

Chemosynthetic Communities in the Western Pacific

Jun Hashimoto¹ and Suguru Ohta²

1) Japan Marine Science and Technology Center (JAMSTEC)

2) Ocean Research Institute, University of Tokyo

Since the discovery of deep-sea chemosynthetic communities at the Hatsushima site in Sagami Bay (Okutani and Egawa, 1985; Hashimoto *et al.*, 1989) and along the landward flank of the trenches around Japan (Ohta and Laubier, 1987), there have been many explorations of seep and vent communities in the Western Pacific.

New cold seep sites dominantly by the vesicomid clams were found at the bases of the Sagami Knoll, the Miura Knoll, the Misaki Knoll, and the Okinoyama Bank in Sagami Bay (Hashimoto, 1992), Suruga Bay (Okutani *et al.*, 1993), the landward slope of Japan Trench (Fujioka *et al.*, 1992) and the Ashizuri and Muroto Knolls off Shikoku (Fujikura *et al.*, 1995). A deep-sea community associated with a gas source was also reported from the Sea of Okhotsk (Zonenshayn *et al.*, 1987).

New hydrothermal vent communities were first located on a rift system in a back-arc basin of the Western Pacific, specifically, the middle portion of the Mariana Trough (Hessler and Lonsdale, 1991). Vent communities dominantly by deep-sea mussels and vestimentiferans were discovered on the Minami-Ensei Knoll (Hashimoto *et al.*, 1995), the Izena Cauldron and the Iheya Ridge (Ohta, 1990) in the Mid-Okinawa Trough. Explorations of hydrothermalism along the rift system in the back-arc basins were extended to the North Fiji and Lau Basins (Julibet *et al.*, 1989; Desbruyeres *et al.*, 1993) and Manus Basin. Submarine volcanoes accompanied by similar biologic communities were found on the Kaikata, the

Suiyo, the Mokuyo and the Nikko Seamounts located along the eastern edge of the Philippine Sea Plate (Hashimoto, 1992). Shallow-water gasohydrothermal vent communities were also reported from the Kurile Islands (Tarasov *et al.*, 1989) and from Kagoshima Bay (Hashimoto *et al.*, 1993).

Thus, to date, many chemosynthetic communities were found in hydrothermal vent fields along the actively plate-diverging margins, cold seep areas along the subduction zones where the plates converge, and places where reducing chemicals emanate from the underground aqueducts irrespective of the plate tectonics in the Western Pacific (Fig. 1). Although considerable differences are present in the chemosynthetic environments, constituent species, and relative abundances of associated fauna in the Western Pacific, there are also some common characteristics. Dominant animals such as bivalves, gastropods and vestimentiferans, are common to all reducing localities, regardless of geologic settings or other taxa present.

Morphologic and genetic data regarding speciation and evolution of the chemosynthetic communities in the Western Pacific collected from 80 meters to 6500 meters and spanning an area of several thousand square kilometers in discrete patches around the Western Pacific (Fig. 1) will offer valuable base-line data for comparative studies, including zoogeographic and evolutionary studies and succession studies.

Faunal interchange at a generic level between the Mariana Trough chemosynthetic communities and the Mid-Atlantic Ridge chemosynthetic communities via the Indian Ocean was suggested (Hessler and Lonsdale;

1991). The chemosynthetic communities in the Indian Ocean will be instructive regarding the affects of geologic history and dispersal patterns on establishing current global biogeographic distributions.

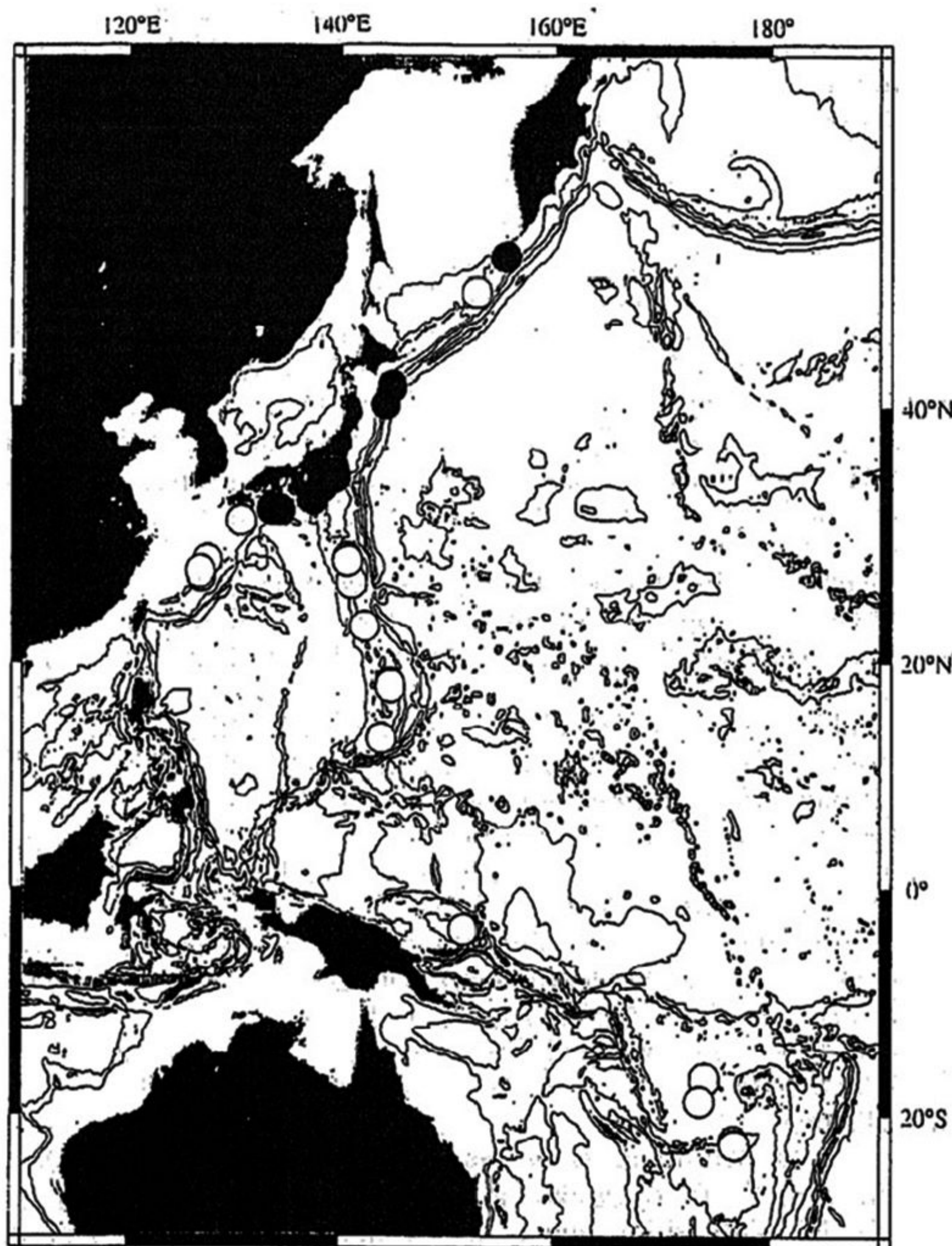


Fig. 1. Deep-sea chemosynthetic communities in the Western Pacific. Closed circles: cold seep communities. Open circles: hydrothermal vent communities.

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