
A comparative study of rare earth element concentration in coppersulfides from different hydrothermal sites on the MAR

C. Evrard^{1,*}, J.A. Barrat² AND Y. Fouquet¹

¹ Ifremer, BP70, 29280 Plouzané, France

² IUEM, Place N. Copernic, 29280 Plouzané, France

*: Corresponding author : C. Evrard, email address : catherine.evrard@ifremer.fr

Rare earth elements (REE) are good tracers of the evolution of geochemical systems. Their geochemistry is classically studied in hydrothermal fluids [1, 2], mid-ocean ridge basalts and seawater [3]. Because of their low concentration, few studies exist on the REE geochemistry in hydrothermal sulfides. The aim of this study is to determine the REE concentrations and their evolutions in sulfides close to equilibrium with the endmember fluid. At the core of the chimney, Cu-sulfides (chalcopyrite, isocubanite...) are generally dominant. Minerals were sampled from three sites associated with ultramafic rocks: Rainbow (36°14'N), Logatchev (14°45'N), Ashadze (12°58'N), and one site associated to basalt: Snake Pit (23°22'N). All sulfides were collected on active black smokers (fluids at 250-350 °C) or in massive sulfide from the internal part of large spires. The differences in the REE concentrations will be discussed in terms of basement rock settings and in terms of zonation across the sulfides precipitation. We will also discuss how the fluid evolves during the growth of the chimney. The normalization by REE concentration of hydrothermal fluids from the same area [4] is a way to trace the relationship between the precipitated chalcopyrite and the endmember black smoker fluid.

[1] Douville et al. (2002) *Chemical Geology* 184(1-2), 37–48.

[2] Schmidt et al. (2007) *Chemical Geology* 242(1-2), 1–21.

[3] Elderfield (1988) *GCA* 52(1583), 105–126. [4] Mills & Elderfield (1995) *GCA* 59(17), 3511–3524.