WATER MASS ANALYSIS

3. Western North Pacific

3.1 Water masses between Mindanao and New Guinea

Kashino, Aoyama, Kawano, Hendiarti, Syaefudin, Anantasena, Muneyama, and Watanabe (1996)

In the western equatorial Pacific, particularly in the southern Philippine Sea, there is an area called "water mass crossroads" where several water masses from the northern and southern hemispheres meet.

Kashino *et al.* (1996) investigated water masses between Mindanao and New Guinea, using hydrographic data, during two R/V *Kaiyou* WOCE expeditions conducted in October 1992 and February 1994 by the Japan Marine Science and Technology Center (JAMSTEC) to understand the Indonesian throughflow, which probably plays an important role in the global ocean circulation. It is important to identify which water masses enter the Indonesian Seas from the Pacific.

Conclusions are as follows:

1. South Pacific Tropical Water (SPTW), with a salinity maximum around 25.0 σ_θ reaches north of Morotai Island (Fig. 96-18).
2. Antarctic Intermediate Water (AAIW), with a salinity minimum around 27.2 σ_θ and high oxygen (>100 μmol/kg), exists in the southwestern area of the southernmost Philippine Sea (Fig. 96-19).
3. North Pacific Tropical Water and the remnant of the North Pacific Intermediate Water originating in the North Pacific return from the Celebes/Maluku Seas with the low salinity water via the northeastward flow between Talaud Islands and Morotai Island. They found that this northeastward flow, which was shown to exist in the upper 100 m by Lukas *et al.* (1991), extended to at least a depth of 300-400 m. This finding suggests that retroflection of the Mindanao Current (MC) occurs in the Celebes Sea.
4. The New Guinea Coastal Undercurrent, transporting SPTW and AAIW from the southern hemisphere, is divided into at least two parts because the retroflection of the MC prevents its shallow part from reaching farther north; the shallower SPTW turns eastward as a source of the North Equatorial Countercurrent and retroflects toward the southeast. AAIW and the lower part of SPTW flow northward and appear to be linked to the Mindanao Undercurrent.

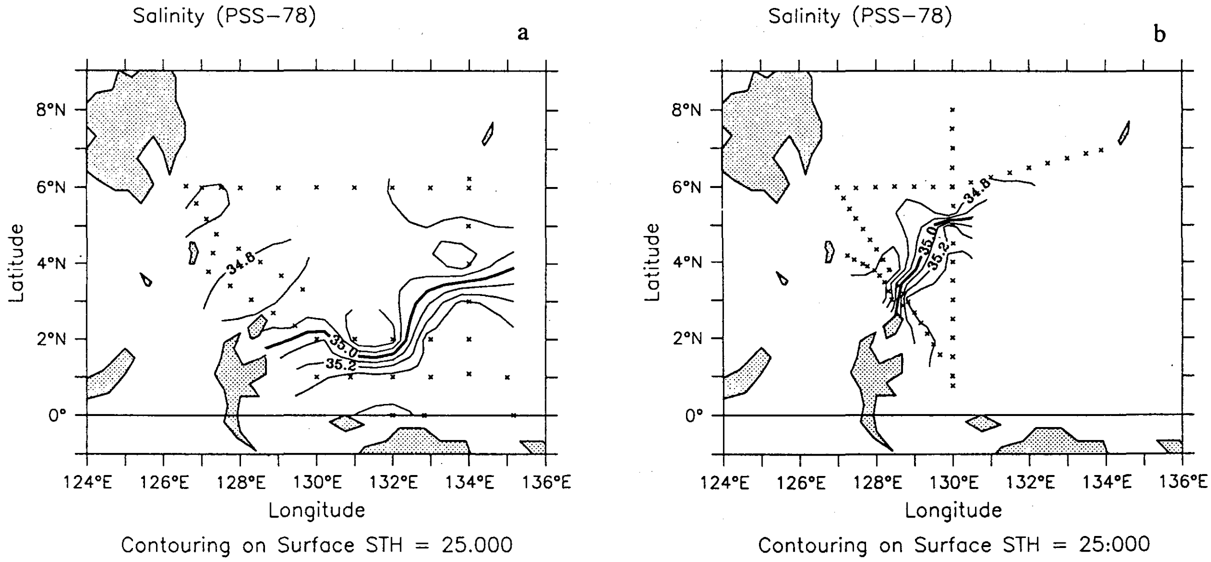

Fig. 96-18 Salinity distributions at surface σ_θ = 25.0 during (a) *Kaiyo* WOCE I and (b) *Kaiyo* WOCE II. Contour interval: 0.1 PSS.

