COMPOSITION OF HYDROTHERMAL FLUIDS AND THEIR INFLUENCE ON GEOCHEMICAL AND GEOPHYSICAL FIELDS ON MID-OCEAN RIDGES

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According to our observations the link between fluid composition and geochemical/geophysical features of hydrothermal fields is established. In situ potentiometric measurements show different content of sulphide in the buoyant parts of plumes forming in different tectonic/geological settings. Sulphur/metal ratio controls the particle composition and distribution in turbulent buoyant warm waters. Sulphur-dominated fluids form the increasing vertical flux of Fe, S, Cu, Mn and Zn forming metal sulphides and intermetal combinations . The plume with a more evenly matched Fe and S molar abundance, precipitates Fe-sulphide particles that settle rapidly and cause particle concentrations in the plume to sharply decrease with distance from the vent. Our measurements show that the cloud of sulphide particles in the buoyant plume forms the distinguished negative Eh anomaly and the anomaly of spontaneous electrical field. The latter could be a response on the gradient of the main components concentrations on the border of the plume and ambient sea waters. Due to effects of the vapor-liquid phase separation below the seafloor the chlorinity of the liquid increases considerably and the bulk of the gases fractionates into the vapor-phase. When discharging, gas-depleted brines should form reverse plumes with negative buoyancy. The potentiometric investigations in situ show the differentiation of the Eh and EH2S fields within the plume. This project was supported by the Russian Foundation for Basic Researches, grants ##99-05-65258, 98-05-169.