SOUTH AMERICA – A KEY CONTINENT ON THE GONDWANA EVOLUTION 5-12

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Gondwana was one of the largest and long lasting supercontinents on Earth's history, comprising five large actual continents (Africa, Australia, Antarctica, South America and India) and many other smaller masses scattered today around the globe (e.g. Madagascar, Sri Lanka, New Zealand, Falklands/Malvinas, and others now embedded in Asia, Europe and North America). Amalgamation of Gondwana was completed at ca. 500 million years ago, during the Cambrian period, when microbial marine life was flourishing evolving fast to visible organisms. For more than 350 million years, this supercontinent as an entity moved between the South Pole and the low latitudes of the southern hemisphere. The continental margins of Gondwana were very heterogeneous. From the present day location of the Andes to the Papua New Guinea, active tectonics predominated, with subduction zones, collisions and accretion of new terranes. The northern margin of Gondwana - facing the Tethys Ocean - was more stable, wide continental shelves and shallow seas from Northern Africa to Papua New Guinea. This extensional tectonic setting allowed small continental blocks to separate from Gondwana, drifting away to be deformed and welded onto Laurasia. Finally for about 100 million years, starting ca. 200 million years ago, Gondwana started to break up into several land fragments evolving steadily into the present-day picture of the continents and oceans on Earth.

South America represents a major piece on the Gondwana evolution, registering the three main tectonic scenarios of this supercontinent: Amalgamation (800-450 Ma), Development (450-180 Ma) and Break up (180-80 Ma). The major cratons (Pre-Neoproterozoic) are wielded by the Brasiliano orogenic belts. Together they represent the large stable eastern South America lithosphere that, with Africa, constituted the West Gondwana sector at the end of the amalgamation phase. The development of Gondwana in South America is registered two distinct main tectonic settings. The intracratonic basins provide the information about the evolution of life, climate and intracontinental tectonics. On the other hand, the Andean and Patagonian regions register the events that took place on the West Gondwana margin, such as the accretion of exotic terranes and activity of subduction zones. The Breakup scenario, during the Cretaceous, is well recorded in the actual eastern South American margin, both onshore and offshore.

We present here the first draft of the South America geological map as part of the project: "The Gondwana Map Project– the geological map and the tectonic evolution of Gondwana". The aim is to update the Gondwana Geological Map of Maarten de Wit's 1988 with an approach of the 21st century. In order to do so, the Gondwana concept has been revised with new interpretations and research focuses using the vast new geological data produced in the last 30 years and also the new computer technologies. The dynamic digital process allows the construction of not just an improved Gondwana Map but also a wide variety of maps showing the evolution of this supercontinent. Since 1988, the geological data have improved incredibly in the wake of new geochronological laboratories and investigative methodologies.

The development of a GIS data-base is the on-going first phase of this project. The most recent geological data from all the Gondwana pieces was compiled in the scale of 1:5M. Subsequently, all maps converged in one big map with a common legend. The proposal until now is to use the colours of the geological time scale from IUGS to characterize the geological units. The patterns within the polygons will document the nature of the rocks (classification and chemistry) and the tectonic reactivations. We present here the South American map with only coloured polygons. The three major phases of the Gondwana tectonic evolution are easily recognized in the map enhanced by its entities: the pre-Neoproterozoic cratons, the Neoproterozoic-Paleozoic orogenic belts, the Paleozoic-Mesozoic intracratonic basins, the Paleozoic-Mesozoic orogenic marginal belts. The structures are not yet represented and constitute an important layer on the map, since

