



REPORT

FOR 2015

— THE BRAZILIAN NATIONAL COMMITTEE —

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PROJECTS WITH BRAZILIAN LEADERSHIP OR PARTICIPATION

Brazil participates on 1 IGCP Project with Brazilian leadership (project 628), and 2 with Brazilian participation (projects 609 and 632).

Projects With Brazilian Leadership Or Co-Leadership

No. 628 – THE GONDWANA MAP PROJECT - THE GEOLOGICAL MAP AND THE TECTONIC EVOLUTION OF GONDWANA (2013-2017)

Project Leader: Renata da Silva Schmitt - Departamento de Geologia IGEO - CCMN - Federal University of Rio de Janeiro - UFRJ - Av. Athos da Silveira Ramos 274 sl. J2-020 - 21949-900 - Brazil (renatagondwana@uol.com.br / renata.schmitt@pesquisador.cnpq.br; Tel. (55 21) 2598-9482, (55 21) 99638- 8859).

Project Co-Leaders: Dr. Umberto Giuseppe Cordani (Brazil) - ucordani@usp.br; Dr. Edison José Milani (Brazil) - ejmilani@petrobras.com.br; Dr. Maarten De Wit (South Africa) - maarten.dewit@nmmu.ac.za; Dr. Alan Collins (Australia) - alan.collins@adelaide.edu.au; Dr. Philippe Rossi (France) - p.rossi@brgm.fr; Dr. Colin Reeves (The Netherlands) – reeves.earth@planet.nl

Summary of Activities: During 2015, the activities of the Brazilian group were mostly concentrated at the GONDWANA DIGITAL CENTER OF GEOPROCESSING (GDCG) (Universidade Federal do Rio de Janeiro – UFRJ), Brazil, the so-called GONDWANA LAB. The development of the GIS database for the geological maps of all Gondwana-derived continental fragments is in its final stages. In June of 2015, the Gondwana Map draft version 1.3 was released at the RIO WORKSHOP, organized by the Brazilian scientific group (see details below). The map was criticized and reviewed during this workshop, which was mostly responsible for the improvement of the geological data base and the Gondwana Map. During the second semester, the Gondwana Lab group worked on correcting the Gondwana geological map. Now the next step is the revision of the maps by scientific groups worldwide.

Another technical issue addressed this year was the paleogeographical reconstruction of this paleocontinent. The Brazilian group took a short course on the software G-Plates, a plate tectonic interactive device that will be used to fit the Gondwana-derived landmasses in order to generate the new Gondwana reconstruction for the Jurassic. Two Master dissertations are being developed on this subject. One of those is related to the reconstruction of the South America-Africa connection.

There was also a greater cooperation between Brazilian and South American and South African scientists through field trips. During this geological investigation at least four regions were focused: (1) Sedimentary and volcanic units from Patagonia (Devonian to Triassic) related to the tectonic evolution of the SW margin of Gondwana; (2) Metamorphic medium grade units from northeast Uruguay and south Brazil at the Dom Feliciano Neoproterozoic belt; (3) Stratigraphy of the Paleozoic-Mesozoic Parnaíba basin and its correlation with the Congo Basin; (4) Correlation between Sierra de La Ventana belt (Argentina) and Cape Fold Belt (South Africa), the Gondwanides (more detail in item Graduate students).

The social impact of the activities in Brazil is mostly related to the scientific events organized by the Gondwana group. The Gondwana Project website was also remodeled and presents a more informative and helpful outfit, specially to facilitate the download of the material produced by the group.

Scientific Meetings Attended: The most important scientific meeting that the Brazilian group participated on the IGCP-628 this year was the RIO GONDWANA WORKSHOP. This scientific workshop of three weeks (22/6/2015 until 11/7/2015) united more than 20 scientists from abroad and at least 40 Brazilian researchers. It was organized by the Brazilian group from the Gondwana Lab (GDCG). On the first week (22/6 to 26/6) the state of art of the project and mostly the geological maps and GIS database were presented. The results and the data on which the Brazilian group is working on at the Gondwana Lab have been shown. Talks on the geology of different Gondwanan continents have been presented and common and specific problems regarding the representation of geologic units and the Gondwana margins were discussed.

