

## **Effects of eruptions Villarrica Volcano observed in the chemical variability of Araucaria araucana tree-rings records**

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A frequent volcanic activity is part of the landscape dynamic in Chile. However, only a few studies about the chemical changes in environment surrounding southern Andean volcanoes have been addressed. Providing an annual resolution, the study of the tree-rings in Andean forests can be a novel approach to study these environmental changes. The main objective of this study was to assessing the relationship between the elemental composition of Araucaria araucana growth-rings during eruptive events of different volcanic explosivity index of Villarrica volcano. Dendrochronological samples from Araucaria araucana trees were taken in three sites: two in slopes of the Villarrica volcano (CHA01C and CHA02C), and one site located 64 kilometers away from this volcano (LAN01C). Using Araucaria growth series perfectly cross-dated, composite samples biannually from several trees were built. Using these composite samples, 17 chemical elements were analysed using ICP-MS in periods of 21 years, ten years before and after selected eruptions: 1822 (VEI = 2), 1915 (VEI = 1), 1963 (VEI = 3) y 1984 (VEI = 2). In the most of the analysed elements the chemical variability did not show a specific response to the eruption years. However, an increase in the concentration of Cu, Pb and Zn in the period from 1905 to 1925 in composite samples from Villarrica's sites occurs possibly associated to a higher eruptions frequency of Villarrica volcano in this period. Also, in some eruptions these metals presented well defined pulses in the same year or after two years since the eruption events. The long extension of the Araucaria tree-ring chronologies could be used as a high resolution paleo-record of volcanic eruption. The input of heavy metals in forest ecosystems and other natural resources could be studied using dendrochemical approaches.



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