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Role of magma mixing in the pre-eruptive dynamics of the Aeolian Islands volcanoes (Southern Tyrrhenian Sea, Italy)

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We coupled literature and experimental data to unravel the role of magma-mixing in the pre-eruptive dynamics of the Aeolian Islands volcanoes. Firstly, we reviewed the evidence supporting the hypothesis of mixing-triggered eruptions in the Aeolian archipelago, providing textural, chemical, and rheological constraints. Literature data highlighted a meaningful role of magma mixing dynamics in many eruptive events in the Aeolian archipelago. Some examples are the Upper Pollara and Porri volcano eruptions (Salina Island), Monte Guardia, and the AD 1230 Monte Pilato eruption (Lipari Island), as well as the present-day volcanic activity at the Stromboli island.

Then, we moved on Vulcano Island, selected as a study case. This is because Vulcano poses the highest volcanic risk in the Aeolian archipelago. There, we studied the role of magma-mixing in the AD 1739 and 1888–90 eruptions. Finally, we studied mixing-to-eruption timescales for the AD 1739 eruption, performing magma mixing experiments, and evaluating the decay of the chemical concentration variance with time. Our results highlighted to mixing-to-eruption timescales of the order of 29 $\pm$ 9 hours and magma ascent velocities ranging between 3×10-2 and 5×10-2 ms^{-1}.$We emphasized that the presented results have significant implications in the context of volcanic hazard mitigation and