

# The Oldest Crust in the Ocean Basins

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The oldest crust in the ocean basins is the Mesozoic crust located in the Pacific Ocean Basin (Figure ). Scientists have been studying this area in water depths of more than m through ocean drilling for more than three decades. The most recent penetration of the approximately million year old crust by ODP occurred on Leg as part of the "Subduction Factory Experiment"

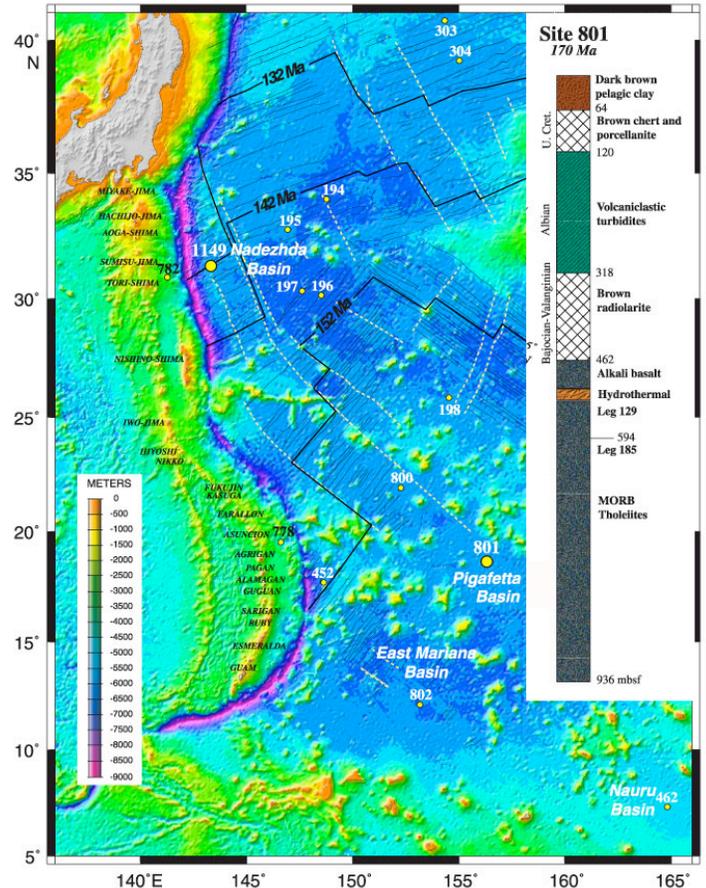
DSDP Legs and in were the first to search the western Pacific for the Earth's oldest oceanic crust and sediments. Achieving this goal ultimately took years and legs of DSDP/ODP (Legs and ). During the early legs drilling sites were targeted with single channel seismic records characterized by acoustically opaque chert layers that obscured the underlying volcanic basement. Often the coring was frustrated by these impenetrable cherts as well as by volcanoclastic sediments and basalts of Cretaceous age. To those who shipped out repeatedly and returned home with more questions than answers what had started as an oceanographic exercise turned into an ongoing quest for the "old Pacific"

Leg brought the transition from the research vessel *Glomar Challenger* to the *JOIDES Resolution* with its improved drilling capabilities. In addition preparations for Leg led by Yves Lancelot and Roger Larson included four multichannel seismic expeditions to the area searching for seismic "windows" through the Cretaceous volcanoclastic sediments and solid basalts. This combination of improved science and technology finally allowed successful drilling in at Site in the Pigafetta Basin where sediments from the mid Jurassic were discovered overlying Ma oceanic crust (Lancelot Larson et al )

In addition to dating the basement and the oldest overlying sediments in order to verify magnetic anomaly patterns plate reconstruction and Jurassic Cretaceous paleo oceanography (e.g. Bartolini and Larson ) penetration of the oldest crust of the ocean basins has helped scientist solve some fundamental problems such as the nature of the Earth's magnetic field during the Jurassic "quiet" period and the mantle composition prior to the Cretaceous Large Igneous Province pulses

Because the oldest plates on the Earth are generally close to subduction zones the principal aim of the re entry of site C on Leg (Plank T Ludden J N Escutia C et al Ludden et al ) was to quantify the geochemistry of the basement and sediment section being subducted in the Mariana Arc. A similar but Ma younger site ( ) was also drilled in the Nadezhda Basin to characterise crust being subducted into the Izu Bonin Arc (Fig )

These two sites were the first part of a project to quantify the fluxes into subduction systems which is part of the Margins and Geochemical Earth Reference Model (GERM) Initiatives



**Figure** Predicted topography of the northwest Pacific (Smith and Sandwell ) and magnetic lineations of the western Pacific compiled from Nakanishi et al ( ) and the PLATES Project ( ) Ages of selected lineations (solid black lines) are given using the time scale of Channell et al ( ) Open circles show locations of selected DSDP/ODP sites Site is located km northwest of Site along a fracture zone bounded flow line spanning m y White dashed lines locations of fracture zones (GMT software; Wessel and Smith ) The section shown on the side of the Figure represents a simplified stratigraphic section of ODP Site

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