# Deep-sea hydrothermal plumes: An important source of stabilised dissolved Fe to the oceans

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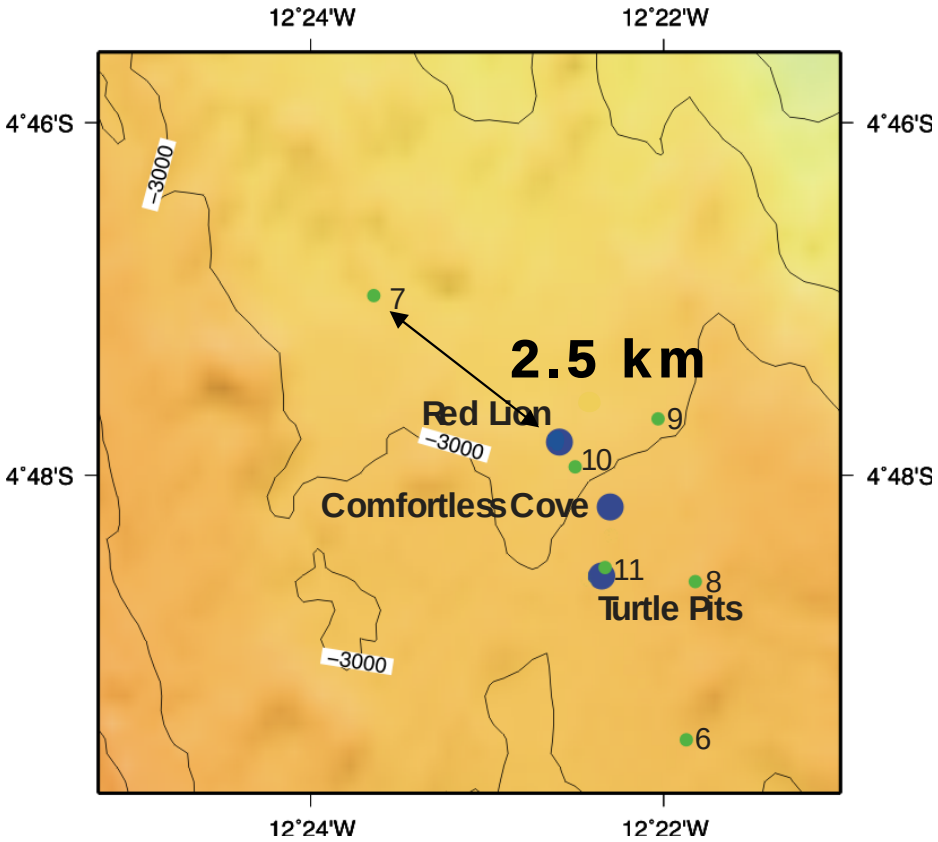
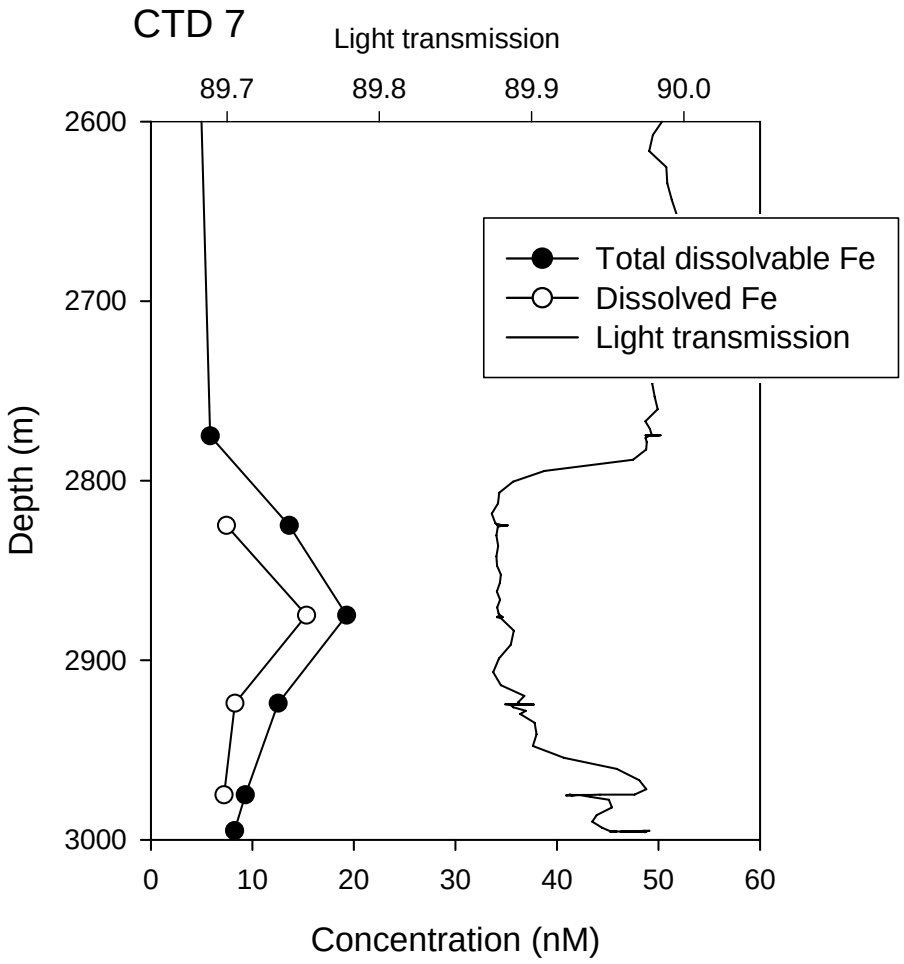
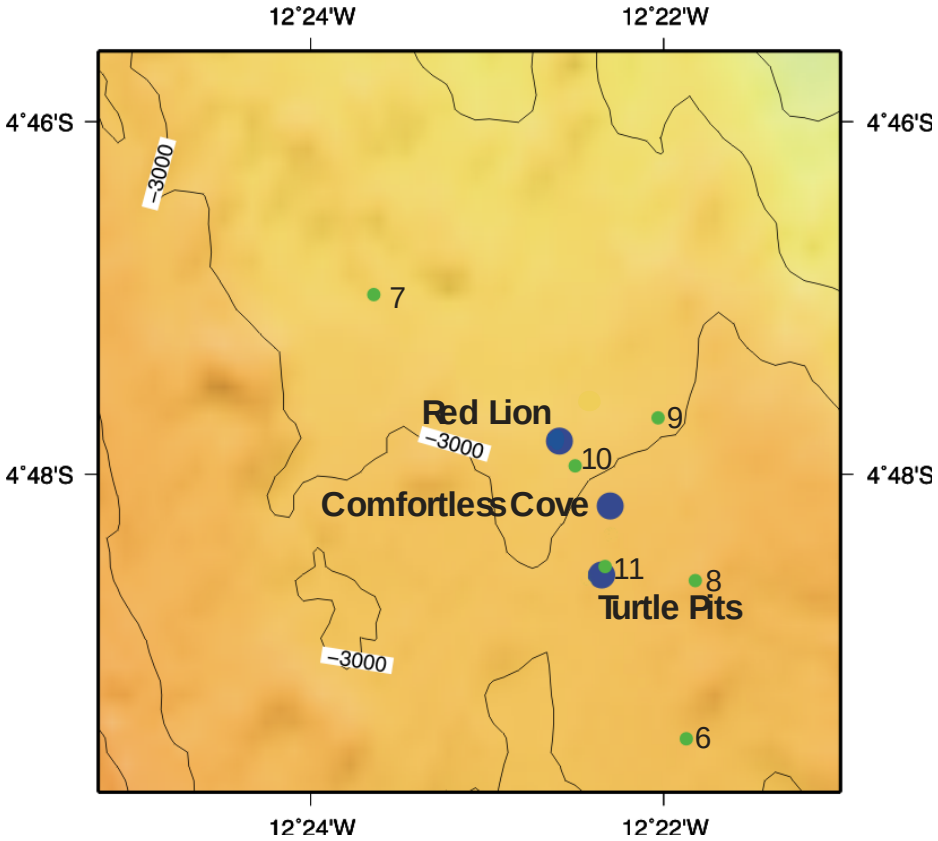
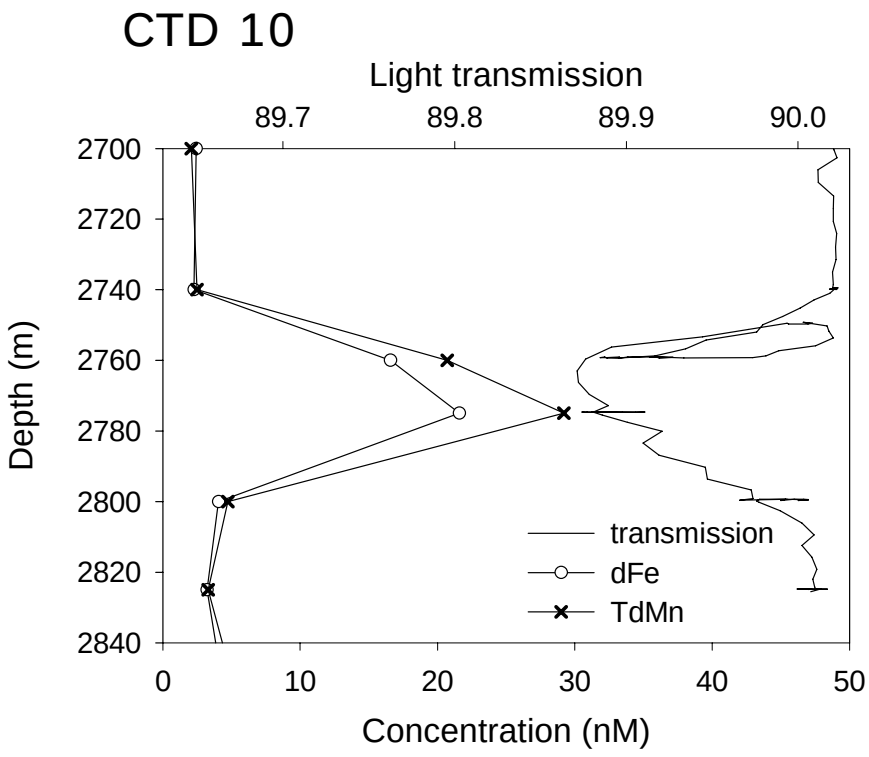
# Non-buoyant plume study



# Fe speciation in a non-buoyant plume



# CLE-CSV results

| Depth (m) | $[Fe]_d$ (nM) | [L] (nM) | Estimated $K_{Fe'L}$ |
|---|---|---|---|
| 2739 | 2.3 | 2.0 ± 0.2 | 11.2 ± 0.1 |
| 2759 | 16.6 | n.d. | n.d. |
| 2775 | 21.6 | n.d. | n.d. |
| 2800 | 4.1 | 3.9 ± 0.4 | 11.6 ± 0.2 |
| 2825 | 3.2 | 2.7 ± 0.3 | 11.3 ± 0.2 |

- Compared to open-ocean
  - $[Fe]_d$ = 0.7 nM
  - [L] = 0.7 – 1.4 nM
  - $K_{Fe'L}$ = 11.4 – 12.3

# Global mass balance

- Stabilisation of ~4% of the hydrothermal Fe flux from Red Lion
- Sufficient to supply 10 – 20% of the deep-sea dissolved Fe budget.
- Upwelling in tropical and circumpolar latitudes – eventually delivered to the upper ocean.