Abstracts

28th International Geological Congress

Washington, D.C. USA
July 9-19, 1989

Abstracts are presented in alphabetical order. A detailed directory of the presenters in this volume is provided at the back of the book.

A number of abstracts were received too late to be included with the major alphabetical listing. Many of these late abstracts may be found in a separate section at the back of volume 3.

introduced by prolonged drilling-induced disturbances.

The special nature of flow and its characterization in low-diffusivity formations is well illustrated by recent field studies in the Cretaceous Pierre Shale. Quartz pressure transducers were permanently cemented into boreholes terminated at three levels in the 250 m thick shale. This technique gave a high probability of successfully sealing the boreholes, but required highly reliable instrumentation because retrieval is not feasible. Pressure measurements from the three transducers have shown that drilling induced disturbance is still dissipating more than a year after sealing the boreholes. However, these long-lived disturbances, which are apparently caused by near-field inelastic dilatation, were relatively minor. In this rock, at least, the measured pressures showed no significant changes after the boreholes had been sealed for several days.

The measured pressures, which after more than a year apparently closely approximate the natural conditions, indicate an interesting pattern in the vertical dimension; all are significantly below hydrostatic and the lowest hydraulic head is at mid-level in the shale. In a system with dominantly vertical flow such as this one, the resulting flow must be toward the shale interior from the upper and lower formation boundaries. This unusual regime can be explained as a response to erosional unburdening over the last several Ma. The rate of rebound dilatation is sufficient to increase pore volume more rapidly than fluid flow can occur to accommodate it. According to this interpretation, the same flow regime will persist for a significant period in the future, even if erosion were to cease. Thus the site studied may represent a rare instance in which it is possible to predict groundwater flow over the next 10^5 years with some degree of confidence.

NEVES, B. B. B., and G. CORDANI, Universidade de São Paulo, São Paulo, Brazil

Geologic Evolution of South America During Late Proterozoic

The welding and final consolidation of the Gondwana Super-continent was achieved during late Proterozoic times, by activation and agglutination of several mobile bets that form a continuous tectonic network around older cratonic areas. On that occasion, the geologic evolution of South America cannot be dissociated from that of Africa, both continents being affected by the essentially synchronous Brasiliano and Pan-American orogenic cycles.

The central-eastern part of the Brazilian Shield was strongly involved in the late Proterozoic orogeny, which produced the most visible geologic structures, not only with the Brasiliano mobile belts, but also over their cratonic areas (São Francisco, São Luiz, Rio de La Plata), affected in different ways by tectonism during the latest Precambrian and early Phanerozoic. In contrast, the northwestern part of the shield (Amazonian Craton) was almost unaffected by the Brasiliano orogeny, its structures being older, formed principally in early and mid-Proterozoic times.

Different types of late Proterozoic mobile belts can be described in South America according to their tectonic significance and development:

1. The Periamazonian Folded System (Paraguay–Araguaia–Tocantins and associated belts), as marginal units at the eastern and southern borders of the Amazonian craton.
2. The Mid-Coreau fold belt, correlative of the Pharusian belt in Africa, as marginal units at the eastern border of the São Luiz -west African craton.
3. The Oiapoc belt, correlative of the Rockelide belt in West Africa, ensialic and intracratonic, in view of the probable link of the Amazonian and West African cratons in late Proterozoic times.
4. The Brasilia, Rio Preto, Sergipe, and related folded belts, as marginal units at the western and northern borders of the S₆ao Francisco craton.
5. The Araçuai fold belt, correlative of the West Congolian belt, with intracratonic development, considering the obvious connection of the São Francisco and the Congo–Kasai cratons in late Proterozic times.
6. The Ribeira fold belt, marginal to a cratonic unit that is supposed to be present beneath the sediments of the Paraná basin.
7. The Don Feliciano belt, marginal to the Rio de La Plata craton at its southeastern border.

In addition, two large areas with crustal shortening, basement reactivation, and intense tectonism along megasutures can be characterized:

1. The Borborema structural province, correlative of the Eastern Nigerian province in Africa, in which a complex interaction of microplates and microcontinents occurred during the Brasioliano–Pan-African orogeny.
2. The Central–Coiás collisional terranes, a mosaic of tectonic blocks bounded by large thrusts and transcurrent faults, generally associated with the Transbrasiliano lineament.

