

Compilation of Geochronological Data from the Western Cordillera and Ecuadorian Coast: Geodynamic Interpretation

Johanna Criollo¹

¹Escuela Politécnica Nacional, Quito, Ecuador

This project presents the construction of a radiometric database for the Coast and Western Cordillera of Ecuador, aimed at understanding the geodynamic evolution of the region through statistical analysis and Kernel Density Estimate (KDE) diagrams. A total of 4,850 individual data points were compiled, including 3,870 corresponding to 283 radiometrically dated samples from the Coast and Western Cordillera. Statistical analysis revealed gaps in data coverage in the northwestern coastal zone and highlighted K-Ar as the most frequently used dating method. The dataset was represented in KDE diagrams and classified into four groups: Coast, Western Cordillera, "Miocene River Sand Samples," and "Miocene Offshore SW Ecuador." Ages range from the Precambrian, representing inherited peaks likely derived from the Cordillera Real. Magmatic U-Pb KDEs indicate crystallization ages of 90.8 Ma (Pujilí Formation), 86.4 Ma (San Juan Formation), 42.1 Ma (Macuchi Unit), and 10.3 Ma (intrusive in Silante Formation) in the Western Cordillera. Coastal intrusives show ages of 98.4, 95.9, and 86.6 Ma (Redondo, Pascuales, and Dique Chivería intrusives, respectively). Detrital U-Pb KDEs provide Maximum Deposition Ages (MDAs) for the Western Cordillera (56–10.2 Ma) and for the Coast (60.2–10 Ma) across multiple formations, reflecting sediment provenance and tectonic activity. Thermochronology KDEs (K-Ar, Ar-Ar, U-Th, U-Th/He, Re-Os) highlight a K-Ar age peak of 73 Ma in the Piñon Formation, suggesting thermal resetting related to Late Cretaceous accretion events that formed the basement of the Coast and Western Cordillera. This database provides a robust geochronological framework for the region, supporting geodynamic interpretations and guiding future exploration targeting across Ecuador's complex terranes.