CALENDAR

from page 5

October 7-9, 1987. 59th Annual Mtg, Eastern Sect., Seis. Soc. of Am. R. B. Herrmann, Saint Louis University, Organizer. (314) 658-3120.

October 26-29, 1987, Geol. Soc. of Am., 1987 Annual Meeting & Exposition. Phoenix Civic Center, Phoenix, Ariz. Abstracts due June 11. For abstract forms: (303) 447-8850. Info: (303) 447-2020.

DECEMBER

December 14-18, 1987. U.S.-Asia Conf. on Eng. for Mitigating Natural Hazards Damage, Bangkok, Thailand. Info: Dr. Arthur N. L. Chiu (EERI, 1984), or Dr. Prinya Nutalaya, Div. of Geotechnical and Transportation Engineering, Asian Institute of Technology, GPO Box 2754, Bangkok 10501, Thailand.

1988

FEBRUARY

February 4-6, 1988, EERI SEMINAR and ANNUAL MEETING in the Phoenix area, at the Ramada Renaissance Hotel, Mesa, Arizona.

JUNE

June 1-5, 1988. 2nd Int. Conf. on Case Histories in Geotechnical Eng., University of Missouri-Rolla, St. Louis, MO.

June 27-30, 1988. Earthquake Engineering and Soil Dynamics II -- Recent Advances in Ground Motion Evaluation. ASCE specialty conference, Park City, Utah.

AUGUST

August 2-9, 1988, Ninth World Conf. on Eq. Eng., Tokyo/Kyoto, Japan. The 2nd Circular has been mailed. Send for a copy (and send an Abstract by July 1, 1987) to Dr. Hajime Umemura, President of IAEE; c/o Japan Convention Services, Inc.; Nippon Press Center Bldg.; 2-1, 2-chome, Uchisaiwai-cho; Chiyoda-ku, Tokyo 100; Japan.

EARTHQUAKE IN PAPUA, NEW GUINEA, 9 FEBRUARY 1987

by D. Tamsett, Department of Applied Physics; A. K. Aggarwal, Department of Civil Engineering; P.N.G. University of Technology, Lae, Papua New Guinea.

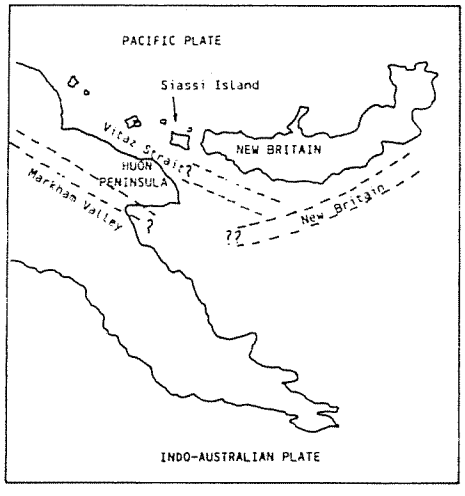


FIGURE 1

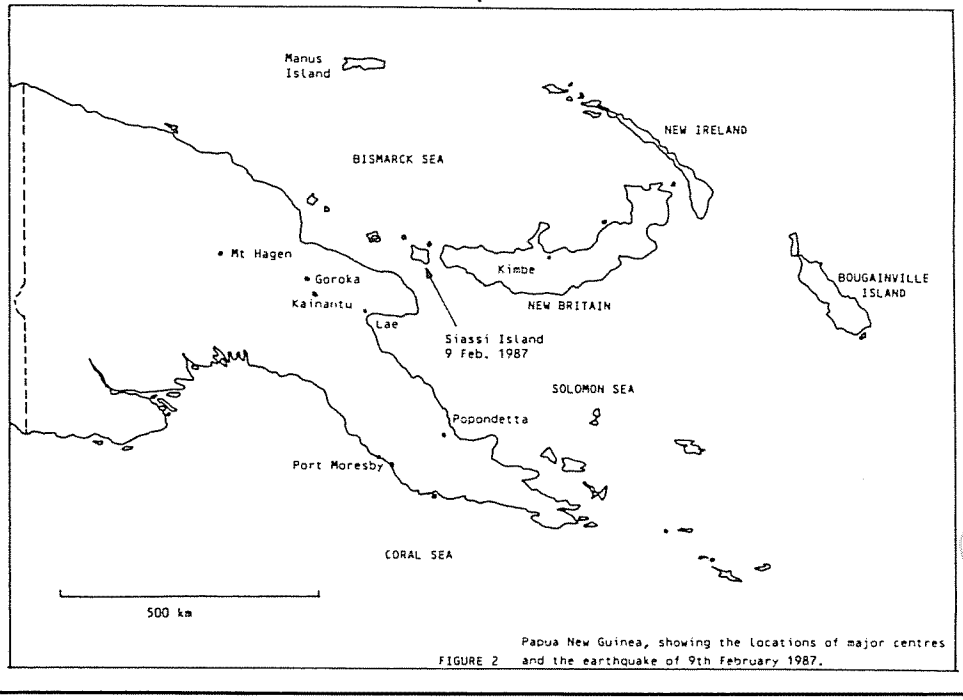
Schematic diagram illustrating the compressive plate boundary between the Pacific and the Indo-Australian plates running across northern New Guinea.

