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50 & 100 YEARS AGO

50 YEARS AGO

In 1920 a German, Freiherr von Pohl, propounded the theory that certain rays emanate from the Earth which are injurious to the health of man... He followed this with the publication of a book... in which the use of the divining rod is recommended for detecting the presence of such rays. Credence was given to his theory by an astonishing number of people, particularly in Germany, Switzerland and the Netherlands... Spread of the belief, however, gave scope for the activities of large numbers of diviners, professional and otherwise. They appeared mostly to act in good faith, although one feels that the lady who claimed for her divining rod the ability not only to detect the presence of Earth rays, but also to extract them from the ground and deposit them in a ditch or rubbish heap... was making rather a good thing out of her neighbours' troubles... In the Netherlands, agriculture was at first unaffected by von Pohl's theory, until about ten years ago intensive propaganda on the part of the diviners proclaimed the efficiency of the protective boxes for controlling animal and plant disease. The propaganda was so successful... that uneasiness was felt in scientific circles.

From *Nature* 27 April 1957.

100 YEARS AGO

In addition to the usual record of measurements taken during the year 1906 at Epsom College, the report of the college Natural History Society for last year gives the average height, weight, and chest girth of all boys who have been measured in the ten years 1897–1906... On the whole, the average Epsom College boy would appear to be rather superior in physique than inferior to the average public-school boy. One marked exception is evident in the curves for the ages 17 yr. 10 mo. to 18 yr. 4 mo., though... the number of observations on which the curves are based is, for these months, much smaller than the rest.

From *Nature* 25 April 1907.

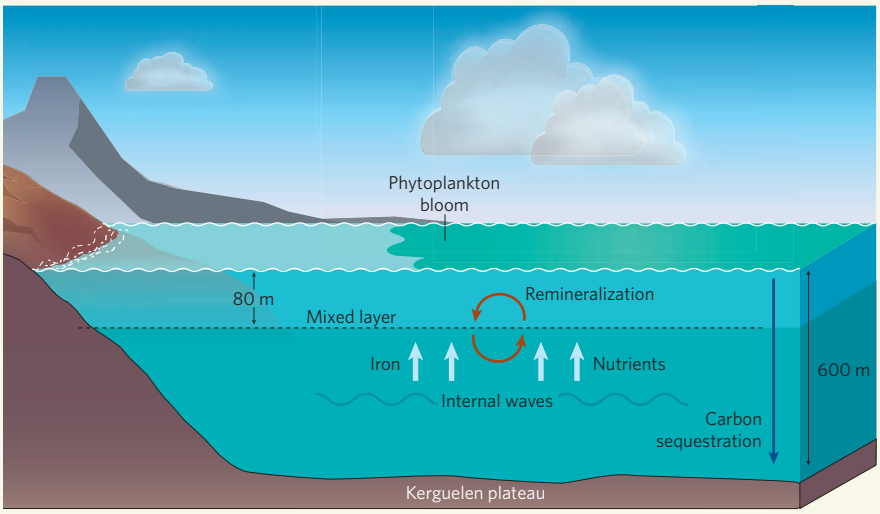

Figure 1 | Kerguelen blooming. The Kerguelen plateau is about 600 m under the ocean surface; in this region, internal waves enhance the vertical mixing of the deep waters above the plateau, which have higher iron and nutrient concentrations, with those in the 80-m-thick surface mixed layer. Up to half of the particulate iron and other nutrient elements were broken down (remineralized) to dissolved forms in the upper ocean. Both of these processes supplied continual nourishment to the phytoplankton studied by Blain *et al.*[3], which — through photosynthesis and the subsequent sinking of organic carbon into the deep ocean over several months — contribute to higher than previously reported[2] sequestration of atmospheric CO_2 per unit iron supplied.

they were too short-term (lasting just weeks) to observe its full extent. Second, they overestimated iron supply: pulses of extra iron into the surface ocean are prone to rapid removal, for example by sticking to sinking particles.

The ratios of carbon export to iron supply estimated by Blain *et al.* for particles sinking from the Kerguelen bloom are very similar to carbon–iron ratios in phytoplankton in high-iron laboratory cultures[7], pointing to little biological modification of these ratios between photosynthesis and subsequent sequestration. The similarity of the ratios is difficult to reconcile with recent reports that the organic carbon on sinking particles is broken down into dissolved forms, or remineralized, more rapidly than is iron[8]. The authors also report high stocks of zooplankton grazing on the Kerguelen blooms that would be absent from the laboratory cultures. The presence of zooplankton aids the remineralization of both iron and carbon, and thus reduces carbon export while resupplying iron to the phytoplankton.

The phytoplankton bloom at Kerguelen, fuelled by a sustained supply of iron and nutrients, was of exceptional duration, lasting some months. Although it used up virtually all of the iron and silicic acid in surface waters, it did not deplete its nitrate stock. Under high-iron conditions, a bloom should use equal amounts of nitrate and silicic acid[9]. The implication is that, despite the continuous vertical supply of nutrients characteristic of the Kerguelen site, the growth rate of the resident bloom is probably suboptimal owing to insufficient iron.

Together with other measurements[2], Blain and colleagues' results provide a powerful tool for modellers investigating the effects of the mode of iron supply on ocean biogeochemistry. The main modes, in the geological past, have been episodic iron enrichment of the uppermost ocean through dust deposition and/or sustained enrichment of overlying waters through the upwelling of deep waters. The sustained iron and nutrient supply through internal wave activity at Kerguelen means that the intensity — and, more importantly, the ratio of its iron and nutrient supplies — may differ from those of polar upwellings. A quantification of the effects of upwelling and internal waves on this ratio is needed to determine whether the Kerguelen data are a proxy for the polar ocean during the glacial maxima.

But does Blain and colleagues' evidence[3] of more carbon export per unit iron supply mean that iron enrichment is a viable short-term climate-mitigation strategy? The authors say no: the enhanced export resulted from bloom longevity that was driven not just by sustained iron enrichment, but also by continuous nutrient enrichment. Moreover, the ratio of carbon export to iron supply is notoriously difficult to measure, and only a fifth of the phytoplankton's requirements were accounted for in the study's iron budget.

Nevertheless, the work is a novel and valuable addition to the library of phytoplankton-biogeochemistry studies. A final testament to the challenges of marine research, and the technical difficulties in assessing the efficacy of iron enrichment as a climate-mitigation strategy, is given by the story of Blain and colleagues' sediment traps, particle interceptors used to measure carbon sequestration at great depth. These could not in the first instance be recovered, but have just finally been salvaged — one year on. ■

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