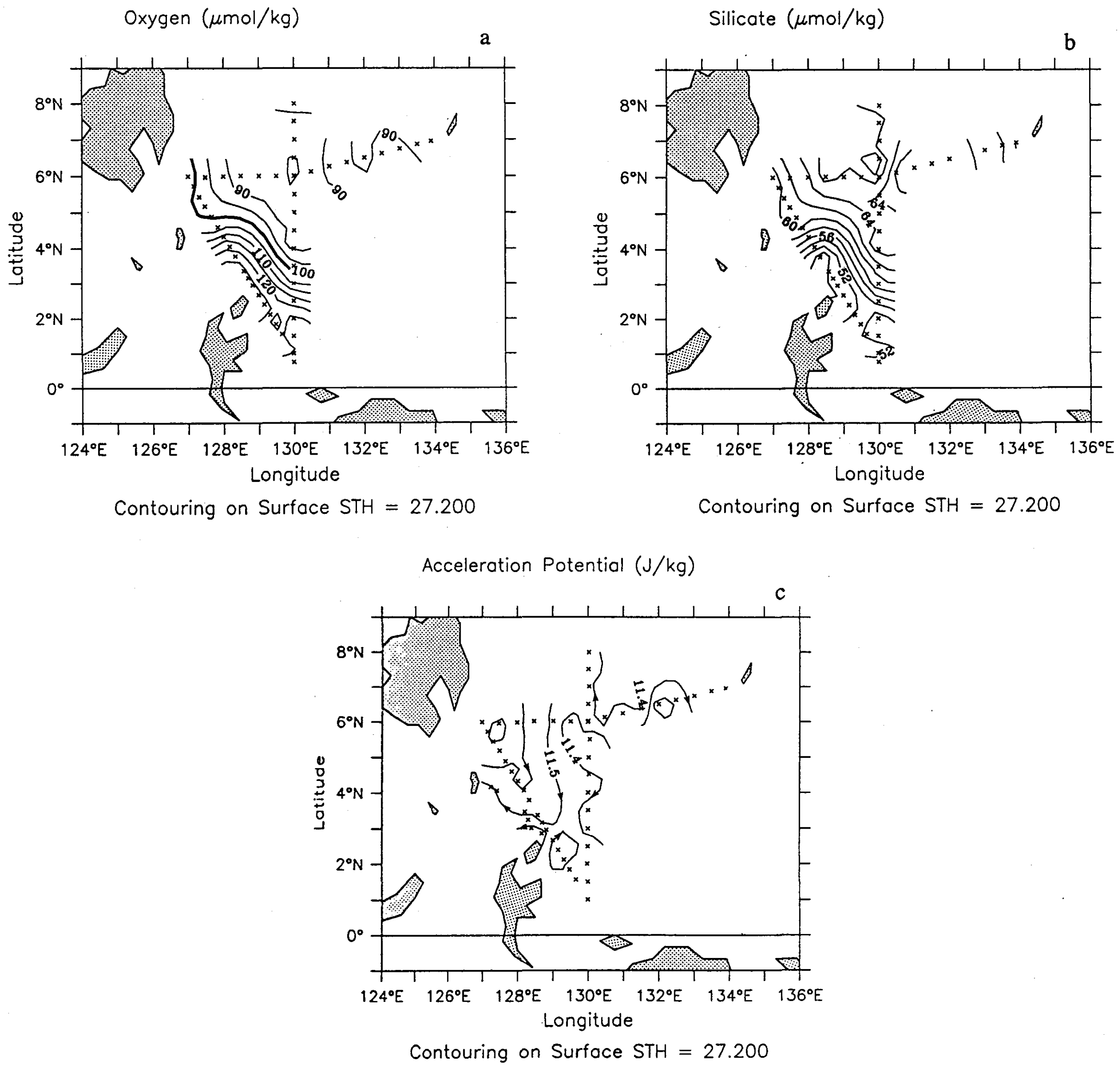

Fig. 96-19 (a) Dissolved oxygen, (b) silicate, and (c) acceleration potential relative to 1500 dbar on the surface σ_θ = 27.2 during *Kaiyo* WOCE II. Contour intervals are 5.0 μmol/kg, 2.0 μmol/kg, and 0.1 J/kg.

3.2 Preliminary study of in the north central Japan Sea temperature structure

Hirose, Hong, and Miyao (1996)

The north Japan sea is significant because of the formation of upper Japan Sea Proper Water (JSPW), which occupies most of the deep waters in the Japan Sea and is extremely homogeneous in salinity, temperature, and higher oxygen in winter due to deep convection. Little observational data has been collected, however, especially in winter.

In March 1994, a Japan-Korea-Russia Expedition was conducted in the north central Japan Sea, the main purpose of which was to determine the radioactive contamination of seawater, biota, and sediment from radioactive waste dumping by Russia (and the former USSR). During the expedition, Hirose *et al.