Geophysical Research Abstracts
Vol. 21, EGU2019-1434, 2019
EGU General Assembly 2019

Structural control on carbon dioxide diffuse degassing at the Caviahue – Copahue Volcanic Complex, Argentina

Maria Clara Lamberti (1), Nicolás Vigide (), Stefania Venturi (), Mariano Agusto (), Daniel Yagupsky (), Diego Winocur (), Hernán Barcelona (), María Laura Velez (), and Franco Tassi ()

(1) University of Buenos Aires, Buenos Aires Capital Federal, Argentina (mariaclaralamberti@gmail.com), (2) University of Buenos Aires, Buenos Aires Capital Federal, Argentina , (3) Geosciences and Earth Resources (IGG), National Research Council of Italy (CNR), Firenze, Italy, (4) University of Buenos Aires, Buenos Aires Capital Federal, Argentina , (5) University of Buenos Aires, Buenos Aires Capital Federal, Argentina , (6) University of Buenos Aires, Buenos Aires Capital Federal, Argentina , (7) University of Buenos Aires, Buenos Aires Capital Federal, Argentina , (8) University of Buenos Aires, Buenos Aires Capital Federal, Argentina , (9) Universita degli Studi di Firenze, Dipartimento di Scienze della Terra, Firenze, Italy

Caviahue – Copahue Volcanic Complex (CCVC) is located within the Andean Cordillera, in the Neuquén province, Argentina. This tectono-magmatic system lies within the northern termination of the Liquiñe – Ofqui fault zone, a 1,200-km-long intra-arc strike-slip fault system. Fluid emissions are fed by a hydrothermal reservoir located at 800 m depth, mostly recharged by meteoric water and heated by a magmatic chamber located at 5 km depth. Over 200 tons per day of CO_2 are released by this system thorough diffuse degassing from the soil. The aim of this study is to evaluate the control that the local structural architecture exerts on CO_2 flow, from the hydrothermal reservoir to the surface.
The correlation between diffuse degassing anomalies and geological brittle structures (i.e. faults and fractures) was based on punctual diffuse degassing measurements coupled with structural data. A total of 1,819 measurements of CO_2 flux and soil temperature were carried out, over an area of $\sim$10 km2. The CO_2 flux database was processed in order to map the spatial distribution of diffuse emissions. The local structure was characterized by means of a kinematic analysis of fault-slip data.
The geochemical analysis showed well-defined CO_2 diffuse degassing anomalies in four hydrothermal sites within the CCVC. These anomalies follow clear linear trends that can be clustered in different domains regarding their orientations. The principal domain strikes NE-SW. The analysis of the fault-slip data gave as a result an extensional stress regime. This is evidenced by three fault sets. The main set consists of NE-SW normal faults, which result in horst-and-graben structures. The second set is constituted by NW-SE faults, that act as transfer zones between the main extensional structures. These faults present strike-slip kinematics with minor normal components. The third set consists of E-W oriented dextral strike-slip faults. Two length-weighted rose diagrams were computed, plotting diffuse degassing anomalies directions and fault planes directions. The similarity of these plots suggests that the main NE-SW normal faults constitute the preferential pathways for soil diffuse CO_2. This also suggests that the two secondary fault sets act as fluids pathways as well. The position of diffuse degassing anomalies with respect to the fault traces suggests that diffuse degassing occurs in several structural settings. CO_2 rises through fault planes; it also rises through areas between fault segments and terminations of individual faults, characterized by relatively high structural damage.