New groundmass K-Ar ages of Iliniza Volcano, Ecuador

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1. Introduction

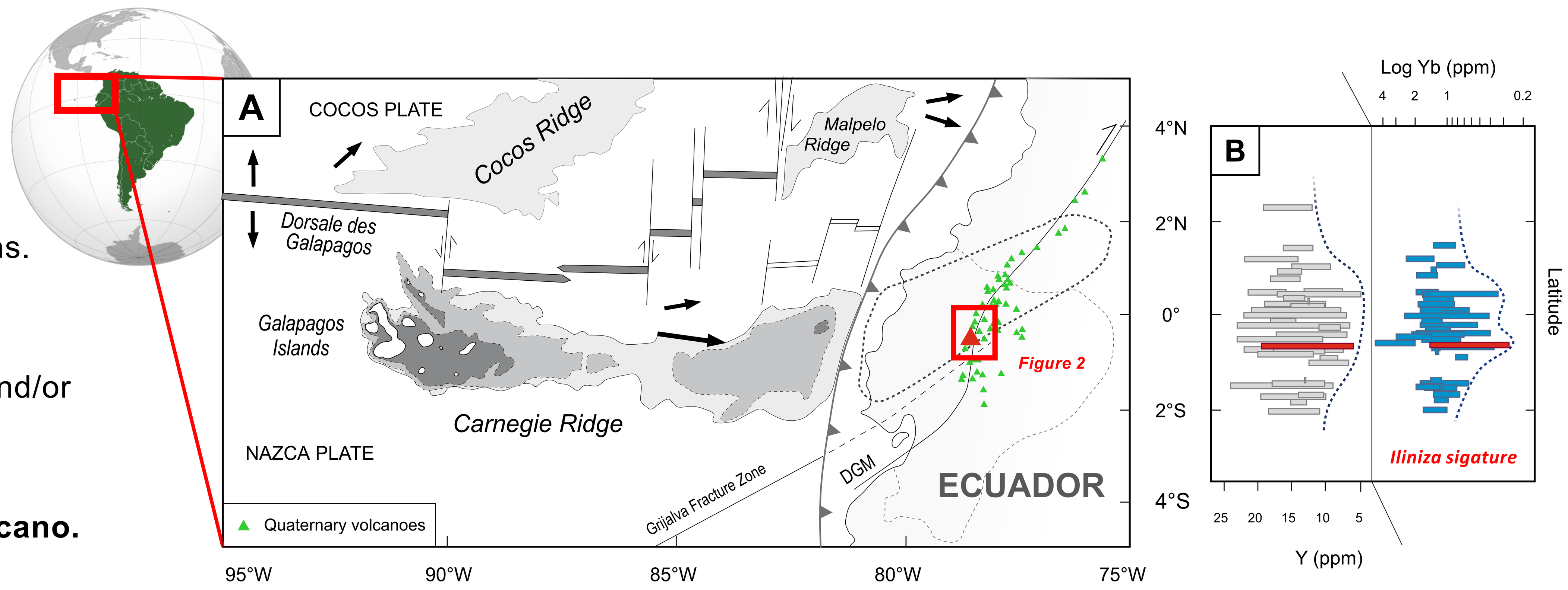
Previous studies demonstrated the existence of a **temporal geochemical variation** of several Ecuadorian volcanoes of the arc, that includes an evolution from **typical calk-alcaline** arc magmas to **adakite-like** compositions.

Two non-exclusive models have been proposed:

► A progressive **change** of the nature of the **subduction component** [1, 2], and/or

