

JOIDES Resolution ocean drilling research ship berthed in Wellington.

UNDERSTANDING THE HIKURANGI SUBDUCTION ZONE

USING SCIENTIFIC DRILLING TO INVESTIGATE EARTHQUAKES

The International Ocean Discovery Program (IODP) is a long-running, international marine research collaboration involving scientists from 26 nations. It undertakes Government-funded research on the history of the Earth and its oceans to better understand Earth processes and the impacts of climate and environmental change. In late 2017 and mid-2018, IODP plans to learn more about the processes that drive large subduction zone earthquakes by undertaking a scientific drilling expedition offshore of the North Island's East Coast.

New Zealand scientists from Crown Research Institutes (CRIs) and universities have been at the forefront of developing this research. They will play lead roles in a new project funded by the Ministry of Business, Innovation, and Employment (MBIE) called 'Hikurangi subduction earthquakes and slip behavior', and ensure that the research findings are used to build safer infrastructure and more resilient communities in the regions at risk from the effects of subduction zone earthquakes.



IODP
INTERNATIONAL OCEAN
DISCOVERY PROGRAM

WHY IS SCIENTIFIC DRILLING BEING USED TO EXPLORE THE SUBDUCTION FAULT?

Offshore of the East Coast, near Gisborne, are the world's shallowest slow slip events (or slow earthquakes) making it the best place in the world to study why slow slip earthquakes occur. **Slow slip earthquakes occur slowly, over a period of weeks or months, rather than suddenly in one large earthquake.**

Scientists use drilling to find out what is causing the fault to move (slowly or fast) and how that has influenced earthquakes and tsunamis in the past, to understand what might happen in the future.

WHAT DOES THE DRILLING INVOLVE?

IODP's drill ship JOIDES Resolution will work in the area marked on the map (page 2), just east of Gisborne. The ship has equipment on board enabling it to drill beneath the seabed to take core samples, and insert equipment in bore holes to monitor activity on the subduction zone.

This monitoring equipment will give scientists information on when the fault moves and how it is moving, and help solve the mystery of why slow slip events happen. Similar types of equipment could eventually be used in an early warning system for earthquakes and tsunamis along the East Coast.

The scientific drilling will also recover samples in a region where landslides have been extensively mapped so scientists can understand what causes landslides offshore of Gisborne - landslides are one of the causes of tsunamis.

IS SCIENTIFIC DRILLING SAFE?

Yes. The JOIDES Resolution has extremely strict safety and environmental protection standards and an excellent safety record. Furthermore, the IODP and NZ project will comply with New Zealand's Environmental Protection Agency's strict regulations aimed at protecting local communities and marine life. Research ships have been safely drilling and surveying oceans for many years.

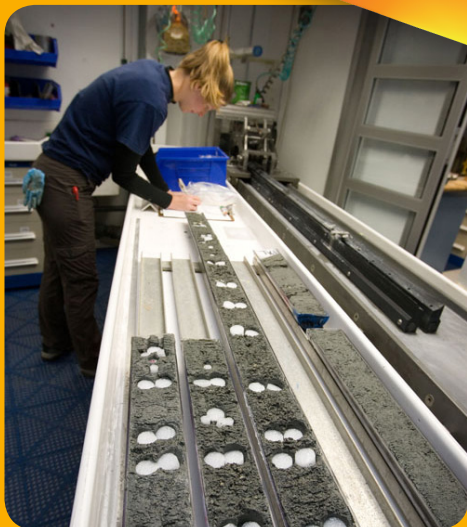
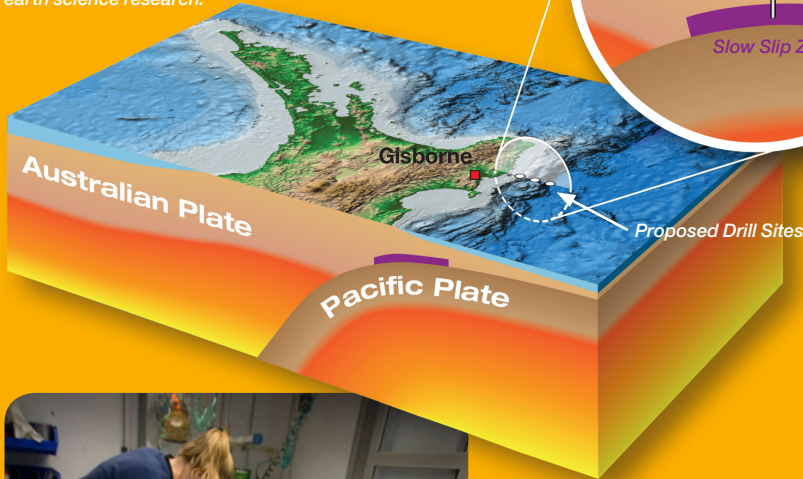
ARE THE SCIENTISTS LOOKING FOR OIL?

