Origin and Early Evolution of Terrestrial Volatiles

BERNARD MARTY[1]

[1]Centre de Recherches Pétrographiques et Géochimiques, CNRS & Université de Lorraine, Nancy France
bernard.marty@univ-lorraine.fr

Understanding the origin and evolution of life-supporting volatile elements (water, carbon, nitrogen) on Earth has been an evolving and debated area of research since the antiquity. Thanks to the analyses of the modern atmosphere and hydrosphere, of mantle-derived samples and of meteorites, a consistent picture is emerging. Several regions of the solar system contributed organics and water to the forming Earth at different periods of time. These contributions were sequenced by the drift of planetary bodies outside the Earth's forming region. Stable isotope ratios suggest that volatiles were primarily sourced by planetary bodies from the inner solar system. Recent measurements by the European Space Agency Rosetta probe on the coma of Comet 67P/Churyumov-Gerasimenko indicate that comets also contributed volatiles to the surface of our planet. Using this data together with recent high-precision analyses of noble gases from the deep mantle, I shall discuss the sources of volatile elements and the timing of their delivery to the proto-Earth.