Eyjafjallajokull's iron-rich ash fertilized North Atlantic Ocean

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In about a third of the global ocean, the abundance of life is limited by a dearth of biologically available iron. The supply of iron to a region that is depleted in this important nutrient can stimulate algal productivity, and can result in a temporary boom in biological activity. For much of the surface ocean, the wind-borne transport of iron-rich dust and the upwelling of nutrient-filled water are the major sources of iron.

Another potentially important source is the deposition of the iron-rich ash produced by volcanic eruptions. Though satellite observations and modeling work suggest that volcanic ash could seed life in such a way, there have been only a limited number of direct observations of the effects of ash deposition on surface ocean waters.

Thanks to a bit of serendipitous scheduling, Achterberg et al. conducted a series of research cruises in the Iceland Basin region of the North Atlantic Ocean both during and after the month-long eruption of Iceland's Eyjafjallajökull volcano in the spring of 2010. Three cruises allowed the authors to undertake measurements of surface ocean iron concentration before, during, and after the eruption in a region directly affected by the towering ash plume. Beneath the plume, the authors found peak dissolved iron concentrations up to 10.2 nanomolar, compared to 0.23 to 0.45 nanomolar detected before ash deposition.

Using a model of the ash plume trajectory and ash deposition rates, along with measurements of iron dissolution, the authors calculated that up to 570,000 square kilometers (220,000 square miles) of North

Atlantic waters could have been seeded with at least 0.2 nanomolar of iron. In controlled biological incubation experiments, the authors added volcanic ash collected under the plume to sea water, and find that iron leached from the ash could drive an increase in biological productivity and a draw-down of nutrient levels.

More information: Natural iron fertilisation by the Eyjafjallajökull volcanic eruption*Geophysical Research Letters*, doi:10.1002/grl.50221, 2013