* (1996) conducted CTD and XBT measurements to determine hydrographic features of the area surveyed (Fig. 96-20).

Water mass in early spring in the north central Japan Sea (north of 40°N) was characterized as cold (less than 2.5°C) and salinity-homogeneous (34.07±0.02). Vertical profiles of seawater temperature suggest that the water mass can be divided into at least two parts: surface water and JSPW. The spatial distributions of seawater temperature suggest that an anticyclonic eddy coupled with a cyclonic eddy was present in the north central Japan Sea (Fig. 96-21). Hydrographic information is important to understanding the distribution of radionuclides in the north central Japan Sea.

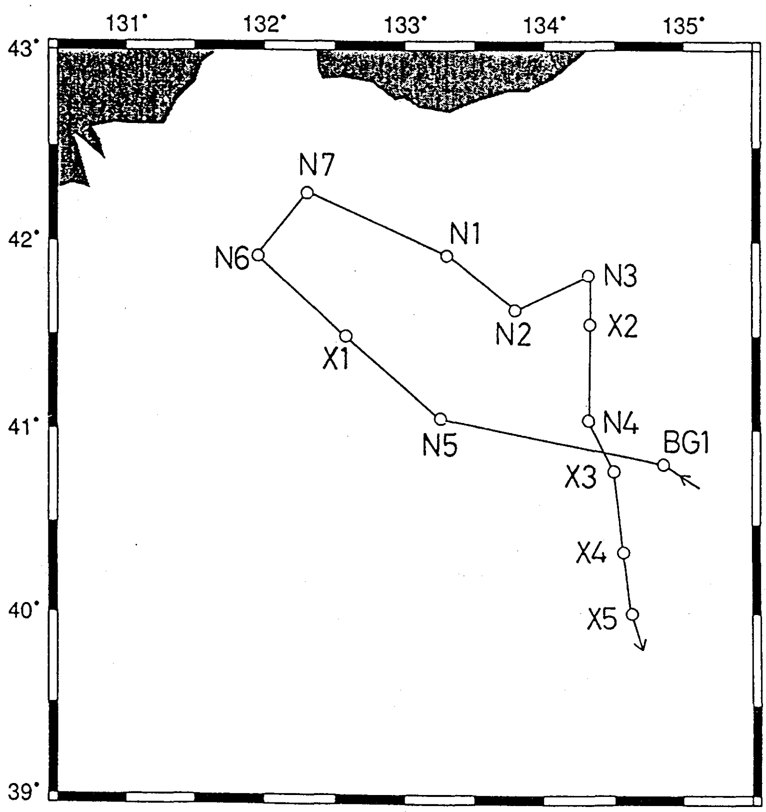

Fig. 96-20 Track and sampling points in central Japan Sea.

