Impact of geotectonic on the formation of the Co-rich ferromanganese crusts

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Interest on Co-rich Ferromanganese Crusts (hereafter abbreviate the crust) is based on two main aspects: economically the Co, Pt and EER in the crusts has been considered to be potential metal resources and scientifically the compositions of the crusts acts as an indicator for the paleoceanography and paleochemistry of the environments in which the crusts form. The formation and distribution of the hydrogenetic crusts is controlled by a number of factors such as sea floor topography, water depth, structure of water column (oxygen minimum zone, carbonate compensation depth), type of substrate materials for the crusts, biological productivity, sedimentation, ocean current, especially Antarctic bottom water and upwelling. Our study of the crusts of 13 seamounts in the central Pacific (Line Islands Ridge, Midpacific Mountains) and the west Pacific Ocean (Magellan Seamounts, Marcus-Wake Ridge)show that the crusts are mainly distributed on seamounts , plateaux and aseismic ridges which are older than about 15 m.y; the crusts have three growth periods and the crusts with 3 layer in the West Pacific Ocean more developed than that of the central Pacific; average thickness of the crusts above 2500m of water depth is increasing from 3.33cm of the east part of study areas to 6.67cm of the west part and the average content of cobalt in the crusts above 2500m 0f water depth is decreasing from 0.74% of the east part to 0.57% of the west part. Above mentioned phenomenon is caused by ocean plate and hot spots motion. The west Pacific and the central Pacific crust area is mainly distributed on linear seamount chains of hot spot origin, such as Magellan Seamounts, Marcus-Wake Ridge, Mid-pacific Mountains, Hawaiian Islands Chain and Line Islands Ridge. Most of linear volcanic chains in the Pacific are oriented west-northwesterly in general and formed sequentially above stationary hot spots during the past 42 m.y. as the Pacific plate rotated clockwise about a pole located near 69°N,68°W (Clauge and Jarrard, 1973a). Another group of linear chains exhibit chiefly north-trending orientation and were formatted by the same mechanism between 80 and 42 m.y. ago as the Pacific plate rotated about a pole located near 17°N, 107°W (Clauge and Jarrard., 1973b). The early plate motion between 100 and 150m.y. into westerly direction. (Vallier *et al*., 1983). The above mentioned plate and hot spot motion caused to form the seamounts, plateaux and ridge on the ocean floor and to open and close of sea passage and isthmus, which changed the pattern of ocean current, specially Antarctic bottom water with oxygen –rich and structure of water column such as oxygen minimum zone as well as biogeography and bioproductivity close related to the formation and distribution as well as composition of the crusts.

Re-Os geochemistry of Barents Sea shales: Anisian-Ladinian stage boundary, faunal distributions, and hydrocarbon exploration

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Re-Os isotope geochemistry of C_{org}-rich shales provides depositional ages and syndepositional seawater $^{187}Os/^{188}Os$ ratios. Re-Os isochron ages calibrate biostratigraphic ages while seawater $^{187}Os/^{188}Os$ ratios fingerprint hydrocarbon source rocks. Together, these data inform basin modeling, faunal distributions, and hydrocarbon exploration. Here we apply Re-Os geochronology to Anisian black shales from pristine outcrops in western Svalbard, and drill core from the submerged Svalis Dome, ~600 km SE in the Barents Sea.

Black shales of the Blanknuten Member, Botneheia Formation, western Spitsbergen Basin yield a Model 3 Re-Os age of 241 Ma and initial $^{187}Os/^{188}Os$ (Os_i) of 0.83. Black shale sample suites only 0.5 m apart in the Steinkobbe Formation from Svalis Dome IKU core 7323/07-U-09 (94-95 m) yield distinct ages, but indistinguishable Os_i: 237 Ma (Os_i = 0.69) above and 243 Ma (Os_i = 0.65) below.

The sampled section in Svalbard underlies a distinctive *Frechites* (ammonite) layer, and is inferred to be middle to upper Anisian. The upper Steinkobbe section was sampled ~3 m above the late Anisian *Frechites laqueatus* zone and is thus assumed to be near the Anisian-Ladinian transition. Our results support correlation of the Botneheia and Steinkobbe Formations, and agree with the 237 ± 2 Ma age for the stage boundary based on magnetostratigraphy. The U-Pb zircon age for an ash bed at the GSSP in the Tethyan realm, however, is 3 to 4 m.y. older. This is problematic. If both radiometric ages are correct, then Baltic and Tethyan faunas may not be globally correlative. The high Os_i for the Svalbard suite coincides with a sharp spike in seawater $^{87}Sr/^{86}Sr$ in the Middle Triassic. The lower Os_i in correlative units at Svalis Dome may reflect locally restricted seawater circulation. Large variations and sudden swings in seawater Os ratios show great potential for correlating hydrocarbons with their source rocks, provided paleogeographic constraints are taken into account.