

Inboard advance of arc magmatism regulates mountain building in the Andes

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Supplementary Data Table of Contents:

Supplementary Data 1: Igneous Geochronology Date Compilation (Fig. 2A; Supplemental Figure 1)

Supplementary Data 2: Compilation of Bedrock Nd isotope data (Fig. 1B; Fig. 3B)

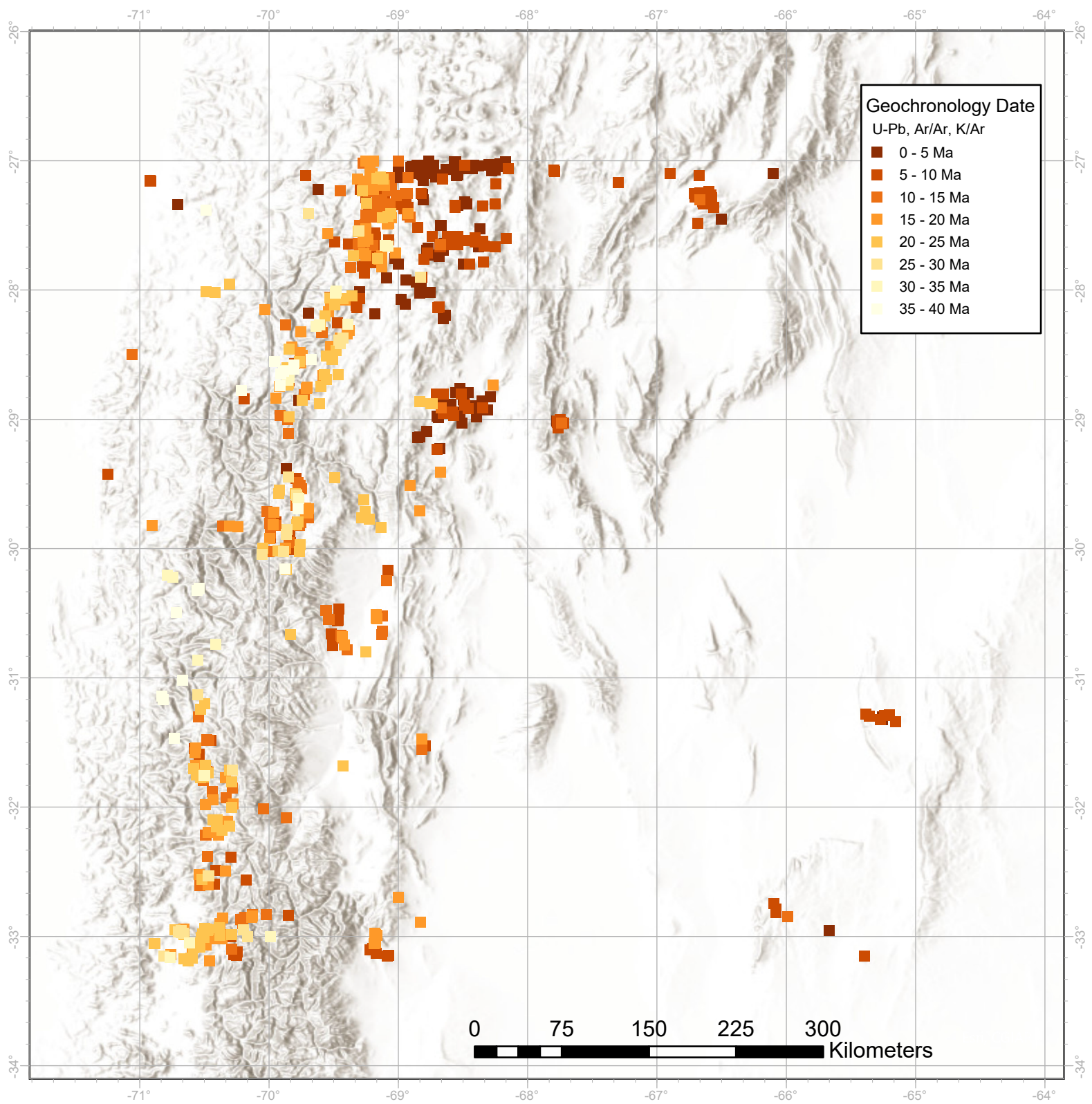
Supplementary Data 3: Compilation of Bedrock and Detrital Zircon Lu-Hf data (Fig. 1B; Fig. 3B)

Supplementary Data 4: Apatite (U-Th-Sm)/He Thermochronology Date Compilation (Fig. 2A; Supplemental Figure 2; Supplemental Figure 3)

