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Program and Abstracts

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c/o Universität Potsdam, Institut für Erd- und Umweltwissenschaften
Karl-Liebknecht-Str. 24-25, Haus 27, 14476 Potsdam, Germany
Tel.: +49 (0)331-977-5789, Fax: +49 (0)331-977-5700
E-Mail: infos@geo-union.de

Editorial office

Schriftleitung

Dr. Christof Ellger
GeoUnion Alfred-Wegener-Stiftung
c/o Universität Potsdam, Institut für Erd- und Umweltwissenschaften
Karl-Liebknecht-Str. 24-25, Haus 27, 14476 Potsdam, Germany
Tel.: +49 (0)331-977-5789, Fax: +49 (0)331-977-5700
E-Mail: christof.ellger@geo-union.de

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Editors

Ulrich Riller & Paul Göllner
Institut für Geologie
Universität Hamburg
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Abstracts

Impacts of climate and humans on vegetation in northeastern Brazil during the late Holocene

C. Alves de Moraes¹, H. Behling¹, M. Accioly Teixeira de Oliveira¹

¹Georg-August-Universität Göttingen, Department of Palynology and Climate Dynamics, Goettingen, Germany

The Holocene is a key period for understanding the role of climate change and the human impacts on the environment. These changes are probably the main drivers of forest-related vicariance and patterns of genetic diversity in the tropics. Vegetation changes are good indicators of climate change/and or human impacts. In this context, a sediment core was collected using the Russian Sampler in a swampy area in the Catimbaú National Park, State of Pernambuco, Northeast Brazil. Although the studied region is located in the semiarid conditions of Caatinga, the coring site is in a particular area providing moist conditions in the Holocene. The collected core is 420 cm long and a basal age of around 2.800 cal yrs B.P. The core was studied by pollen, spores, and sedimentary characteristics as well as dated by AMS radiocarbon dating. The results allow distinguishing three different periods. The first period is characterized by the dominance of Cecropia, indicative of strong disturbances, suggesting relatively dry conditions until 2.160 cal yrs B.P. In the following period, the site is represented mainly by arboreal vegetation, indicating a transition to wetter conditions, between 2.160 and 450 cal yrs B.P. The last period is marked by the presence of more open vegetation as consequent of a return to drier conditions, after 450 cal yrs B.P. Along the core is also possible to recognize the presence of Orbignya palm pollen, what also indicates the presence of human's disturbance in the area during the late Holocene.

P-t-d path of a garnet-bearing metagranite from the Paleoproterozoic basement of the Tandilia terrane, Rio de La Plata craton, Argentina

M. Angeletti¹, J. C. Martínez^{1,2}, M. C. Frisicale^{1,2}, H. J. Massonne^{3,4}

¹Universidad Nacional del Sur, Geología, Bahía Blanca, Argentina

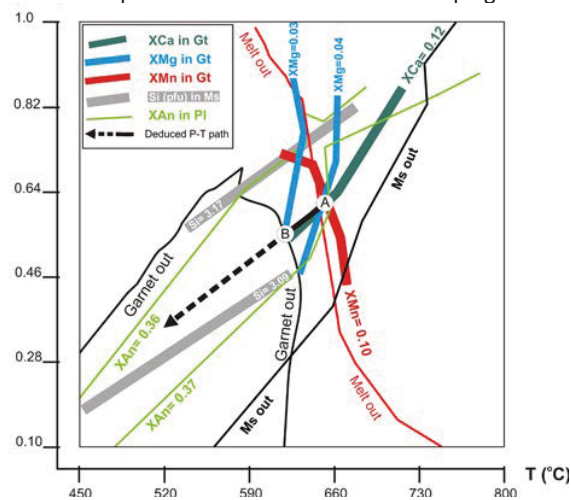
²Conicet, Ingeosur, Bahía Blanca, Argentina

³Universität Stuttgart, Fakultät Chemie, Stuttgart, Germany

⁴China University of Geosciences, School of Earth Sciences, Wuhan, China

The Tandilia Terrane (TT), in central-eastern Argentina and southeastern Uruguay (Pamoukaghlian et al., 2017) is a Paleoproterozoic igneous-metamorphic complex where the southernmost portions of the Rio de la Plata craton are exposed. The study area includes small outcrops of garnet-bearing metagranite at the La Virgen hill, western TT. To constrain the P-T-d evolution of this rock, we considered microstructures and a P-T pseudosection contoured with chemical parameters of interest. This pseudosection was constructed with the PERPLE_X software for a selected bulk-rock composition in the 11-component system Si-Ti-Al-Fe-Mn-Mg-Ca-Na-K-O-H. The analyzed rock is a slightly deformed, peraluminous (ASI= 1.07), grey granite composed of (~ vol.%): K-feldspar (Kfs, 37), quartz (Qtz, 30), plagioclase (Pl, 18), biotite (Bt, 7), garnet (Grt, 5), muscovite (Ms, 2), and zircon, apatite, monazite, ilmenite (Ilm), and magnetite (Ma) as accessory phases (1). The porphyroclastic texture is characterized by 15 vol.% of a fine-grained (20-100 mm) granoblastic matrix.