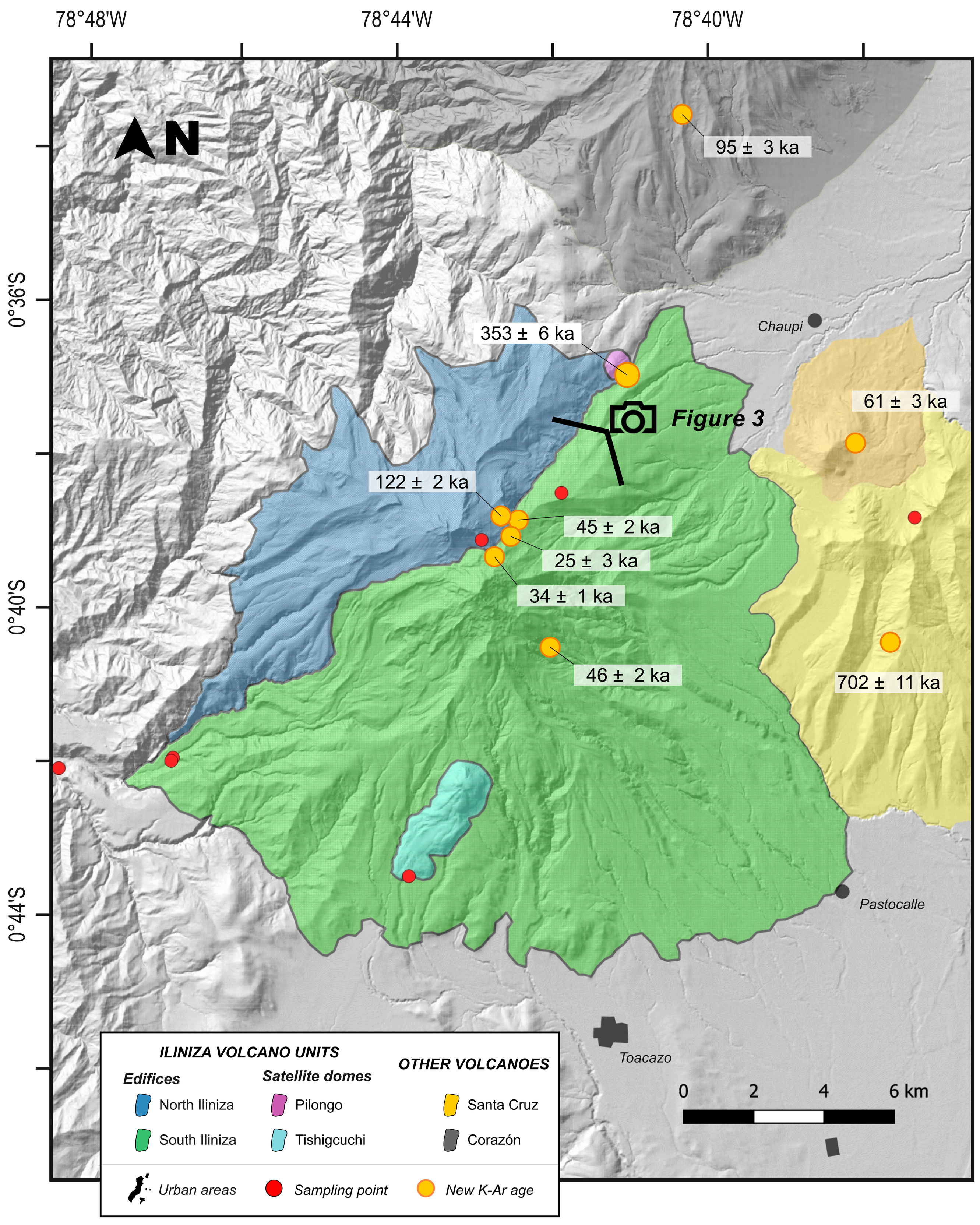
► A **change** in the modalities of the **magmatic differentiation** in the crust [3].

The purpose of this study is to constrain the **temporal evolution of Iliniza volcano.**