Finally, fragments of late Proterozoic belts can be identified within the domains of the Andrean cordillera, overprinted by Phanerozoic tectonomagmatic events. Their paleogeographic position and tectonic significance cannot be envisaged with the reduced data presently available.

carbonatic component over and along the cratonic border, with skin tectonics and reduced magmatism typical of passive margin evolution; and a flysch-type volcanosedimentary component, including important amounts of bimodal volcanics and calcalkaline plutonic rocks characteristic of magmatic arcs and associated tectonic environments.

The geometry of the late Proterozoic mobile belts in South America is strongly influenced by structures originated in previous mid-Proterozoic tectonic events that occurred between 1800 and 1000 Ma. These include crustal fracturing and development of rift-type environments, as well as the evolution of ancient passive margins. For example, an extensive metamorphic belt of mid-Proterozoic age extends semicontinuously below the supercrustals of the Brasilia and Rio Preto folded belts, across the Borborema province, the probably onto the Eastern Nigeria belt in Africa. One other example is the Araçuai–West Congolian belt, which occupies an area previously affected by strong tectonism and development of aulacogenic basins in mid-Proterozoic (Espinhaço–Kibaran times.

At continental scale, the structural trends of the Brasiliano–Pan-African belts indicate the existence of practically synchronous multilateral stresses, within the lithospheric plates, partially following previous zones of crustal weakness. This can be produced by complementary deformational adjustments of the continental plates as response to major events, analogous to the modern India–Asia collision. In this scenario, two large tectonic zones are the best candidates for such major collisions: the Hijaz–Mozambique megasuture, which is the probable site of connection of East and West Gondwana; and the Transbrasiliano lineament, which cut across South America and extends in North Africa along the Pharusian and Dahomeyian megasutures.

Considering pervasive calcalkline granitoids as indicators of subduction-related juvenile material, the Transbrasiliano lineament may have been the site of consumption of a previous oceanic basin, and subsequent collision of two large continental masses, one including the Amazonian and the West African craton, the other including the São Francisco, Congo–Kasai, and Kalahari cratons. A smaller wedge-shaped oceanic basin, opening towards the south (the Adamastor Ocean), can also be envisaged to account for the observed features within the Don Feliciano and Gariep belts, formed in connection with its closure in late Proterozoic times.

The deformations connected with lithosphere cooling at the end of the Brasiliano orogenic cycle produced widespread fracturing with graben formation and associated volcanism, with ages around 520–580 Ma, in all of the mobile belts but especially along the weakness zones of the Ribeira and Don Feliciano belts and along the Transbrasiliano lineament in Ceará and Goiás.

NEVES, B. B. B., W. TEIXEIRA, C. G. TASSINARI, and K. KAWASHITA, Universidade de São Paulo, São Paulo, Brazil

Contribution to Geochronological Subdivision of Precambrian of South America

The Geochronological Research Center of the University of São Paulo is celebrating 25 years of existence, with about 16,000 determinations already done. These data associated with other available data from different laboratories proved a considerable amount to be worked out in terms of the geochronologica evolution of South American Precambrian.

The absolùte majority of the data were achieved through Rb-Sr (60%) and K-Ar (40%) methods. This is indeed a modest geochronological background, if it is taken into consideration the geographic distribution and the dimensions onf the shield areas are around 5,000,000 km^2.

The major stratigraphic marks proposed by Almedia (1971), with quite few number of data for the most important tectonomagmatic cycles are now being confirmed, with improvement expected. It is also observed that the recent proposition made by the Submission on Precambrian Stratigraphy (SPS), signed by Plumb and James (1986), may be useful for the Precambrian of South America, if some adjustments will be done.

Age values in the range of the Archean I Era (>3.5 Ga) are practically unknown up to now, this being understood only as a result of the present stage of knowledge.

Age values in the range of the Archean II Era (3.5–2.9 Ga) have been obtained, but most of them still need further improvement in terms of new analytical methodologies. Generally, they have been detected with a character of relict among many other values of younger ages of the end of the Archean, in the basement of old cratonic blocks and of Early Proterozoic mobile belts. This situation tends to be changed with the introduction of new methodologies of analyses, but for the moment we should state the impossibility of speaking about a complete cycle prior to the end of the Archean.

The geochronological representation of the Archean III (2.9–2.5 Ga) is very good all over the shield areas, usually in some scattered portions of the basement of old cratonic blocks (Santa Izabel, Jequié, Lençóis, Xingu,