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Monogenetic volcanism in the Cordillera Central of Colombia: unknown volcanic fields associated with the northernmost Andes' volcanic chain related subduction

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Monogenetic volcanic fields are commonly related to rifts and/or intraplate tectonic settings. However, although less common, they appear also associated with subduction zones, including both front and back-arc volcanoes. To nourish this uncommon tectonic location, it is shown here that monogenetic volcanic fields, in addition to polygenetic volcanoes, also appear at the northernmost part of the Andes Northern Volcanic Zone (NVZ) (2° S to 4°30′N). These fields are associated with the main axe of the Quaternary active volcanic structures; they are linked to the polygenetic Cerro Bravo – Cerro Machín Volcanic Chain (∼80 km long; CBCMVC) in Colombia, the chain that hosts the iconic Nevado del Ruiz volcano. To the present, three monogenetic volcanic fields, with a typical calc-alkaline signature, have been identified in both sides of this chain: 1) Villamaría – Termales Monogenetic Volcanic Field (VTMVF) located to the northwestern part (>5 km) of the CBCMVC. This field is made up of at least 14 volcanoes aligned with the Villamaría – Termales fault zone. The volcanism has been mainly effusive, represented by lava domes and some lava flows. The volcanoes are andesitic to dacitic in composition. It is inferred that the magmatic source is a magma chamber close to Nevado del Ruiz volcano. Based on stratigraphic relationships, it is assumed that the last eruption occurred <38 ka. 2) Samaná Monogenetic Volcanic Field (SMVF) located ∼50 km north of Romeral volcano, the northernmost active volcano from the CBCMVC. This field comprises at least three volcanoes: A maar-diatreme volcano (∼20 ka years old) and two undefined structures. The volcanic products exhibit andesitic and riolitic composition. It is inferred that this field results of the same magmatism of the CBCMVC. 3. Pijaos Monogenetic Volcanic Field (PMVF) located ∼25 km south of Cerro Machín volcano, the southernmost active volcano of the CBCMVC. This field comprises at least four volcanoes formed by effusive and explosive volcanism. Three lava domes and a maar-diatreme volcanoes are recognised. The volcanoes are basaltic to basaltic andesitic in composition, being the most mafic expression (MgO >10 wt.%) in the whole CBCMVC. Its source is related to the same magmas that feed the volcanoes in the CBCMVC. Stratigraphic relationships show that the volcanoes are younger than the underlying alluvial and volcaniclastic Ibagué fan (<1 Ma). Overall, it is clear that monogenetic volcanic fields are not atypical in the area, although their relationship with the magmatism feeding the polygenetic arc of the Andes' volcanic chain related subduction, is still unknown.