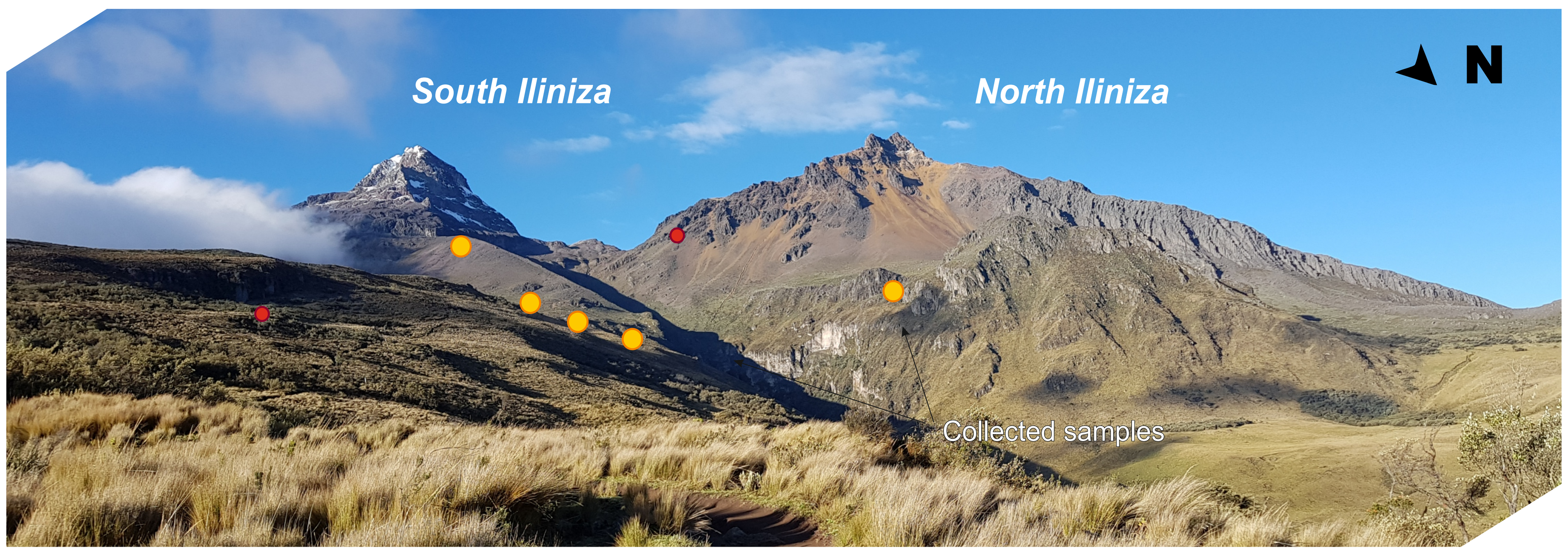


▲ ***Figure 1. A.*** *Geodynamic context of Ecuador. Carnegie aseismic ridge, trace of the Galapagos hot spot, is being subducted beneath the South American Plate [4].* ***B.*** *Y and Yb content evolutions with latitude [5,6,7]*

2. Geological context



Iliniza is a twin-peaked composed volcano, comprising **two main edifices**: North and South Iliniza, and **two satellite domes**: Pilongo and Tishigcuchi. The whole volcano is located closely to the west of the eroded Santa Cruz volcano, partially covering its western flank (Figure 2).

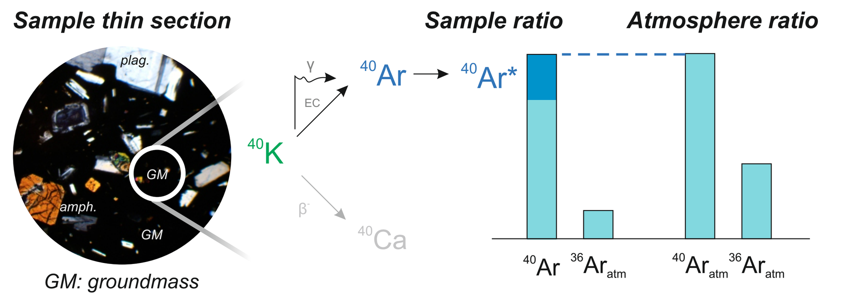


▲ ***Figure 3.*** *Panoramic photograph of Iliniza volcano showing some sampling points.*

◄ ***Figure 2.*** *Simplified geological map of the Iliniza volcano [1] and our preliminary ages.*

3. Methods

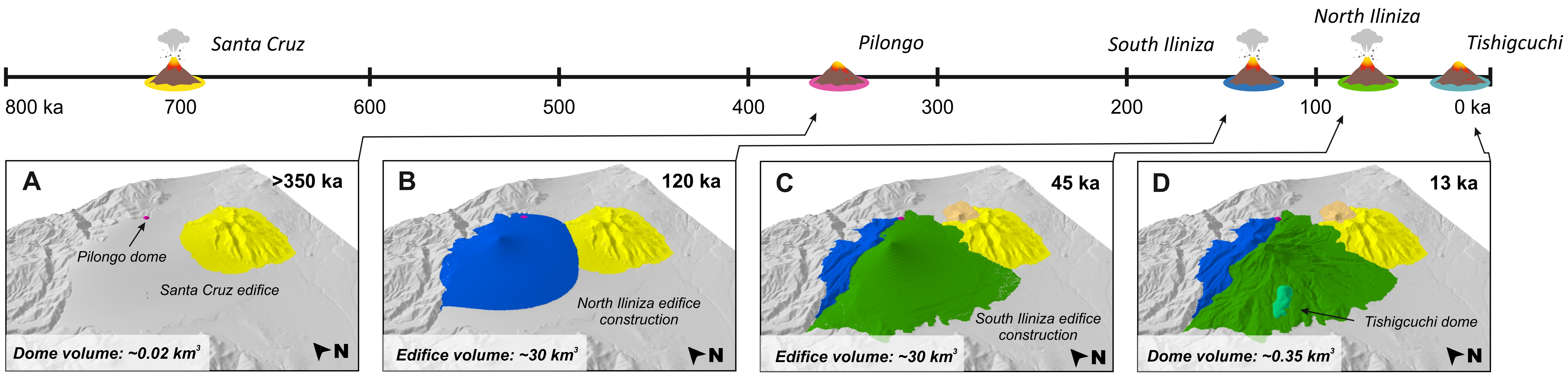
Following the previous work of Hidalgo et al. (2007), we collected several rock samples from Santa Cruz volcano and the main geological units of Iliniza volcano for petrology, geochemistry and dating using the K-Ar Cassignol-Gillot technique performed on groundmass.