Introduction

The collision zone between the Indian-Australian plate and the Pacific plate cuts across north New Guinea. East of the Huon Peninsula, the Solomon Sea is subducted along the New Britain deep sea trench running to the south of New Britain Island, giving rise to an easily recognizable plate boundary and a belt of earthquakes distributed on a plane dipping beneath New Britain Island (Ripper, 1982).

In the vicinity of the Huon Peninsula the situation is more complex and not well resolved. The Huon Peninsula appears to have once been sub-continuous with the New Britain Island arc but has become involved in a collision with the rest of New Guinea. The aerial Markham Valley appears to be the post-collision remnant of a deep sea trench associated with subduction beneath the Huon Peninsula. There is bathymetric evidence that the New Britain deep sea trench bifurcates just east of the Huon Peninsula into a trench running towards the Markham Valley, and a more subdued valley running into the Vitiaz Strait. Subduction may therefore be taking place along a double plane in this region (Johnson, 1979).

The distribution of earthquake hypocenters in this region is not as easily interpreted in terms of plate tectonics as it is further east along New Britain Island. The earthquakes are distributed over a wider zone and this might be a reflection of a current tectonic rearrangement in this area resulting from the collision between the Huon Peninsula and the rest of northern New Guinea.



Papua New Guinea, showing the locations of major centres and the earthquake of 9th February 1987.

FIGURE 2

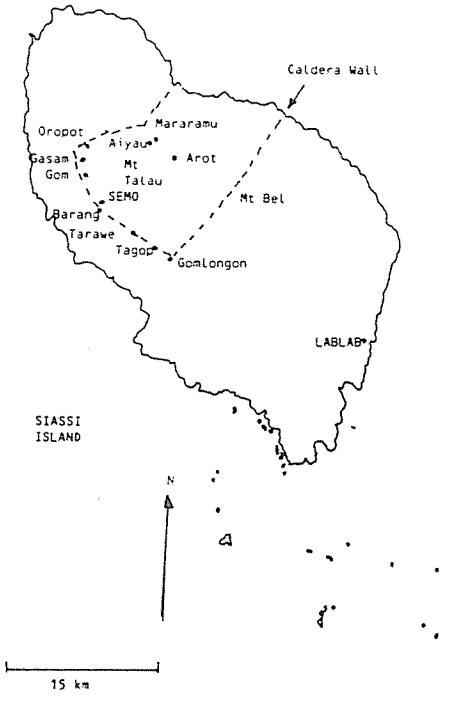


FIGURE 3 - Siassi Island, showing villages affected by the earthquake.

Earthquake of 9 February 1987

Earthquakes are regularly felt by people residing in Lae (the main population center in the region) and villages widely distributed over the region, and indeed many tremors will not even give rise to comment.

At 4:34 am (local time), on 9th February 1987, residents in a region extending from New Britain to beyond Kainantu (in the Highlands of Papua New Guinea, 140 km west from Lae) were rudely awakened by a severe tremor originating at 6.1°S and 148.0°E, having a hypocentral depth of 23 km. An estimate of the Richter magnitude of the earthquake was 7.3-7.4 (Geophysical Observatory, Port Moresby). Aftershocks were felt almost continuously for a number of hours following the main shock, and there were many hundreds of instrument recordings of aftershocks during the following two weeks.

