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The Late Holocene Eruptive Record Of Melimoyu Volcano, Northern Patagonia: Temporal Controls On Magma Residence And Recharge

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Eruptive characteristics are strongly dependant on the internal dynamics of the magma reservoirs. Consequently, the use of whole rock chemistry, glass and mineral phenocryst compositions and their compositional zoning can be effectively used to document sub-volcanic magmatic processes before and during eruptions. In this study, we focus on the stratigraphy, age and chemistry of eruptive products from Melimoyu Volcano, located in northern Patagonia, Chile.

The study area covers a remote and little-studied segment of the southernmost part of the Southern Volcanic Zone (SSVZ), which corresponds to a continuous volcanic arc segment, generated by the subduction of Nazca oceanic plate beneath the South American continental plate. In northern Patogonia , the eruptive record is essentially restricted to the post-glacial (<14 ka BP), given the pervasive influence of Andean glaciation which has either eroded and/or buried older volcaniclastic successions during the late last glacial and Last Glacial Maximum.

No recent historical activity has been documented for Melimoyu Volcano; however two prominent and closely-spaced pumiceous fall beds can be observed eastwards extending from Melimoyu. The lower bed, dated at c. 2.9 cal ka BP, appears compositionally zoned with dacitic pumice (64.25-65.38% SiO_2) predominating in the lower and middle portions before grading abruptly upwards to basaltic clasts (49.27-50.41% SiO_2). In contrast, the upper bed, dated at c. 1.6 cal ka BP, has a tightly clustered andesitic composition (59.47-61.29% SiO_2). The aim of this work is to present new petrology and mineral and glass chemistry together with compositional modeling in order to evaluate pre-eruptive conditions for these two compositionally distinct Melimoyu eruptives. This information will provide insights into the complexity of the sub-volcanic system beneath Melimoyu as well as identify the likely style and magnitude of eruptives that could reasonably be expected in the future.