Large scale export of vent derived chemical tracers

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While it has long been recognised that submarine hydrothermal vents release significant fluxes of chemicals from the seabed what have remained elusive are (*i*) an evaluation of the frequency and distribution of hydrothermal vents around the global ridge-crest and (*ii*) the fate of materials dispersed away from individual vent-sites. Prior WG activities from InterRidge have focussed on efhit rst of those problems (see, e.g., synthesis paper by Baker & German, 2004). In this presentation I will focus on the latter: export fluxes from vent-sites to the deep ocean. In a recent synthesis from the Mid-Atlantic Ridge, an integrated study of fluxes from the Rainbw vent-site has revealed that ~0.5GW of heat-flux, accompanied by chemical fluxes of ~10mol/sec Fe and ~1mol/sec each of Mn and CH4 pass through the non-buoyant hydrothermal plume. Further, physical oceanographic arguments indicate that this flux is almost entirely derived from focussed flow, with no significant entrainment of a diffuse-flow entrainment. This is in apparent contradiction with current "received wisdom" in which only ~10% of on-axis hydrothermal heat-flux occurs as chemically-laden high-temperature vent-fluids and closer to 90% of the total flux is as "chemically-spent" – but biologically more attractive? - diffuse flow. For physicists, and certain chemists, the arguments are academic – the flux of heat and conservative chemical tracers (e.g. Sr isotopes) will be identical, however the flux is partitioned. But if high-temperature fluxes are more important than previously anticipated then the impacts on global ocean biogeochemical cycles could be profound. In the extreme, the entire volume of the oceans may be processed through vent-plumes on the same time-scale as thermohaline circulation. So: it is now fundamentally important to understand: (a) how processes active in plumes might vary from one ocean to another and (b) where we should study next, to best address global-scale impacts of venting on whole-ocean biogeochemistry.

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