

## 論文内容の要旨

論文題目 : Tectonic Evolution of a Classic Arc-Backarc System: the  
Southern Izu-Bonin Arc, Southern Shikoku Basin, and Central Kyushu-  
Palau Ridge

(島弧・背弧海盆系の構造発達 :  
南部伊豆小笠原島弧・南部四国海盆・中部九州パラオ海嶺の例)

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The Philippine Sea constitutes one of the best areas globally to study the complete tectonic evolution of a backarc spreading system, specifically the Shikoku Basin, which is bounded by the active Izu-Bonin arc to the east, and the Kyushu-Palau Ridge (interpreted remnant Eocene – Oligocene arc of the Proto-Izu-Bonin arc and backarc system) to the west.

To investigate the development of the Proto-Izu-Bonin backarc system, in particular the nature of rifting, breakup, and backarc seafloor spreading, I have analyzed high-quality, deep penetration multichannel seismic reflection (MCS) data, in conjunction with swath bathymetry, satellite-derived free-air gravity, and marine magnetic data, across the central Kyushu-Palau

Ridge and southern Shikoku Basin. To complement analyses of these primary data, I have calculated stretching (beta) factors for the crust and plate strength of the arc.

Basement of the Kyushu-Palau Ridge has been deformed by normal faulting, forming small sedimentary basins and sediment ponds. Analysis of the structures suggests that the Kyushu-Palau Ridge formed as part of the active Proto-Izu-Bonin arc in early Tertiary time, and was separated from the active portion of that arc by rifting, breakup, and backarc seafloor spreading starting in Oligocene time.

I propose the following model for the Cenozoic tectonic evolution of the Proto-Izu-Bonin arc and backarc system, incorporating previous Izu-Bonin tectonic reconstructions: (a) rifting of the Proto-Izu-Bonin arc (Eocene – Oligocene volcanic arc's intra-arc rifting), (b) breakup of the Proto-Izu-Bonin arc, and then (c) continuous Shikoku Basin spreading and separation of the Kyushu-Palau Ridge as a remnant arc.

Swath bathymetry data suggest contemporaneous late-stage Kyushu-Palau Ridge arc volcanism and initial Shikoku Basin spreading ridge volcanism, probably the result of interactions between arc and backarc spreading ridge volcanisms. During initial spreading of the southern Shikoku Basin, "chaotic terrain" characterized by five newly identified oceanic core

complexes and anomalously thin oceanic crust formed in the southwestern Shikoku Basin. This suggests that spreading of the southern Shikoku Basin is partially controlled by weak magmatic activity. The basic architecture of the Proto-Izu-Bonin rift system and its tectonic evolution are comparable to those of weakly magmatic passive continental margins that have experienced deep crustal and/or upper mantle material exhumation.