No. This research is not looking for oil or gas, and it is unrelated to any petroleum exploration off the East Coast. The drilling is funded by the 26-country membership of IODP. New Zealand's participation in this expedition and in IODP is supported by Government scientific research funds, with no involvement of any oil exploration companies.

The IODP environmental protection and safety regulations for the research ship, JOIDES Resolution, require that any scientific drilling project specifically avoids locations of potential oil accumulations or pockets of natural 'free' gas. If signs of these are found at the drill site, drilling will stop immediately, and be moved to a different location.



The JOIDES resolution is 143m long and its drill rig is 63m high—equivalent in height to a 20 storey building. Since 1985 it has drilled more than 2400 holes in the ocean floor in scores of locations around the globe. It can drill in water 6km deep and its deepest hole went down 2km beneath the ocean floor. It has superbly equipped laboratories on board for earth science research.



Lara Miles (Curatorial Specialist, IODP-USIO/TAMU) records samples in the Core Splitting room.

CREDIT WILLIAM CRAWFORD, IODP/TAMU, PHOTO ID: EXP317_063



Scientists Kimihiro Mochizuki (Earthquake Research Institute, University of Tokyo) and Syuichi Suzuki (Tohoku University) carry an absolute pressure gauge that recorded over a year's worth of fluctuations in water pressure on the seafloor offshore Gisborne, New Zealand.

PHOTO CREDIT: STEVEN PLESCHIA, UNIVERSITY OF COLORADO

HIKURANGI DRILLING TIMETABLE:

NOV 2017-JAN 2018: JOIDES Resolution begins its first leg of the research project and will drill the first holes to study slow slip. It will also drill additional holes to investigate shallower landslide activity and its underlying causes.

MAR-MAY 2018: JOIDES Resolution will drill holes into the seafloor to take core samples and put in long-term monitoring equipment. The monitoring equipment will be in place for many years, and will help scientists better understand the linkage between slow slip events and damaging earthquakes and tsunamis.

WILL THE DATA COLLECTED BE AVAILABLE TO THE PUBLIC?

Yes. All data that the scientists collect is kept under a one-year embargo from the date of sampling for the project scientists to use in their research. After that, it becomes publicly available. For this project the data is likely to become publicly available in mid to late 2019.

DOES DRILLING INTO OR NEAR FAULTS CAUSE EARTHQUAKES OR TSUNAMIS?

No. Many other faults have been drilled worldwide for scientific research without causing earthquakes or tsunamis. Here in New Zealand drilling has taken place at the Alpine Fault without causing any earthquakes.

For more information about drilling on the Alpine fault read: <http://tinyurl.com/zqmmkvs>

WILL THE WORK AFFECT MARINE LIFE?

The scientific drilling process does not impact marine mammals and pre-drilling surveys have been conducted to ensure that no sensitive marine ecosystems will be disturbed.

MORE INFORMATION

- To learn more about the International Ocean Discovery Program (IODP) watch: www.youtube.com/watch?v=yZvm15Gg4wo
- To learn more about an IODP drilling project offshore Japan to investigate the source of great earthquakes on the Nankai Trough subduction zone watch: www.youtube.com/watch?v=KHqkr sUKio0
- See the earthquake observatory recently installed in drill holes offshore Japan by IODP, narrated by Hikurangi project leader Laura Wallace: www.youtube.com/watch?v=PUh5UeKE oIU

To read more about the International Ocean Discovery Program (IODP) and the JOIDES Resolution visit: www.joidesresolution.org/ and www.iodp.org/

If you have questions, please contact one of the New Zealand expedition leaders, or visit:

www.gns.cri.nz/hikurangi

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