The derived P-T path is based on garnet zoning. The garnet core composition pyr4(gro+andr)12spes10alm74, which equilibrated with andesine (XAn = 0.37), yielded P-T conditions of 6 kbar and 650°C (Fig. 1, point A) above the solidus (~7 vol.% of melt). The stable assemblage at these conditions is Ms+Pl+Kfs+Ilm+Ma+Grt+Bt+Qtz+melt, as in the natural rock. Garnet recorded a rimward decrease in pyrope from 4 to 3 mol% by slow cation diffusion to its stability limit which is reached at 5.5 kbar and 620°C (Fig. 1, point B). The subsequent path is constrained by metamorphic muscovite with Si contents of 3.09-3.17 Si per formula unit and XAn=0.36 in plagioclase.



The deciphered P-T path in the studied rock demonstrates the cooling of granitic material at near solidus conditions and the exhumation from the middle crust (22 km), under an apparent geotherm of ~ 30 °C/km, to upper crustal depths of ~7 km. The ductile microstructures of deformation in the protomylonitic granite are consistent with microstructures in feldspars (deformation twins, myrmekites, and flame perthites) from a 1.5 km distant granitic rock of the Siempre Amigos area

which were restricted between 650° and 430° C (Angeletti et al., 2016). The exhumation path suggested for the studied metagranite is similar to that of the garnet-bearing postcollisional leucogranite of San Veran hill, assigned to Trans-Amazonian orogeny cycle (Martínez et al. 2017).

GNSS-based remote sensing: Innovative observation of key hydrological parameters in the Central Andes

N. Antonoglou¹, B. Bookhagen¹, J. Wickert², A. Güntner³, A. de laTorre⁴

¹Potsdam University, Institute of Geosciences, Potsdam, Germany

²GFZ Potsdam, Space Geodetic Techniques, Potsdam, Germany

³GFZ Potsdam, Hydrology, Potsdam, Germany

⁴Universidad Austral, Ingeniería, Buenos Aires, Argentina

The Central Andes are characterized by a steep climatic and environmental gradient with large spatial and temporal variations of associated hydrological parameters. In this region, important hydrological components are integrated water vapor (IWV) and soil moisture. Both parameters can be monitored in parallel by using Global Navigation Satellite System - Reflectometry (GNSS-R) techniques.

As part of the International Research Training Group-StrATEGY project, this research aims at monitoring IWV and soil moisture with new station data in the Central Andes. According to the needs of the research, four independent GNSS ground stations were installed for the collection of the data. Each station will be located in different altitude along the climatic gradient and will contain various quality GNSS receivers. It has been shown that some high-quality receivers provide precise measurements, while low-quality receivers have not been widely tested for these applications. A goal of this project is the direct comparison of data quality from each site and receiver type. Additionally, soil moisture sensors will be installed at each site. This set-up will help to evaluate the quality of the GNSS receivers. Moreover, the GNSS-based remote sensing approaches will be directly compared to traditional Time-Domain Reflectometry (TDR) techniques for calibration and evaluation. On-site meteorological stations will be used for studying the relation between the magnitude of precipitation events and soil moisture as well as the time needed to spot a significant change in soil moisture after a precipitation event.

Station	Altitude (m)
University of Salta	1150
Tolombon	1700
Payogasta	2500
Pozuelos	3800



Reference

Wadge, G., Francis, P.W., Ramírez, C.F. 1995. The Socompa collapse and avalanche event. *Journal of Volcanology and Geothermal Research* 66(1): 309-336.

Mapping marine geothermal resources with the magnetotelluric method in the northern Gulf of California

T. A. Avilés-Esquivel¹, C. Flores-Luna¹, V. Reyes-Ortega², E. Gómez-Treviño¹, S. Constable², G. Antonio¹

¹CICESE, Earth Science, ENSENADA, Mexico

²Scripps Institution of Oceanography, Earth Science, La Jolla, United States

Different geological and geophysical disciplines have suggested the Wagner Basin as a promising location of geothermal resources. As a reconnaissance tool Magnetotelluric (MT) data were measured at 10 sites along with a profile over this basin in the northern Gulf of California. The subsurface distribution of electrical resistivity was estimated with two-dimensional smooth inversion using the apparent resistivities and phases from both field polarizations. We also found a deep conductor underneath the center of the basin, interpreted as a zone of partial melt feeding the accretion zone of this young crustal spreading zone. From six MT sites with close-by heat flow measurements, we also found a positive correlation between the interpreted shallow (first 100 m) resistivities and high heat flows. This shows that the MT method can be used to map submarine heat sources. We also found a deep conductor underneath the center of the basin, interpreted as a zone of partial melt feeding the accretion zone of this young crustal spreading zone.

Holocene flank-eruptions at the Lanín Volcano (Southern Volcanic Zone), Patagonia

C. Balbis¹, I. A. Petrinovic¹, J. A. Brod²

¹CONICET, CICTERRA, CÓRDOBA, Argentina

²Universidade Federal de Goiânia, Goiânia, Germany

The Lanín (39° 38.34'S/71° 30.16'W) is considered an active volcano and is located in the Central South Volcanic Zone (CSVZ) being part of the Villarrica-Quetrupillán-