

AN OCEAN BOTTOM SEISMOGRAPHIC REFRACTION  
EXPERIMENT IN BRANSFIELD STRAIT, WEST  
ANTARCTICA, 1990/1991 (ABSTRACT)

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A detailed refraction seismological experiment to study the crust and upper mantle structure in Bransfield Strait, by the use of 10 sensitive Japanese OBSs (Ocean Bottom Seismographs) and 5 Polish land seismographs, was carried out in 1990-91. Bransfield Strait, between the South Shetland Islands and the Antarctic Peninsula, is suspected to be a young rift system or the back-arc basin in the first stage; knowledge about the Moho discontinuity beneath the strait is poor. Three refraction profiles, 180-250 km in lengths, were taken. The main profile, profile 20, was directly in the Bransfield Strait. The spacing between the OBSs, 40-50 km, and those of shots fired in the sea, 5 km on average, were dense enough to obtain a detailed structure. The records obtained by the OBS were very clear up to the distance of 250 km, sometimes up to 350 km.

We have obtained the detailed structure of the Bransfield Trough, *i.e.* the central trough of Bransfield Strait, down to 30 km for the first time. The depth to the Moho discontinuity becomes shallower toward the center of the Trough, from 30 to 10 km, and is shallowest at the central subbasin where the sea bottom is nearly deepest. The shallowest value, 10 km, coincided with a result which was obtained by a crossing profile in a preceding experiment made by GUTERCH *et al.* in 1984-1985. The upper mantle velocity beneath the whole of the Bransfield Strait is slow, about 7.7 km/s, which suggests existence of high temperature mantle beneath the Strait. We found an abnormally low velocity layer, 5.5 km/s, in the middle of the crust where the Moho is shallowest.

We have also found that the thinning of the crust toward the central part of the Trough solely consist of thinning of the upper crust, the 6.5 km/s layer. Such thinning of the crust by thinning of the upper crust, is very similar to what happened in the Okinawa Trough, an active back-arc basin in southwest Japan, which we obtained also by dense OBS refraction study. This suggests that the process beneath Bransfield Strait is similar to the Okinawa Trough back arc basin.

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