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Tectonic Evolution of the Proterozoic Brazilian Crust

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After twelve years of regional tectonic studies, a synthesis of all structural investigations carried out in Brazil, rendered it possible to analyse the mechanical systems which were responsible for building up the brazilian portion of the proterozoic continental crust, i.e., the plates "Brasileira" also known as "Sul-Americana". From such analysis it was inferred that, possibly, on an archaean crustal portion —— mainly plutonic, deformed and differentiated during Early Algonkian —— occurred an intense fracturing which induced zones of contrasting degrees of tectonic stability. This ended up in intense fragmentation caused by two fracture systems (NE and NW), followed by magmatism and sedimentation, during the 1,900 m.y. to 1,600 m.y. interval. A later diastrophysm (1,400 m.y. to 1,000 m.y.) made itself present on several zones with variable intensity, and deeply differentiated the sialic substract, more intensively deforming the eastern portion, which remained unstable and became once more the site of sedimentation, magmatism and partial deformation (750 m.y. to 450 m.y.), while the western half stabilized since 1,000 m.y.. The main deformation took place by rotation and differential displacement of wedge-shaped blocs, thus resulting in significant compactation of the primitive archaean area. The transformations originated by the last deformation were primarily hydrothermal and diaphthoretic, related mainly to epeirogenesis.

Geochronological evolution of the precambrian rocks of the state of Bahia, BRAZIL

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The state of Bahia occupies an area of 561,000km^2 in Northeast Brazil, and only about 500 radiometric ages have been determined for its Precambrian rocks.
These date have been interpreted with the purpose of supporting the preparation of the geologic and tectonic maps at the scale 1/1,000,000. The São Francisco craton of Pre-Brazilian age, surrounded by Brazilian belts lies at the central position of the state.
The basement of this craton exhibits ages around 3.0±0.1 b.y., 2.6±0.1 b.y. and 2.0±0.2 b.y., within different tectonic segments. Volcanic and clastic-pelitic sedimentary covers were developed during the Espinhaço cycle in the interval between 1.7 and 1.3 b.y. ago and in the Brazilian cycle between 1.1 and 0.65b.y. ago. The Brazilian metamorphic belts evolved from the Late Proterozoic, around 1.0 b.y. ago, underwent the main episode of metamorphism around 650 m.y. ago, and at beginning of the Phanerozoic, molasse -type deposits were formed and anchimetamorphosed around 470 to 500 m.y. ago.

Suture pan-africaine et proto-atlantique en Afrique de l'Ouest.
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Une suture aux caractéristiques voisines de celles des chaînes récentes sépare le craton ouest-africain de la chaîne pan-africaine, depuis le Sahara septentrional jusqu'au Golfe de Guinée. Des magmas ultramafiques et tholéïtiques mis en place lors d'un amincissement extrême de la croûte sialique se rattachent à la "basification" de larges domaines continentaux vers 800 Ma, en liaison avec l'ouverture d'un océan. Une marge passive fortement subsidente et flanquée d'un aulacogène transverse au Mali (Gourma) caractérise la bordure orientale du craton ouest-africain. De grandes nappes de charriage (> 80 km) originaires des portions les plus affaissées de cette marge (Gourma interne au Mali, "Buem" + "Atacora" au Sud du Niger) portent sur plus de 300 km de long l'empreinte d'un métamorphisme de HP/BT. A l'Est de la suture lui fait face au Nord Mali une zone d'accrétion à croûte basique et calco-alcaline juvénile dont les caractères sont analogues à ceux d'un arc et d'une cordillère moderne. La répartition et la polarité du magmatisme calco-alcalin pré-collision suggèrent l'existence d'une zone de subduction plongeant à l'ESE et ayant fonctionné entre 800 et 630 Ma avant la collision intercontinentale finale.

Oceanic closure and continental collision in the Hoggar-Iforas Pan-African segment.
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Rifting occurred around 800 m.y. along the eastern margin of the West-African craton with a triple point in Mali, the Gourma being interpreted as an aulacogen. Continental fragmentation was accompanied by the injection at the base of the crust and at high levels, of basic and ultrabasic magmas. The presence of basalts of possible oceanic origin, island arcs and marginal troughs volcanoclastic assemblages, widespread calc-alkaline plutonism, and paired metamorphic belts, including high pressure eclogitic schists, testify that active subduction processes were at work. In the western part of the eastern continent (Pharusian belt) widespread continental cordilleran conditions prevailed, several cycles having been identified, the oldest being dated at 865 m.y. Three major tectonic events have been distinguished : stabilisation of the eastern Hoggar-Ténéré domain around 750 m.y., N-S Himalayan type collision in the western branch of the Pharusian belt around 700 m.y., and finally oceanic closure around 600 m.y., which led to the E-W collision between the passive continental margin of the West African craton and the active continental margin of the eastern continent. The suture is marked by a string of positive gravity anomalies corresponding to the emplacement of ultrabasic and basic rocks. The 600 m.y. old collision which was accompanied by the translation onto the West African craton of foreland nappes, affected the entire Touareg shield. The reactivation of older gneissic terranes in the central and eastern part of the shield is marked by greenschist metamorphic overprinting, intense intraplate deformation in N-S linear belts accompanied by crustal thickening, and generation of granites, and major lateral displacements along mega-shear zones. A parallel is drawn with the Molnar-Tapponnier model (1975).