The second week (29/6 to 03/7) was devoted to the paleogeographic reconstruction of Gondwana (rotation, fit and projection of the Gondwana-derived blocks). There were talks and discussions in the mornings, especially on continental margins, paleomagnetic data, rotation and plate subdivisions. During the afternoons a course on G-Plates has been held by Nicholas

Barnett-Moore from the University of Sydney.

During the third week (6/7 to 10/7) Prof. Colin Reeves held the course “African Geodynamics – from Precambrian to present day” - the key continent on the Gondwana map, so it was worth having a special week on the African tectonics.

The Brazilian scientists that participated on this RIO WORKSHOP were: Dr. Miguel Basei (USP), Sr. Antônio Carlos Pedrosa Soares (UFMG), Dr. Leonardo Fadel Cury (UFPR), Dr. Ricardo Trindade (USP), Dr. Rudolph Trouw (UFRJ), Dr. Silvia Medeiros (UFRJ), Dr. Julio C. Mendes (UFRJ), Dr. Renata Schmitt. Geologists from PETROBRAS that also participated were: MSc. Cesar Rigotti, Dr. João Marinho, Dr. Isabela Carmo, Dr. Vitor Savastano, DMSc. Marco Antônio Thoaldo. The invited international speakers were: Dr. John Bradshaw (New Zealand), Dr. Alan Collins (Australia), Dr. Peter Johnson (USA), Sr. Victor Ramos (Argentina), Dr. Colin Reeves (Holland), Dr. Renata Tomezzoli (Argentina), Dr. Bastien Linol (South Africa), Dr. Nicholas Barnett-Moore (Australia). Few undergraduate and graduate students from UFRJ, UERJ also attended.

During the last week of November (23-30th) the IGCP-628 supported the symposium “ORIGIN AND EVOLUTION OF THE CAPE MOUNTAINS AND KAROO BASIN”, a scientific meeting held in Port Elizabeth (South Africa). The Brazilian group sent two abstracts that were presented orally by a Brazilian Graduate student. This region is specifically crucial in understanding the tectonic evolution of the “southern” Gondwana margin, since the beginning of the Paleozoic with the deposition of the Cape sequence, through the Gondwanides orogeny in the Permian, culminating with the starting of the Gondwana break up in the Jurassic. On addition to this discussion, the correlation between the geological evolution of Cape Fold Belt and the Sierra de La Ventana belt (the South American fold and thrust belt which is the continuation of the orogen) was also addressed.

Published Papers and Maps (Brazilian group):

Geological Map of Gondwana. Draft 1.3. 2015. IGCP-628 RIO Workshop. Universidade Federal do Rio de Janeiro. Rio de Janeiro (Brazil).

Bongiolo, E., Renac, C., D’Almeida de Toledo, P., Schmitt, R.S., Mexias, A.S. 2015. Origin of pegmatites and fluids at Ponta Negra (RJ, Brazil) during late- to post-collisional stages of the Gondwana Assembly. *Lithos* (in press).

De Paula, R.R., Nepomuceno, F., Assis, A.P., Schmitt, R.S., Tomezzoli, R.N., Linol, B. 2015. The Cape-Sierra de La Ventana fold belt of southwest Gondwana. Abstracts Volume IMBIZO meeting, Port Elizabeth (South Africa), November, 2015.

Fernandes, G.L., Schmitt, R.S., Bongiolo, E., Mendes, J.C., Basei, M.A.S. 2015. Unraveling the tectonic evolution of a Neoproterozoic-Cambrian active margin in the Ribeira Orogen (SE Brazil): U-Pb and Lu-Hf provenance data. *Precambrian Research*, 226: 337-360.