Sample age calculation $t = \frac{1}{\lambda_{tot}} \ln\left(1 + \frac{\lambda_{tot}}{\lambda_{Ar*}} \cdot \frac{^{40}Ar^*}{^{40}K}\right)$

4. Geocronological evolution

Our preliminary ages show that:



A. ***Santa Cruz*** *volcano was active at about 700 ka. The oldest age from Iliniza volcano is obtained for the* ***Pilongo dome*** *(353±6 ka).*

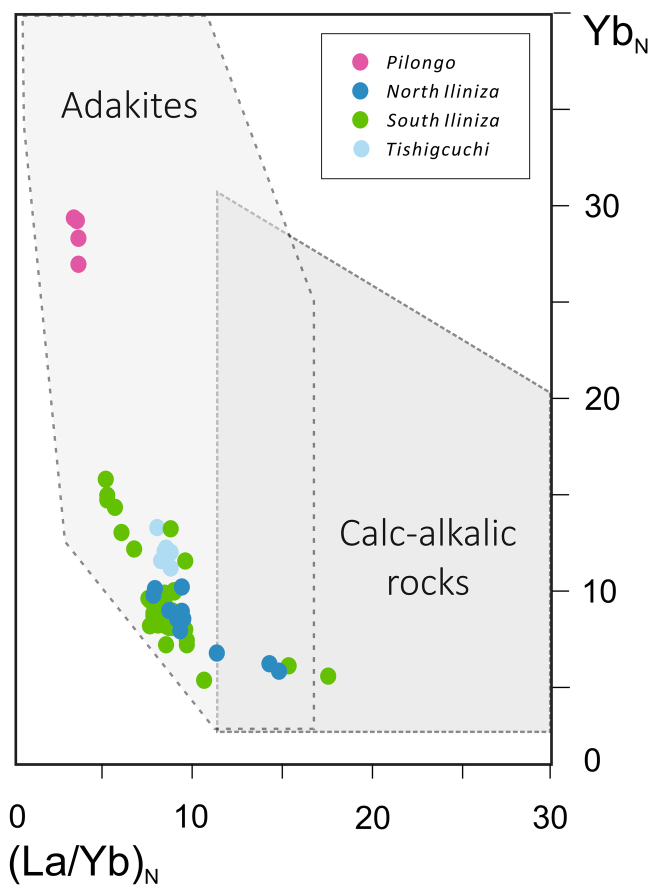
B. ***North Iliniza edifice*** *began its construction since at least 120 ka, followed by an erosion dominated period as infered from stratigraphic relationships and our dating results.*

C. *We obtained ages between 45 and 25 ka for* ***South Iliniza edifice****, this suggests that construction of the North Iliniza edifice probably ended earlier than 50 ka.*

D. *Since the F-rhyolite fallout deposits from Cotopaxi volcano (13-5.9 ka [8]) cover all Iliniza volcano units, the emplacement of* ***Tishigcuchi dome*** *must have ocurred before 13 ka.*

► Based on numerical reconstructions, the volumes of North and South Ilinizas are comparable and estimated here at about 30 km^3 each.

► Coupling these new ages with the geochemical data (Figure 4) we found that the geochemical change **occurred gradually** in Iliniza volcano between 120 ka and 13 ka; with the **exception** of the adakite-like Pilongo dome, which was emplaced during an earlier stage at 350 ka.



▲ ***Figure 4.*** *$(La/Yb)_N$ vs Yb_N diagram (Martin, 1999) for Iliniza volcano rocks [1].*

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