

Ocean research

Japan to hit bottom

Tokyo

A FRANCO-Japanese deep-sea exploration programme using France's brand-new undersea research vessel, the SM97, is to begin in Japanese waters this June. Final plans for the two-year project — named *Kaiko* (Trench) — were announced by the University of Tokyo's Ocean Research Institute (ORI) this week after the Ministry of Finance agreed to provide Y 800 million (\$0.35 billion) as Japan's half-share of the costs.

The areas to be explored in the Japan Trench and Nankai Trough — where the Pacific and Philippine plates collide with the Eurasian plate upon which Japan stands — are of more than academic significance for Japan. Deep seismic activity in the subduction zone is the major trigger for the shallower earthquakes which threaten Tokyo and other parts of Japan's densely populated eastern seaboard.

Nine years of negotiations between ORI and France's Centre National pour l'Exploitation des Océans (CNEXO), within the framework of an older general agreement on oceanographic cooperation, have already gone into the project. Early plans to use the French bathyscaphe *Archimedes* were abandoned when the French decided it was too old. Instead, the go-ahead was given for the SM97 which, with a depth limit of 6,000 metres, can reach the bottom in 97 per cent of the ocean areas.

Construction of the SM97 is now nearly complete and, after testing in the Atlantic, its maiden research voyage will be in Japanese waters. Weather permitting, some 60–70 dives will be made in the spring and summer of 1985, in seven regions off the Japanese coast. As well as the Japan Trench and the Nankai Trough, surveys will be made of the triple junction of the Eurasian, Philippine and Pacific plates; the Suruga-Sagami Trench complex, where the northernmost boundary of the Philippine plate is colliding with the Japanese landmass; and the first Kagoshima Sea Mount. This remarkable undersea mountain, first discovered in 1980, returned to prominence this week with the announcement of the results of a high-definition sonar survey by Japan's maritime safety agency which confirm the movement of the Pacific plate. The undersea mountain, the size of Mount Fujiyama, has split into two as the past few hundred thousand years of plate movement have carried it westward over the edge of the Japan Trench. One-half of the mountain has slid 1,700 metres down into the trench and is separated by nearly five kilometres from the rest of the mountain, poised on the edge of the trench.

This summer, before the SM97 arrives, the French oceanographic vessel *Jean Charcot* will spend two months making a detailed map of the bottom topography of

the regions using Seabeam, probably supplemented by photography from the unmanned towed deep sea vessel *Epaulard*. The SM97 carries a crew of three — two scientists and one operator — down to 6,000 metres and is equipped with video-cameras and a manipulator which can be used to take cameras' samples from the ocean bottom. Equal numbers of French and Japanese scientists will man the vessel

Dioxin exposure

US Air Force reassures veterans

Washington

A US Air Force study* has found scant evidence for veterans' claims that their health was damaged by herbicides sprayed by US forces in Vietnam. The Air Force called the results of the five-year epidemiological study "reassuring" for the veterans and their families. But the argument will continue, most conspicuously in the federal courts.

Thousands of Vietnam veterans claim to have suffered cancer, birth defects in their children and other medical problems as a result of their exposure to the 19 million gallons of herbicides the Air Force used during the war in "Operation Ranch Hand", which aimed to destroy crops and deny cover to Vietcong forces. Residues of dioxin were present in all of the herbicides; Agent Orange, of which 11 million gallons were sprayed, contained 2 p.p.m. dioxin.

The Air Force study compared the "Ranch Handers" with a control group drawn from airmen who flew cargo missions in Vietnam and who were not involved in herbicide spraying. There were significant differences between the two groups in the incidence of certain birth defects, skin cancer and in "miscellaneous" liver disorders. But there appeared to be no consistent pattern of the frequency of these maladies in relation to the doses of dioxin that different groups of Ranch Handers were calculated to have received. For example, the number of birth defects in the children of enlisted men increased with exposure to dioxin, whereas officers with the highest calculated exposure to dioxin reported the fewest birth defects. For skin cancer and liver disorders, no correlation with dose was found. Moreover, there was no evidence of the health problems specifically associated with dioxin exposure. None had soft-tissue sarcomas or chloracne.

The report suggested some grounds for suspicion of the data on birth defects and skin cancer. The birth defect results were based on self-reporting by the veterans and have not yet been confirmed by medical records; the skin cancer data were not adjusted for possible differences in sunlight exposure between the Ranch

and its mothership, *Nadir*, and representatives from the United States and the United Kingdom have also been invited to participate. Results will be used to choose the best areas for the SM97 dives. One key scientific problem for the project, says Noriyuki Nasu, director of ORI, is to discover why the subduction in the deep Japan Trench proceeds rapidly with the formation of only a small accretionary wedge, while in the shallower Nankai Trough, subduction is slow and a large accretionary wedge has developed.

Alun Anderson

Handers and the control group.

Robert Taylor, a Washington attorney representing some 1,000 veterans who are suing Dow Chemical and other manufacturers of the herbicides, claims that the report showed that "science is catching up" with what the veterans have known for some time — that Agent Orange has indeed injured their health. He questioned the validity of the exposure estimates used in the report, which are calculated by dividing the total amount of dioxin-containing herbicide used during an airman's tour of duty in Vietnam by the number of personnel who performed that airman's same task during the same period. "Nobody really knows who was exposed and to how much", he said.

The study does not include some two million ground troops who may have also been exposed to the herbicides. The Air Force maintains that ground troops would have received a tiny fraction of the dose that its personnel received from the herbicide sprays blowing back into aircraft, from leaking hoses and during manual cleaning of the spray tanks. According to the Air Force, 1,269 of its troops were involved in Operation Ranch Hand between 1962 and 1971. Ninety-seven per cent of them filled out a questionnaire for the study, and 87 per cent agreed to undergo a physical examination, which was conducted by civilian physicians on a blind basis.

The veterans' lawsuit, which has been certified as a class action open to all 2.5 million Vietnam veterans, is scheduled to go to trial on 7 May in US District Court in Brooklyn, New York. Nearly 16,000 veterans have joined the suit, which alleges that the chemical companies knew of dioxin's dangers but did not inform the government. The chemical companies are arguing that the government was equally aware of the hazard but took no steps to protect its troops, and that the companies were merely complying with government purchase orders.

Stephen Budiansky

*An Epidemiologic Investigation of Health Effects in Air Force Personnel Following Exposure to Herbicides. Baseline Morbidity Study Results, USAF School of Aerospace Medicine, Brooks Air Force Base, Texas; 24 February 1984. Available from: Surgeon General, US Air Force, Washington, DC 20314.