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Trollveggen Vent Field: Mineralogy and geochemistry of chimneys and deposits, and evidence of hydrothermal activity in far-field cores.

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The Jan Mayen vent fields were discovered in the Mohns Ridge during an expedition with the Norwegian research vessel "G.O. Sars" in July 2005. They comprise two main active areas: (1) Soria Moria and (2) Gallionella Garden & Trollveggen. The Trollveggen vent field is located at depths of 700-750 m. Venting takes place mainly through white smoker chimneys with fluid temperatures reaching up to 260-270°C. Here we present mineralogical and geochemical data from vent chimneys and near vent deposits collected at the Trollveggen vent field with an ROV. Cross-sections of chimneys present evident mineralogical zonation, showing acicular barite crystals in the outer parts and sulphide enrichments in the interior (Sph + Cpy +/- Py - Po). The near vent deposits are mainly formed by vent fragments, showing a mineral assemblage similar to that of chimneys. Total geochemical analyses both from vents and near vent deposits showed higher concentrations in Ba, Co, Zn, Fe, but also slight enrichments in Au and Ag. REE patterns from chimneys and near vent deposits suggest that REE have been deposited from hot (> 250ºC) hydrothermal fluids. Sediment cores collected in the vicinity of the Jan Mayen hydrothermal field suggests that hydrothermal activity is not restricted to the known vent areas. Two of the collected gravity cores registered geochemical signatures related with hydrothermal activity, showing metal enrichment and a slightly positive Eu anomaly.