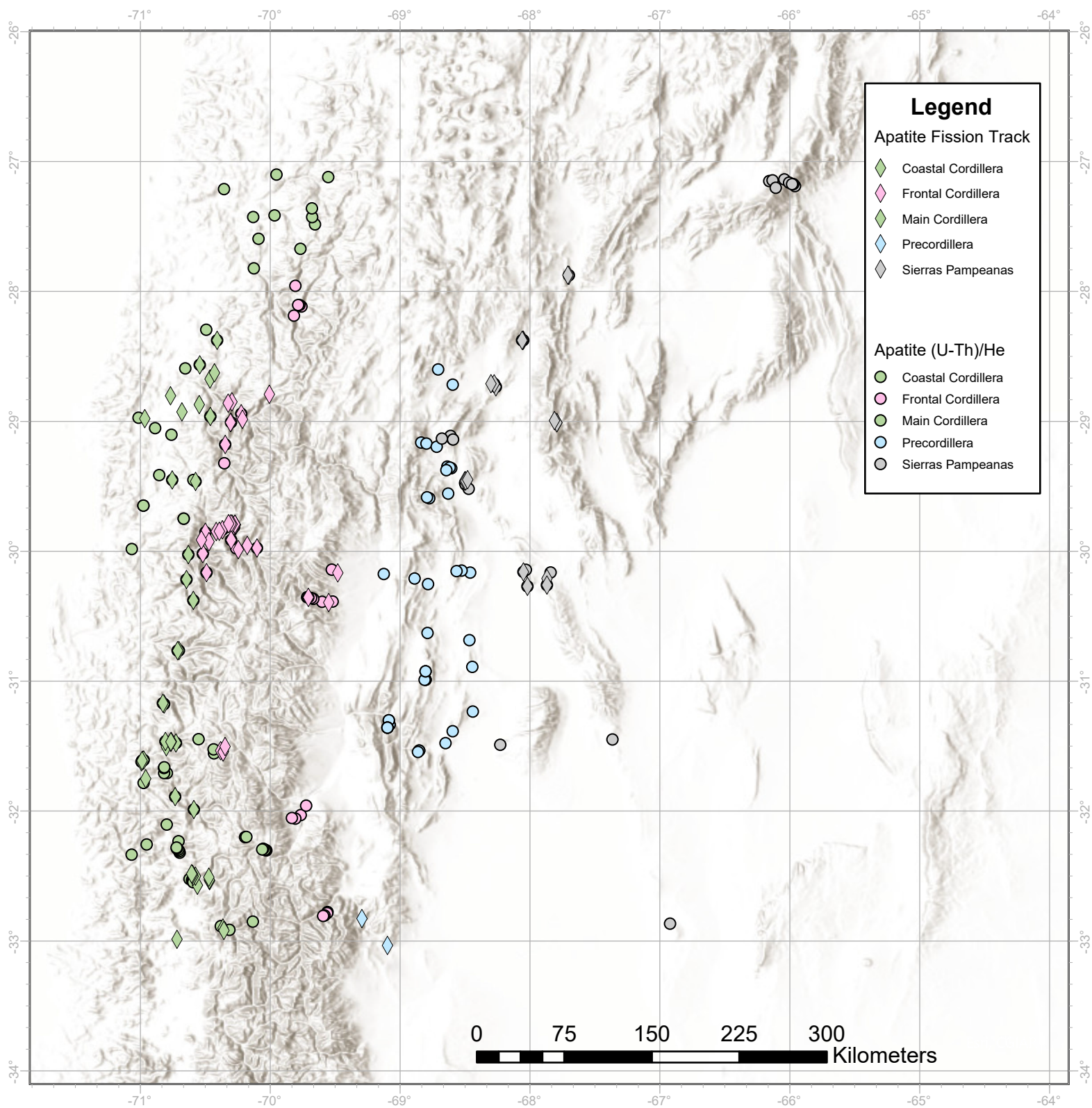
Supplementary Data 5: Apatite Fission Track Thermochronology Date Compilation (Fig. 2A; Supplemental Figure 2)

Supplementary Data 6: Deformation Front constraints from synorogenic stratigraphic data, structural and cross-cutting relationships, thermochronology data, and thermokinematic modeling (Fig. 2A).

