GSA Connects 2024 Meeting in Anaheim, California

Paper No. 163-6
Presentation Time: 9:50 AM

UPLIFT MECHANISMS AND EROSIVE HISTORY OF AN INTRACONTINENTAL PLATEAU IN THE BRAZILIAN STABLE PLATFORM INFORMED BY CAVE SEDIMENT GEOCHRONOLOGY

PADOAN, Lucas[1], KARMANN, Ivo[2], GRANGER, Darryl E.[3], ALMEIDA, Renato Paes de[2], LAUREANO, Fernando Verassani[4], CRUZ Jr., Francisco W.[5], SAWAKUCHI, André O.[6], FONSECA Jr., Edvaldo Simões da[7] and MEZA, Alex Boava[7], (1)Instituto de Geociências, Universidade Federal de Minas Gerais, Av. Antônio Carlos, 6.627, Pampulha, Belo Horizonte, Minas Gerais 31270-901, Brazil, (2)Instituto de Geociências, Universidade de São Paulo, Rua do Lago, 562, São Paulo, 05508-080, Brazil, (3)Earth Atmospheric and Planetary Sciences, Purdue University, 550 Stadium Mall Dr., West Lafayette, IN 47907, (4)Reparation Directory, Vale S.A., Av. Dr. Marco Paulo Simon Jardim, 3580, Nova Lima, Minas Gerais 34006-270, Brazil, (5)Institute of Geosciences, University of São Paulo, São Paulo, 05508-080, Brazil, (6)Institute of Geosciences, University of São Paulo, São Paulo, Brazil, (7)Escola Politécnica, Universidade de São Paulo, Travessa do Biênio, 83, São Paulo, São Paulo 05508-070, Brazil

The origin and evolution of intracontinental plateaus in stable terrains is a controversial subject. In the South American Platform, most of the extensive plateaus ranging from 600 to 1,000 m.a.s.l. in elevation occur in Brazil, and their structural context varies from cratonic nuclei to Neoproterozoic accretionary terranes. They were formed in the Cenozoic, after rifting and break-up of Pangea in the Mesozoic. Since the 1950's, different models based on topographic and stratigraphic relationships, apatite fission-track thermochronology, ^{40}Ar-^{39}Ar weathering chronology, marine platform sedimentary production, and lithosphere thermomechanical numerical modeling have argued for distinct and sometimes mutually exclusive landscape evolution hypotheses. These models explain the modern topography by underplate magmatism, edge-driven mantle convection, isostatic flexure rebound due to convergent intraplate stress accumulation or fluvial erosion, and resistant iron-rich regolith covers, but there is no consensus about the dominant uplift processes and erosive stages. In this study, new fluvial erosion rate data are presented for the Central Brazilian Plateau, an extensive ridge (125,000 km^2) in the São Francisco Craton. The erosive retreat of the plateau escarpment controls the evolution of large cave systems in a Neoproterozoic limestone covered by Cretaceous sandstone. Cave sedimentary terraces at different elevations were dated through cosmogenic ^{26}Al-^{10}Be, OSL and U-Th series geochronology, revealing an average fluvial incision rate of 52.5 ± 13.0 m/Ma for the São Desidério River, the local base level for all tributary caves. The average knickpoint migration rate at the limestone/ sandstone contact was determined as 3,782 ± 984 m/Ma. According to the cosmogenic data, the average erosion rate in the sandstone catchment area is 17.1 ± 1.4 m/Ma with a gradual increase from 3.4 ± 0.4 m/Ma over the last 3 Ma. Extrapolating these rates into the past suggests that the time span for major river valley entrenchment was 23.8 ± 6.2 Ma. This agrees with previous models suggesting establishment of the Central Brazilian Plateau near the Oligocene-Miocene transition. It is suggested as a preliminary hypothesis that regional scale river erosion surrounding the resistant Central Brazilian Plateau has caused flexural uplift of the plateau margins due to isostatic rebound.

Recorded Presentation

Session No. 163

T101. Karst Sedimentary, Paleoclimate, and Historical Records
Tuesday, 24 September 2024: 8:00 AM-11:05 AM

212B (Anaheim Convention Center)

Geological Society of America *Abstracts with Programs.* Vol. 56, No. 5
doi: 10.1130/abs/2024AM-403599

Back to: T101. Karst Sedimentary, Paleoclimate, and Historical Records

<< Previous Abstract | Next Abstract >>