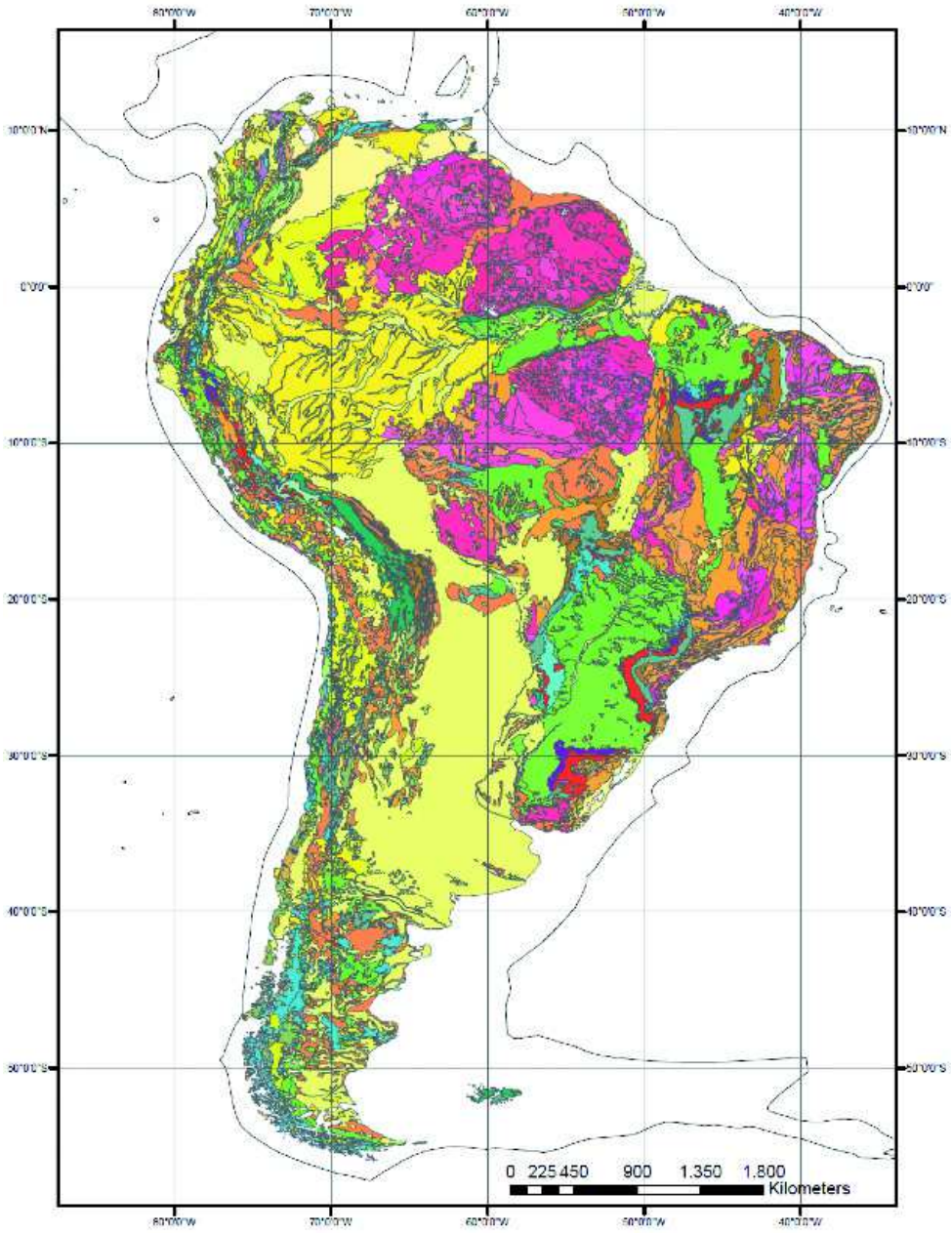

Fig. 1 - First draft of the South America geological map using a common legend with the new Gondwana map. This draft shows only the polygons for the geological units colored according to the geological time table proposed by IUGS. It was compiled based on the GIS data base of the Geological Map of South America (CPRM, 2001). Other geological maps from South American countries were also used: Geological Map of Colombia, 1:2.800.000 (INGEOMINAS, 2007), Geological Map of Argentina, 1:5.000.000 (1997), Geological Map of Chile, 1:1.000.000 (Servicio Nacional de Geologia y Mineria, 2003). The contouring line is the estimated Ocean-Continent transition (OCT boundary) for the recent time based on the Geological Map of the World (CGMW, 2010).

the major sutures will be shown.

This project started in 2011 from a cooperation between UFRJ-PETROBRAS and recently was approved as an IGCP-628 (UNESCO-IUGS-project), continuing until 2017. The leaders of the IGCP-628 are: Renata Schmitt (UFRJ, Brasil), Maarten De Wit (Nelson Mandela Metropolitan University, South Africa), Edison Milani (PETROBRAS, Brazil), Umberto Cordani (USP, Brasil), Alan Collins (University of Adelaide, Australia), Colin Reeves (Earthworks, The Netherlands), and Phillipe Rossi (CCGM - CGMW, France).