Preface

As Editors and researchers we are flattered to present this monograph dedicated to the Copahue volcano ("The smoking mountain between Argentina and Chile") that is located in a remote site of Patagonia, right at the border between Chile and Argentina. The three recent volcanic eruptions (2000, 2012, and 2013) and the present unrest state have had a global echo. The acidic crater lake on the top of the mountain is suffering strikingly modifications and after the eruptive event of 2012, it completely disappeared and then, after a few months the pre-existing conditions almost recovered, although a balance between the inner (e.g., deep fluids) and outer (e.g., meteoric precipitation and ice melting) forces has not yet been established. These repeatedly changing volcanic situations have seen the involvement of several scientists from different part of the world who have contributed with their efforts to a better understanding of the volcanic plumbing and the hydrothermal/magmatic systems. Attempts to build a seismic monitoring array and periodic geochemical and ground deformation surveys are presently underway. Difficulties in retrieving appropriate financial supports, logistic problems, long distances from the main cities of Argentina, instrumental supplies, and trained personnel are some of the many challenges to be solved. The final target would be that to create a volcanological and seismological observatory in this area of Patagonia, able to monitor Copahue and the other volcanic edifices nearby located, such as Peteroa, Lanin, Tromen, and Domuyo.

This monograph, belonging to the Volcanoes of the World Book Series published by Springer-Verlag, is intended to represent a sort of a benchmark for those researchers who want to know more about Copahue.

The volume is divided into five parts: (1) Geology; (2) Eruptive History; (3) Petrology and Geochemistry; (4) Volcanic Monitoring and (5) Volcano and Society.

The volume opens with two interesting reviews by Folguera et al. and Groppelli et al. on the geological and geodynamical settings of this part of the Andes, whose interpretations indicate the need to acquire more data to achieve a common view on the development of the volcanism affecting the area. These aspects are basic and fundamental tools to explain the volcanic events of Copahue. The two contributions by Caselli et al. on the prehistoric to the recent volcanic activity and the December 2012 event summarize what is known about the eruptive style of this volcano. Varekamp et al. provides a

nice review of published and original data of trace and radiogenic elements, highlighting the petrological features of the Copahue volcanic products. This section precedes that of Tassi et al. where a geochemical conceptual model based on chemical and isotope composition of hydrothermal/volcanic gas discharges is presented and gives important hints on a possible gas geochemistry monitoring activity at Copahue. The volcanic monitoring session includes two contributions devoted to ground deformation (Vélez et al.) and water geochemistry (Agusto and Varekamp), where innovative views about the possible volcanic surveillance activities are considered. Caselli et al. provide a comprehensive overview of the risk assessment, focusing on the main hazards related to the activity of this volcano, whereas Rodríguez et al. describe the chemistry of the acid rivers and lakes characterizing this system, interpreted as a good terrestrial analogue for the aqueous paleo-environments on Mars. The fifth part of the volume includes three chapters concerning the geothermal energy and its historical development in the Copahue area by Mas et al., the use of the numerous thermal waters mainly discharging in the village of Caviahue where several spas and resorts are operating (Monasterio et al.), and the religion and popular believes inspired to Mapuche by the presence of the smoking mountain (Castaño et al.).

It is the hope of the Editors that this volume may keep interested the scientific community about the volcanic system of Copahue, which, for different reasons, in the past has somehow not been considered a serious threat for the local population. The recent reactivation of Copahue has unfortunately demonstrated that a lot of work has to be done. To avoid that new and more dangerous eruptions are going to hit unprepared the population, a tighter collaboration between the local and regional authorities and the scientists is a must.

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