Linol, B., de Wit, M., Milani, E.J., Guillocheu, F., Scherer, C. 2015. New Regional Correlations Between the Congo, Paraná and Cape-Karoo Basins of Southwest Gondwana. In: *Geology and Resource Potential of the Congo Basin*, Chapter 13, p 245-268.

Linol, B., De Wit, M., Schmitt, R.S., Martins, F.J.V., Assis, A. 2015. West Gondwana-scale correlations of the Cape-Karoo sequences. Abstracts Volume IMBIZO meeting, Port Elizabeth (South Africa), November, 2015.

Schmitt, R.S., Trouw, R.A.J., Van Schmus, W.R., Armstrong, R.A., Stanton, N. The tectonic significance of the Cabo Frio Domain in the SE Brazilian margin – a Paleoproterozoic through Cretaceous saga of a reworked continental margin. *Brazilian Geological Journal*, under review.

Schmitt, R.S., Armstrong, R., Medeiros, S.R., Mendes, J.C., Van Schmus, W.R. The tectonic evolution of the Congo Craton SW-margin: evidence from an Orosirian continental lithosphere preserved in southeast Brazil. *Precambrian Research*, submitted.

Graduate students: The Brazilian graduate students involved in IGCP Project 628 are 3 Master, 2 Phd and 10 undergraduate geology students. This year there were cooperative field trips that involved these students, aiming the development of integrated papers.

In Argentina, the collaboration with Prof. Victor Ramos (Universidad de Buenos Aires) and Prof. Renata Tommezoli (Universidad de Buenos Aires) was held in the Patagonia region where Brazilian and Argentinian graduate students worked together. In Uruguay, collaboration with Claudio Gaucher (Facultad de La Republica) and Jorge Bossi (Facultad de Agronomia), both from Montevideo, resulted in a field trip investigating the tectonic evolution of the northern part of Uruguai (Dom Feliciano Belt) in the border with the Brazilian territory. Students from Uruguay and Brazil worked together on this purpose.

In the Parnaíba basin, there was a one-month field trip for the regional geological reconnaissance of the stratigraphy of this basin and comparison with the stratigraphic column of the Congo basin (in Africa). Researchers from Brazil (PhD and undergraduate students) participated together with a Post-doc researcher from the Port Elizabeth University (South Africa).

This cooperation continued until the end of the year, when this group met again in a field trip in the Cape Fold Belt, South Africa. The aim was to compare the stratigraphy and deformation of this Ordovician-Permian basin with the South American Sierra de La Ventana system.

Educational or Scientific training or capacity building activities: The IGCP-628 Brazilian group organized a short course on the development and understanding of the software G-Plates. During one week (first week of July), 25 participants, among graduate students, professors from federal universities of Brazil, geologists from PETROBRAS, learned how to use this paleogeographic software that works with interactive tectonic plates. The course was held by Prof. Nicolas Barnett-Moore, from the University of Sydney (Australia), co-worker of the G-Plates scientific group of the founder Dr. Dietmar Muller.

The IGCP-628 Brazilian group also organized a short course on the Geodynamic evolution of the African plate, coordinated by Prof. Colin Reeves, taking place at UFRJ. During one week (second week of July), 15 participants, among graduate students, professors from federal universities of Brazil, geologists from PETROBRAS, learned and discussed about the tectonic evolution of the African plate and its platelets.

Activities Planned for 2016: Next year, the Brazilian IGCP-628 group will concentrate on generating the paleogeographical model that will fit the Gondwana landmasses in order to select the best model to build up the map. To achieve this, at least two master dissertations are being developed on the subject, using plate tectonic interactive softwares to create the Gondwana model (G-Plates, Atlas).

By the end of August, a group of Brazilian scientists from the GONDWANA LAB at UFRJ will attend the 35th IGC meeting in Cape Town (South Africa) in order to present the Gondwana Map Draft version 2 to the international community. There will be a scientific session in this meeting entitled "The Tectonic Evolution of Gondwana" (convened by IGCP 628).