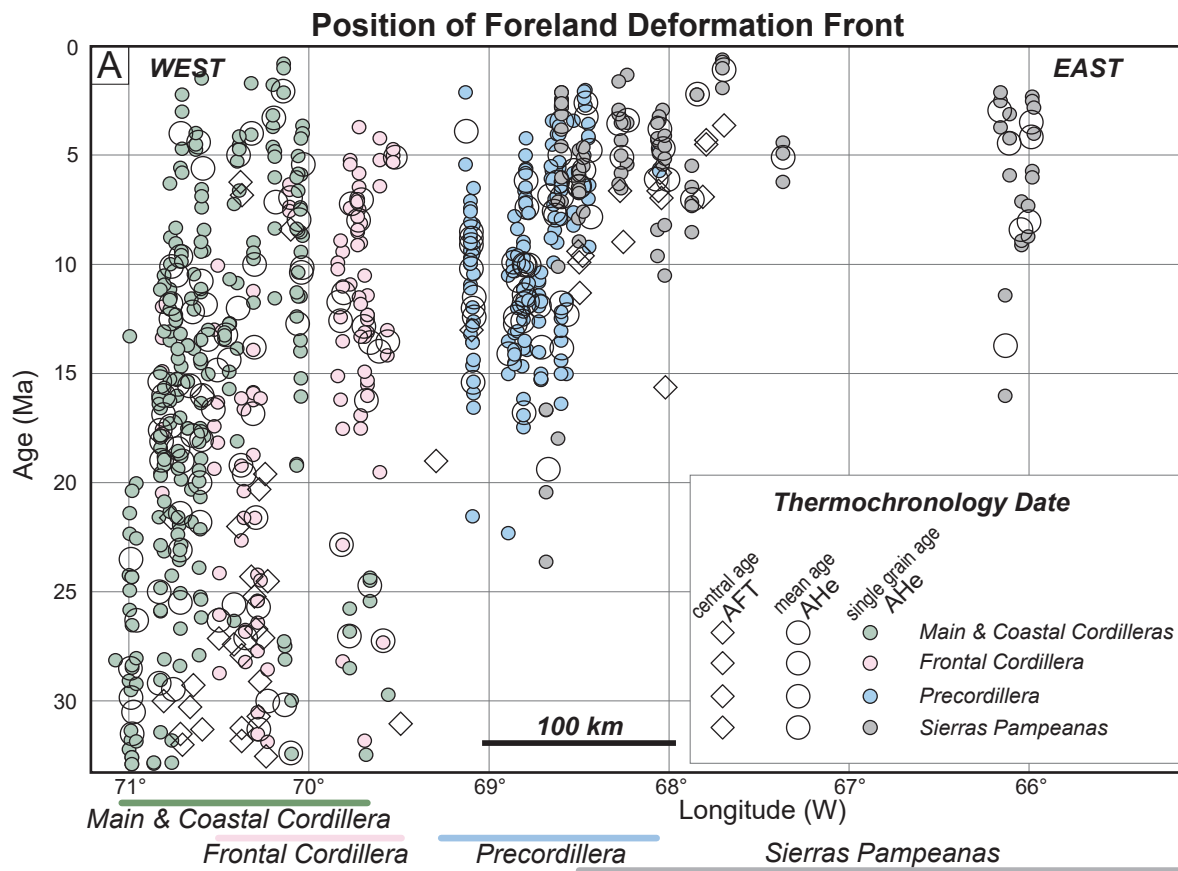
Supplementary Data 7: Chronostratigraphic data used for Retroarc foreland basin sediment accumulation histories (Fig. 3D). 1: Calingasta; 2: Talacasto; 3: Manantiales; 4: Albarracín; 5: proximal Bermejo (Sierra Villicum); 6: proximal Bermejo (Mogna Anticline); 7: distal Bermejo (Ampacama)



Supplemental Figure 1: Spatial and temporal variation in Andean arc magmatism. Data compilation of U-Pb, Ar/Ar and K/Ar ages from Pilger, 2024.



Supplemental Figure 2: Spatial distribution in Andean thermochronological dates. Data compilation of apatite (U-Th)/He dates from: Lobens et al., 2013; Bense et al., 2013; Levina et al., 2014; Hoke et al., 2015; Fossdick et al., 2015; Ortiz et al., 2015, 2021; Lossada et al., 2017; Piquer et al., 2017; Rodriguez et al., 2018; Stevens-Goddard and Carrapa, 2018; Maydagan et al., 2020; Mackaman-Lofland et al., 2020, 2022, 2024; Stalder et al., 2020; Plonka et al., 2023. Data compilation of apatite fission track dates from: Coughlin et al., 1998; Avila et al., 2005; Farias et al., 2008; Sato et al., 2015; Fossdick et al., 2015; Murillo et al., 2017; Rodriguez et al., 2018; Stevens-Goddard and Carrapa, 2018; Maydagan et al., 2020; Stalder et al., 2020; Ortiz et al., 2021.



Supplemental Figure 3: Time-distance plot of single grain and mean/central age thermochronological dates at 27–33°S illustrating progressive eastward advance of retroarc foreland deformation. Data compilation of apatite (U-Th)/He dates from: Lobens et al., 2013; Bense et al., 2013; Levina et al., 2014; Hoke et al., 2015; Fosdick et al., 2015; Ortiz et al., 2015, 2021; Lossada et al., 2017; Piquer et al., 2017; Rodriguez et al., 2018; Stevens-Goddard and Carrapa, 2018; Maydagan et al., 2020; Mackaman-Lofland et al., 2020, 2022, 2024; Stalder et al., 2020; Plonka et al., 2023. Data compilation of apatite fission track dates from: Coughlin et al., 1998; Avila et al., 2005; Farias et al., 2008; Sato et al., 2015; Fosdick et al., 2015; Murillo et al., 2017; Rodriguez et al., 2018; Stevens-Goddard and Carrapa, 2018; Maydagan et al., 2020; Stalder et al., 2020; Ortiz et al., 2021.

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