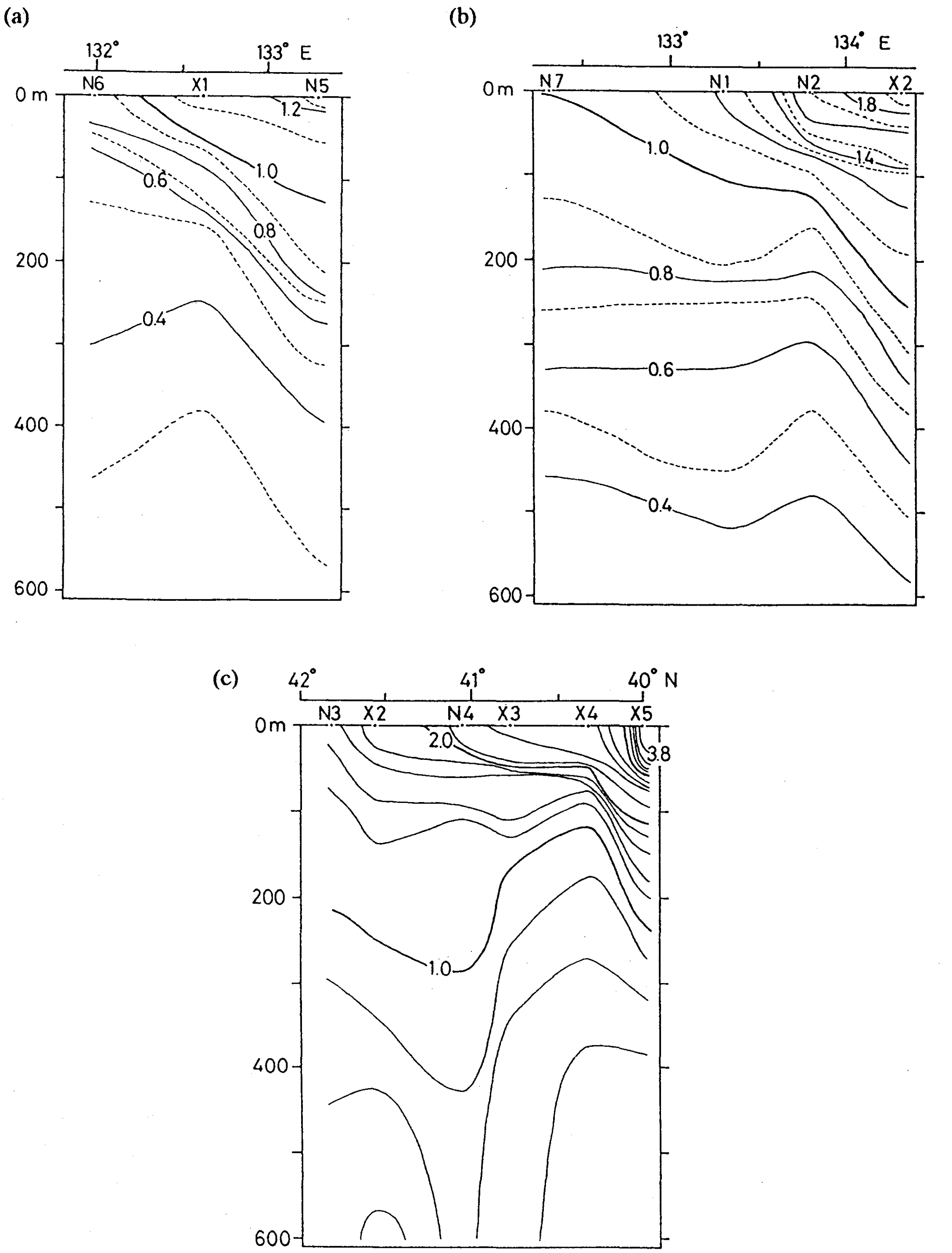

Fig. 96-21 Seawater temperature cross sections from surface to 600 m depth. a: N6-N5, b: N7-X2, c: N3-X5.