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Sete Cidades Volcano (S. Miguel, Azores): Constrains to eruptive scenarios

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Sete Cidades is an active central volcano with an approximately circular summit caldera located on the western part of S. Miguel Island. Inside the caldera there are pumice cones, maars and domes, while the dominant structures on the outer slopes are scoria cones and domes.

The stratigraphy of Sete Cidades Volcanic Complex is divided in two main groups. The Inferior Group encompasses a thick assemblage of lava flows and volcaniclastic deposits that built the sub-aerial basis of the central volcano with more than 200 000 years. The Superior Group consists of six geologic formations (Risco, Ajuda, Bretanha, Lombas, Santa Bárbara and Lagoas) and comprises the material erupted in the last 36 000 years, including pumice and scoria fall deposits, pyroclastic flows and surge deposits and minor lava flows.

The present caldera developed in three stages, associated with paroxysmal eruptions. The first caldera-forming event took place at approximately 36000 years ago and originated the deposits of Risco Formation. A second phase of collapse, associated to the deposits of Bretanha Formation, occurred at 29 000 years ago and enlarged the caldera to the NW. The last caldera-forming event, related to the deposits of Santa Barbara Formation, occurred at about 16 000 years ago, and the lead to the collapse of the northern sector of the caldera.

Around 5 000 years ago the intracaldera volcanic activity changed from a magmatic to a hydromagmatic dominant character. Since then several basaltic s.l. eruptions occurred on the flanks of the volcano and at least 17 trachytic s.l. intracaldera eruptions occurred (named P1 to P17), the latest of which took place some 700 years ago. The

recent eruptive history of Sete Cidades makes it the most active central volcano known in the region. All intracaldera eruptions had an important hydromagmatic character. Most of these eruptions were classified as VEI 4 and the maximum magnitude determined was 4.5.