

Abstracts of Additional Hard Mineral Session Papers

Heavy Mineral and Manganese Nodule Distribution in Areas Adjacent to Taiwan

Ju-Chin Chen
Fei-Jan Lin
*Institute of Oceanography,
Taiwan University
Taipei, Taiwan*

The heavy minerals in the sandy shelf sediments around Taiwan consist mainly of magnetite, ilmenite, amphiboles, pyroxenes, olivine, epidote, garnet, zircon, tourmaline, and monazite. The highest concentration of heavy minerals occurs on the eastern Taiwan shelf where average heavy mineral content is about 8%. This abundance of heavy minerals is closely related to the weathering of pyroxene andesite from the Coastal Range. Amphiboles dominate in the heavy minerals from the shelf of northern Taiwan while zircon and monazite are relatively abundant along the southwestern coast.

The manganese nodules dredged by R/V *Chiu-Lien* from the Philippine Sea consist essentially of akaganeite (β -FeOOH), birnessite, and todorokite, while the nuclei of the nodules contain phillipsite, illite, and feldspar. The average compositions of 18 nodules analyzed are 14.10% iron, 12.94% manganese, 0.26% calcium, 0.80% magnesium, 1.53% sodium, 0.62% potassium, 2,588 ppm cobalt, 30 ppm chromium, 1,257 ppm copper, 14 ppm nickel, 2,733 ppm lithium,

1,033 ppm lead, 80 ppm strontium, and 518 ppm zinc. The (nickel + copper) contents tend to increase with increasing manganese/iron ratios which vary from 0.6 to 1.1 averaging around 0.9. According to the criteria given by Toth, the Philippine Sea nodules are not related to hydrothermal activity. These nodules may have originated by catalytic oxidation and absorption of manganese, iron, and other transition elements upon suitable submarine surfaces.
