they interpret the reduction in the mass-independent fractionation of mercury with increasing latitude as a reduction in the sunlight-induced breakdown of methylmercury with latitude.

Furthermore, the degree of mass-independent fractionation — and thus sunlight-induced methylmercury breakdown — observed in the egg shells was negatively correlated with sea-ice cover in the areas where the seabirds fed during the breeding season. For example, light-driven degradation is estimated to have decreased from 16% in regions with no sea-ice cover, to 8% in regions with 90% sea-ice cover. Putting all the pieces together, the authors suggest sea-ice cover reduces sunlight-driven degradation of methylmercury in the surface ocean[2].

An obvious question is whether the difference in sunlight-induced breakdown of methylmercury affects the levels of mercury exposure in birds from the different colonies. Unfortunately, this relationship could not be explored using the data collected by Point *et al.*, largely because differences in food-web structure between the widely spaced study sites may have obscured the relationship between sea-ice extent and mercury concentration. The accumulation of mercury in the food web is directly affected by its structure, whereas mass-independent isotope fractionation is believed to be unaffected[4,8–11]. It may be possible that, at individual sites, annual changes in sea-ice extent could have a significant impact on seabird exposure to mercury, but this remains to be tested.

Point and colleagues[2] suggest that sea-ice cover impedes the photochemical degradation of methylmercury in the surface ocean. With recent dramatic reductions in Arctic sea-ice extent, and projections for further reductions in a warmer future world[12], it is possible that a previously unexpected and positive outcome of Arctic warming could be a reduction in methylmercury bioaccumulation in the Arctic marine food web. ❒

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ATMOSPHERIC SCIENCE

Triggered lightning

Tiny particles in the atmosphere, termed aerosols, never fail to surprise. Sulphur-containing aerosols cool the planet by reflecting sunlight back to space. In the 1990s, the magnitude of this effect became apparent when it was included in climate models: from a systematic overestimation of greenhouse warming, the models evolved to a broad agreement with observations.

Over the next decades, the story became more complex as the effects of various types of aerosols were differentiated. As opposed to cooling the Earth, black-carbon aerosols exert the second largest human-induced warming, after carbon dioxide. And aerosols were found to change the properties of clouds when present in sufficient concentrations. For example, cloud droplets tend to be smaller but more numerous where small particles act as nuclei for droplet condensation. The clouds become brighter and less likely to produce rain as a result.

Yet there is more to discover. Tianle Yuan and colleagues show that the incidence of lightning activity over the West Pacific Ocean was substantially higher than normal in 2005, following the injection of volcanic aerosols into the usually pristine air (*Geophys. Res. Lett.* doi:10.1029/2010GL046052; 2011).

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Specifically, when aerosol loads rose by 60%, the frequency of lightning flashes increased by 150%.

The effect can be attributed to the way in which aerosols modify cloud microphysics: in the presence of aerosols, the elevation at which all cloud water freezes is higher, which broadens the altitudinal range in which both water and ice particles exist. It is in this layer that charge is generated — and a broader layer implies elevated chances of generating lightning.

The particular instance in 2005 was fortuitous from a scientific point of view. Because the aerosols occurred in air masses that regularly sweep the region — albeit enriched by volcanic activity — it was possible to exclude the possibility that the enhanced lightning activity was caused by unusual meteorological conditions. Usually, it is problematic to distinguish between the effects of unusual air masses in a region and the aerosol loads they carry.

There is no obvious reason why the same mechanisms would not apply to aerosols from other sources, including industrial ones. If so, there may well be a human-induced increase in lightning.

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