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# Transport of fine ash in the southern hemisphere

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Little is known about the transport and fate of fine ash (<32 $\mu$m) from volcanic eruptions in the Southern Hemisphere. This is mostly due to the lack of good observations in a region of the world mostly covered by ocean. Since the start of the satellite era ($\sim$1960s) it has been possible to make global observations of the spread of ash and aerosols from large eruptions, such as El Chichón, Mexico, Mt St Helens, USA and Pinatubo, Philippines. All of these eruptions took place in the northern hemisphere and were observed mostly through the aerosol signal (related to $SO_2$ emissions). In August 1991 Cerro Hudson, in southern Chile erupted ash and gas that was transported in the westerly winds and circumvented the southern hemisphere reaching Australia. Ash deposits from these Andean eruptions typically span the width of Argentina and extend out into the Atlantic Ocean. The proportion of the ash deposit which is unaccounted for (the "missing" ash fraction) remains poorly constrained as "ultra"-distal fallout is often over the oceans. During the recent eruptions of Chaitén and Puyehue-Cordón Caulle (both in southern Chile) stratospheric ash dispersion was tracked for many 1000s km for several weeks as far as Australia, and numerical models were able to capture the main aspects of the transport. Here we investigate important aspects of ash transport, mostly using new measurements from satellites, to estimate ash production, sedimentological analysis of ash fallout over Argentina, and the analysis of collocation of ash and $SO_2$ from Southern Hemisphere eruptions. The sedimentology of ash layers identified in ocean sediments in the Southern Hemisphere has been compared with satellite measurements from recent eruptions, and model simulations of ash deposition. The importance of long-range transport of ash is emphasised in the light of recent concern over the hazard presented to aviation from volcanic ash encounters. The measurements may also be used to guide future stratigraphic studies in the South Atlantic focussed on ocean sediment analysis.