

K-4-2 02376 2011

THE SOUTHWESTERN PORTION OF THE GEODYNAMIC MAP OF ASSEMBLAGE OF GONDWANALAND - PROJECT IGCP 288: SOME COMMENTS

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The compilation of the Latin American portion of Late Proterozoic to Triassic Gondwanaland is here revealed. The Andean region shows persistence of Pan African-Brasiliano blocks in Venezuela and Peru with no clear connections in Brazil. Two main cratons, Sao Francisco and Amazon are clearly defined. The other cratonic areas or blocks, Rio de La Plata, Parana, Goiano, Borborema blocks, have still unclear limits or are buried. The northern termination of the Puncovicana Belt and the Eastern Sierras Pampeanas are also to be solved. The presence of Late Proterozoic metamorphics in Peru and Venezuela puts some doubts on an eventual link between the Arequipa Massif and the Amazon Craton and complicates the Laurentia - Gondwana connection model.

K-4. Recent progress and a review of results of IGCP -- supercontinent formation and dispersal: Rodinia, Gondwana land and Pangea

K-4-1 02010 1691

OROGENESIS PRECEEDING AND TAPHROGENESIS SUCCEEDING RODINIA IN SOUTH AMERICA.

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Evidence for the worldwide Grenville orogenic collage has usually been pointed out in South America throughout the basement of the Andean Chain, from Colombia to Northwest Argentina, and in the Brazil - Bolivia boundaries (northwest of the Amazonia Craton).

Some new geological and geochronological data and a review of preexisting data are demonstrating for the interior of the continent the occurrence of collisional and subordinate events (in the Central Goiás Massif, São Francisco Craton and surroundings) during the same span of the Mesoproterozoic (1300 - 1100 Ma). The preferential (but not exclusive) sites for these compressional events have been those rifts and basin formed during a previous process of taphrogenesis of Paleoproterozoic age (Statherian Period).

Such processes, which had preliminarily been designated as "Uruaçuano" or "Espinhaço" cycles are now recognized as part of a broad compressional regime, responsible for reworking of basement rocks and building of some fold belts, with an striking final phase of Mesoproterozoic (to Neoproterozoic) erosion. They are now recognized as equivalent of the Grenville collage in the interior of the South American continent. Some subordinated activation processes (shearing, gravity faults, thermal rejuvenating, etc.) may also be identified overlapping the cratonic areas at those times.

Succeeding the orogenic events, an overspread phase(s) of taphrogenesis took place, and this has diachronously been identified (1100 to 950 Ma) throughout previous cratonic areas and fold belts. Such extensional domains display a series of coeval geological records (mafic dike-swarms, bimodal volcanism, BVAC sedimentation, some anorogenic plutons, etc.) all over the country, and present the general characteristics of fission of a previous supercontinent (i.e. Rodinia).

For the Neoproterozoic Brasiliano (specially) structural provinces such extensional processes played the role of an inaugural phase of a new tectonic cycle, then defining their overall structural patterns, such as main depositional sites and structural highs.

K-4-3 03404 2873

A Tale of Three Supercontinents

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Rodinia was the supercontinent assembled in the global orogenic Grenvillian event at the close of Mesoproterozoic time, ca. 1000 Ma, and fragmented during the Neoproterozoic, ca. 750 Ma. Critical to its reconstruction are "piercing points" within the Grenvillian and older basement (Moores, Geology, 1991; Dalziel, Geology, 1991). Paleomagnetic data from East Gondwana appear to be compatible with the proposed "SWEAT" juxtaposition of the Pacific margins of Laurentia and East Antarctica through the above time interval (Powell et al., Geology, 1993; Gose et al., EOS, American Geophysical Union 1994). Dike swarms in Laurentia and Australia may constitute a critical test of the fit.

The proposal that the Labrador-Scotland-Greenland promontory of Laurentia can be restored to the ancestral Arica embayment of South America (Dalziel, GSA Today, 1992, and Geology, 1994) is strengthened by recent comparison of the basement of Labrador, SW Scotland, and NW Ireland with the Arequipa massif of southern Peru and the western Amazonian craton. It is also strengthened by comparison, now in progress, of the Dalradian Supergroup of Scotland with the pre-Ordovician cover of the Arequipa massif.

Pannotia (all southern supercontinent) was the hypothetical supercontinent forming as Gondwanaland amalgamated during opening of the Pacific Ocean basin, ca. 750-550 Ma, by closure of the Pan-African/Brazilide oceans prior to separation of Laurentia from Amazonia and its Cambrian faunal isolation (Dalziel, Geology, 1991, and GSA Today, 1992; Hoffman, Science, 1991; Powell et al., EOS, American Geophysical Union, 1995). Paleomagnetic data from Laurentia and East Gondwanaland indicate that Pannotia may indeed have existed, if comparatively fleetingly and with small internal ocean basins near the end of Precambrian time.

Pangea itself, the oldest configuration of continental crust that can be reliably demonstrated using marine geophysical and satellite altimetry-derived gravity data, amalgamated with the global Alleghenian-Hercynian-Uralian orogeny. This followed an "end run" of Laurentia around the proto-Andean margin of Gondwanaland during the Paleozoic Era (Dalziel et al., GSA Bulletin, 1994). Faunal data, however, indicate that collision of the two during the Ordovician Period may have been confined to the Precordilleran terrane of Argentina that probably rifted from the Ouachita embayment (Dalla Salda et al., Geology, 1992a, b; Astini et al., GSA Bulletin, 1995).

Giant radiating dike swarms associated with flood basalt provinces permit an understanding of the way in which mantle plumes have modified the regional stress systems within the supercontinents and thereby triggered sea floor spreading along zones of weak lithosphere (Dalziel and Lawver, EOS, American Geophysical Union, December 1995). Supercontinental fragmentation appears to result from periodic pulses of plume activity between which cratons reassemble in various configurations.