GEODYNAMIC SETTING, TECTONO-METAMORPHIC EVOLUTION OF THE TRANS-SAHARAN-DAHOMEYAN BELT AND ITS LINK WITH NORTHEAST BRAZIL

RENAUD CABY

Géosciences, Université de Montpellier 2, France
Email: renaud.caby@gm.univ-montp2.fr

The sinuous Trans-Saharan-Dahomeyan belt is sharply delimited from the West African Craton (WAC), stable since 2 Ga, by the late Neoproterozoic suture that corresponds to the closure of the large "Pharusian" ocean. The Bou Azzer ophiolite (SE Morocco, 697Ma), is the best preserved piece of oceanic lithosphere at shallow crustal level. Ocean-continent transition of the distal part of the WAC passive margin is recognized in Northern Mali and possibly in Benin. Gravimetric highs correspond in NE Mali to the Tilemsi intra-oceanic arc (730-710 Ma) and to the Amalalaou HP metagabbros (ca. 800 Ma) that represent arc roots, in a similar situation to that of the allochthonous Kabié granulitic metagabbros of the Dahomeyan belt. Eastward subduction down to mantle depths of the WAC around 620 Ma resulted in HP/LT metamorphism of the passive margin (Gourma blueschists, eclogites and occasional coesite whiteschists; Togo eclogites). This HP sinuous belt was emplaced southwestward through a major low-angle thrust above less metamorphic passive margin metasediments of the Gourma and the Volta basins. Polymetamorphic gneisses exposed east of the suture zone represent several continental units assembled along steep strike-slip shear zones which include the 4°50-Kandi shear zone that matches the Transbrasiliano Lineament in South America. These crustal blocks include Archean protoliths (SE Nigeria) while others are formed by reworked Paleoproterozoic crust. The older quartzitic cover predates the emplacement of rift-related 1.8-1.7 magmatic complexes (sub-alkaline volcanics and granitoids; gabbros and anorthosites) coeval with Espinhaço age magmatism, whereas the younger quartzite-carbonate cover that correlates with the 1.1 Ga Atar Group of the WAC predates ca. 800 Ma old basalts and sill complexes. The Iskel block of central Hoggar represents an exotic terrane rooted by Paleoproterozoic crust cut by volcanics and arc related plutons (900-700Ma). Large domains of juvenile crust (Pharusian) to the west of the 4°50 SZ represent both active continental margin and back-arc settings with crust attenuation, mantle exhumation, widespread andesitic volcanism and emplacement of 700 Ma old pre-tectonic dioritic/tonalitic plutons. Large domains of LATEA (central Hoggar) consist of allochthonous eclogitized crust, as in NE Ceará, whereas the high-temperature Nigerian province affected at ca. 610 Ma by granulite facies metamorphism was intruded by late-kinematic charnockite-norite and syenite plutons (630 to 580 Ma). Late Neoproterozoic rocks essentially include turbiditic volcanic greywackes, andesite-dacite volcanics and pre-metamorphic calc-alkaline plutons (640- 630 Ma) typical of an active continental margin. The 620-600 Ma period represents the major stage of tectono-metamorphic events and syn-collisional magmatism. The older continental molasse deposited along the Adrar fault after 580 Ma comprises a new magmatic pulse of both sub-alkaline and calc-alkaline magmas, followed by greenschist facies overprint. Other late shear zone–related dike complexes include deformed syenites, nepheline syenites and peralkaline types in Hoggar. The youngest late kinematic granite in Hoggar is dated at 523 Ma. The Cambrian molasse (up to 6000m thick in NW Hoggar) includes red beds, glacial and aeolian beds, calderas and plateaus of alkaline/peralkaline lavas and hypovolcanic ring plutons. The chronostratigraphic correlation of this late molasse with the Volta and the Taoudeni basins remains so far a severe geochronological controversy.