Damage on Saissi Island

Siassi Island north of the Vitiaz Strait and approximately 30 kilometers from the epicenter was the worst hit area. The extent of damage varied considerably over relatively short distances. The worst damage appears to have occurred in the proximity of Semo village (where the government station on the western side of the island is located). Many buildings constructed of bush material sustained irreparable damage and some government buildings constructed of conventional materials were also severely damaged. There was a report of a single fatality due to a falling tree.

Some villages located just 8 km from Semo, though severely shaken, lost no buildings. Villages on the eastern side of the island, though closer to the epicenter, suffered much less damage than villages on the western side. A few buildings are reported to have sustained serious structural damage. The Morobe provincial government declared an emergency in Siassi Island and tents and food were made available for the people of the island. Shelter is not a particularly serious problem as the village people are adept at constructing adequate buildings rapidly. Perhaps the most serious problem is an economic one, arising from the 9-12 months required for the root crop, taro, to mature. This constitutes the staple food in the villagers' diet. Many food gardens were destroyed either by themselves slipping down hillslopes or by being buried under landslides.

Siassi Island is volcanic and though there are various manifestations of geothermal activity, there are no volcanoes that are classified as active on the island. The villages on the western side of the island are located around the rim of a caldera basin (of unknown age) some 12 km across. The caldera walls are very steep and landslides on these are responsible for most of the damage to food gardens. Satellite volcanoes within the caldera basin, eroded remnants of older volcanic cones outside the caldera basin, and deeply incised cuttings formed by rivers draining the basin, all give rise to very steep terrain. Prior to the earthquake of 9 February 1987, the coverage by tropical forest was almost 100%. There are now wide swathes of exposed scarps where extensive areas of forest have slipped sometimes hundreds of meters.

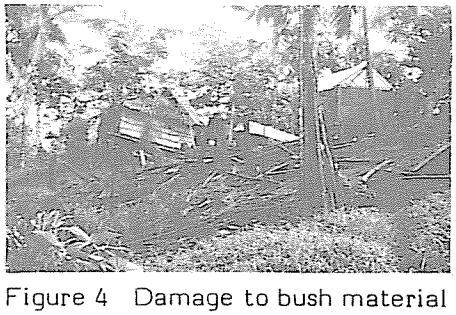


Figure 4 Damage to bush material buildings in Gom village.

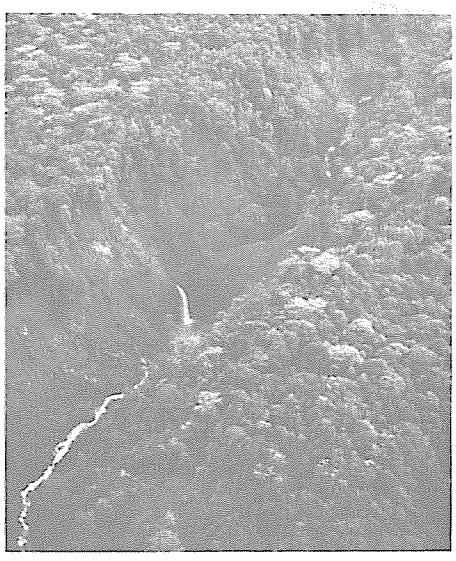


Figure 5 Landslides in this river cutting have affected a swathe approximately 100 m wide.

Tsunamis, giving rise to waves some 2 m high at the coast of Siassi Island caused serious damage to landing wharfs. Ships carrying goods intended to provide relief to earthquake victims were unable to dock, resulting in delays before assistance reached the affected villages.

References

1. Johnson, R. W., Geotectonics and Volcanism in Papua New Guinea: a review of the late Cenozoic, BMR Journal of Australian Geology and Geophysics, 4, 181-207, 1979.

2. Ripper, I. D., Seismicity of the Indo-Australian/Solomon Sea plate boundary in the Southeast Papua region, Tectonophysics, 87, 355-369, 1982