



Tracing long-term fluxes of volatile elements between surface and mantle reservoirs

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Determining fluxes of volatile elements between the surface reservoirs (crust, atmosphere, hydrosphere) and the mantle is essential for investigating reservoir composition and its variation with time, as well as possible climatic impacts on the long term. Volcanic flux measurements allow one to investigate open conduit fluxes, but cannot address cryptic volcanic degassing nor non-volcanic degassing. Thus it is important to establish relationships between global geochemical tracers like noble gases and major, C, H, S, N-bearing species that form the bulk of the volatile phase emission. It is then possible to determine the residence time of major volatile species from fluxes and surface inventories. Results show that the residence times are direct functions of recycling efficiencies, and vary between 200 Ma for sulfur-bearing species up to the age of Earth for N.