# Impact of the Southern Ecuadorian Andes on isotopes in precipitation

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The Andes are a non-collisional subduction orogen and represent one of the main topographic features on Earth. However, uncertainties remain about how long this belt has been acting as a barrier to atmospheric circulation and moisture transport. At present most studies aiming at understanding the link between geodynamic processes, topography and climate focus on the Southern and Central Andes and neglect the role of the Northern Andes in the overall long-term landscape evolution. This negligence is due to the lack of paleoaltimetry data obtained in the Northern Andes, and especially in the Ecuadorian Andes where a strong debate about the timing of its topographic growth is going on.

A fundamental requirement when using stable isotope data for paleoaltimetry reconstructions is the determination of modern $\delta^{18}O$ and $\delta D$ vs. altitude gradients. Here, we present the first comprehensive study of this empirical relationship across the Southern Ecuadorian Western Cordillera and the Inter-Andean depression by analysing surface waters from tributaries from five transects. The surface waters sampled from near sea level and up to ~4000m had their elevations corrected by the ArcGIS Flow Accumulation Model, in order to account for the average elevations of individual catchments.

The results for the two domains show a decrease of $\delta^{18}O$ with elevation which fits a linear regression with a slope of -0.18‰/100 m ($R^2$ = 0.73, n=83). However, the west facing slopes of the Western Cordillera are subject to moisture incoming from the Pacific which gets adiabatically lifted and produce a lapse rate of -0.15‰/100m for $\delta^{18}O$ ($R^2$ = 0.88, n=19) and -1.4‰/100m for $\delta D$ ($R^2$=0.93, n=19) that can be served as a guide for stable isotope paleoaltimetry reconstructions at tropical latitudes.

In contrast, $\delta^{18}O$ and $\delta D$ values from the Cuenca region, in the Inter-Andean valley and further south in the Nabón Basin, do not show a clear correlation with elevation interpreted to reflect a combination of factors including air mass mixing, evaporation, humidity.

In agreement with previous studies conducted in Ecuador and other tropical regions, our work demonstrates that an empirical relationship between elevation and the stable isotope composition of precipitation and surface waters can be established at (or near) the Equator.

**Mots-Clés :** Western Southern Ecuadorian Andes ; Inter-Andean depression ; Stable isotope paleoaltimetry ; Isotopic lapse rate ; Tropical precipitation

**Merci de ne rien inscrire dans cette zone et ne pas modifier les marges des pieds de page et entêtes.**