be the ability to look at the nucleation process of



**Boring science:** geologists hope to probe the San Andreas fault with a well four kilometres deep.

earthquakes, particularly the aseismic phases before an earthquake takes off."

The San Andreas observatory is part of a series of NSF initiatives called EarthScope. This includes a project called USArray, which deploys mobile seismometers to map the Earth's structure under the United States.

The Programs and Plans Committee approved \$58 million for equipment for USArray in July, and the full science board will decide on this project in November. A plate-boundary observatory is also under discussion, but this is not slated for funding consideration until much later.

"All of these projects are designed to give us a better understanding of the physics of earthquakes," says James Whitcomb, acting deputy director of the NSF's Earth science division.

The San Andreas observatory involves 33 principal investigators from 19 US universities, 15 scientists from the US Geological Survey, and research teams from 12 institutions in Japan, France, Germany and Britain.

Planning for the observatory began in 1992, although the concept of drilling into a fault has been debated for decades. Initially, the scientists planned to drill a ten-kilometre-deep observatory, but cost and technical difficulties meant they decided on a four-kilometre-deep well.

Seven locations along the San Andreas fault, between the San Francisco area and east of Los Angeles, were considered for drilling. The team chose Parkfield, where the US Geological Survey has long had a ground monitoring seismology station.

The team's proposal says that an important area of investigation is the "evidence indicating that the slip in crustal earthquakes along major plate-bounding faults — like the San Andreas — occurs at extremely low levels of shear stress." It adds that knowing "how crustal faults lose their strength is critically important" in the mechanics of earthquakes and hazard reduction.

"Our current knowledge of the fault zone process is so poor that not only are we unable to make reliable, short-term earthquake predictions," the proposal says, "we cannot scientifically assess whether or not such predictions are even possible."

Rex Dalton

## ... and more money for the Earth sciences in Germany

### Munich

The German science ministry has launched an Earth sciences programme that will give priority to interdisciplinary projects with socio-economic relevance.

Germany's research minister, Edelgard Bulmahn, has allocated DM500 million (US\$270 million) over the next 15 years for funding the new programme, called Geotechnologies, which will start next year.

In addition, the Deutsche Forschungsgemeinschaft, Germany's main funding agency for university research, will make about DM20 million per year available to support interdepartmental university research in the Earth sciences.

The money is urgently needed: geological research in Germany has been in crisis since the mid-1990s, when several large-scale projects, such as the continental drilling programme, came to an end (see *Nature* 382, 196; 1996).

The new programme is designed to unite the fragmented German Earth science community and increase the relevance of

their work to the management of resources and natural disasters.

Among the themes chosen for funding are global climate change, the tectonics of continental margins, prospecting of gas hydrates, variations in geomagnetism, and early warning systems for earthquakes, floods and volcanic eruptions.

The programme will promote collaboration between universities and other institutes, such as Germany's National Research Centres, which can also apply for funds.

Rolf Emmermann, the scientific director of the Geoforschungszentrum (GFZ) in Potsdam, Germany's largest geological sciences institute, is optimistic that what he calls the "exemplary integrative approach" of the new scheme will keep German researchers at the forefront of international Earth sciences.

The social relevance of today's Earth sciences is not in doubt, says Emmermann. "The results of our research leave their mark in many topical political discussions about

climate policy or disaster management."

In earthquake research, the GFZ is involved in developing early warning systems for some European cities in endangered regions, including Istanbul and Bucharest. Moreover, it participates in international research projects aimed at understanding the mechanisms of the tectonic processes — including the assumed role of fluids in the Earth's crystalline crust — that generate earthquakes.

Emmermann hopes that the interdisciplinary approach of the new programme will encourage collaboration between seismologists and engineers in setting building codes for earthquake regions.

With this in mind, the GFZ has already begun analysing the damage caused by earthquakes in Turkey and the Middle East. Earthquake experts have blamed the disastrous consequences of the recent quake in Turkey on the lack, or disregard, of such standards (see *Nature* 400, 803; 1999).

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