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The Pomici Principali Eruption: a 10.3 ka old Plinian event in the Campi Flegrei caldera (Italy)

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The Pomici Principali Tephra (10.3 ka) is one of the two highest-magnitude eruptions of the Campi Flegrei caldera over the past 15 ka. This caldera is active and largely inhabited, consequently it is one of the most dangerous volcanic areas on Earth.
Stratigraphic and stratimetric studies carried out on an area of about 1000 km2 allowed us to reconstruct both eruption sequence and dynamics. On the basis of both lithological characteristics and dominant emplacement mechanisms, the sequence has been divided in five members: A) a basal ash fallout member, produced by a phreatomagmatic opening phase; B) a second member composed of coarse fallout layers deposited by a pulsating Plinian column; C) a third member which includes an alternation of ash and coarse pumice layers, generated during a magmatic-phreatomagmatic explosion phase; D) a fourth member composed of three thick coarse fallout layers separated by ash layers and generated by a mainly magmatic phase, during which a pulsating column reached the maximum height of about 22 km; E) an upper and fifth member, composed of fine- to coarse-ash surge beds, produced by a phase dominated by phreatomagmatic explosions. During this final phase pyroclastic surges flowed both inside and outside the caldera depression.
The Pomici Principali erupted products were investigated through geochemical and isotope analyses and glass inclusion studies in order to shed light on the processes operating in the plumbing system. Whole rocks and glasses, representative of the complete stratigraphyc sequence, have a fairly homogeneous chemical composition. The isotope data on whole rocks, glasses and mineral phases suggest that at least two isotopic components were extruded during the course of the eruption. One of these components, the least radiogenic one, is represented by light-green pyroxenes. The most radiogenic component is represented by glasses and the majority of the separated minerals. Glass inclusion data were collected to highlight the pre-eruptive storage conditions of the erupted magma.