In 2016, the geological maps already generated at the GDCG-UFRJ will be sent worldwide for revision to each scientific group that work in cooperation with the Gondwana Lab in Brazil. One workshop about the geology of South America in the Gondwana Map will be organized in September, during the Brazilian Geological Congress in Porto Alegre.

Conclusion: The highlight of the Brazilian activities in 2015 was the organization and participation at the three-week RIO WORKSHOP on the Gondwana map. The scientific community endorsed the draft, but also made several comments and suggestions that are being incorporated by the research theme at the Gondwana Lab in Rio de Janeiro.

Another important subject was the field trips on the geology of southern Gondwana which strengthened the link between Brazilian researchers and scientists from other South American countries and southern Africa. The positive aspect is the engagement of more undergraduate and graduate students on the IGCP-628 research subjects supervised by both Brazilian and foreign professors that are cooperating in these Gondwanan areas.

The Gondwana project is an opportunity to include more the Brazilian scientists on the main scientific international issues and also to present to the international community the complexity and singularity of the South American geology.

Projects With Active Brazilian WG's

The Brazilian National Committee does not have information if there are some formal Brazilian WG's in any other IGCP Project.

Projects With Brazilian Participation

No. 609 – **CRETACEOUS SEA-LEVEL CHANGES** (2013-2017)

National Participants: Gerson Fauth - UNISINOS - ITT FOSSIL- Av. Unisinos 950, 93022-000 São Leopoldo RS Brazil - gersonf@unisinos.br, gersonfauth@gmail.com.

Web Site: <http://www.univie.ac.at/igcp609/>

Summary of Activities not received until closure of this report.

No. 632 – **CONTINENTAL CRISIS OF THE JURASSIC: Major Extinction Events and Environmental Changes within Lacustrine Ecosystems** (2014-2018)

National Participants: João Villar de Queiroz Neto - CENPES/PDGeo/BPA - Brazil; joaovq@petrobras.com.br; Tel. (55 21) 2162-1716.

Paulo Roberto de Figueiredo Souto.

Summary of Activities: Dr. Queiroz Neto organized the First Meeting of Brazilian Ostracodologists (ROB-1) hosted by the XXIV Brazilian Paleontology Congress. Concerning the theme of the project, the Lower Cretaceous paleoecology utilizing ostracods recovered from some core samples drilled in the Itapema Formation on the Santos Basin has been discussed. A research on this subject, entitled "Aplicação de ostracodes não-marinhos como ferramenta paleoambiental: estudo de caso no pré-sal da Bacia de Santos" has been presented by Petrobras ostracod biostratigraphers Ariany de Jesus e Sousa, Marcelo Vasconcelos Brandão, João Villar de Queiroz Neto and Jeanine de Lacerda Grillo.

A poster, entitled "Significado Paleocológico dos ostracoditos da Formação Alagamar, Aptiano da bacia Potiguar", presented by Petrobras ostracod biostratigraphers and sedimentologists Rozileide de Oliveira Lima Costa, José Gedson Fernandes da Silva, João Villar de Queiroz Neto and Isabelle Teixeira da Silva was also shown, with the newest paleoecological insights of the Lower Cretaceous Alagamar Formation ostracodite levels from the Potiguar basin.

Dr. Queiroz Neto also participated on a field trip to the Araripe basin, working on the description and sampling of Tithonian-Berriasian strata.

ACTIVITIES OF THE NATIONAL COMMITTEE

The Brazilian National Committee for the IGCP endorsed the Project Proposal entitled "AQUIFER RECHARGE IN DIFFERENT CLIMATE AND HYDROGEOLOGICAL ENVIRONMENTS IN IBERO-AMERICA: EFFECTS OF CLIMATE AND GLOBAL VARIABILITY AND CHANGES", to be submitted for approval at the next annual meeting of the IGCP Scientific Board. The project will be led by Dr. Teresita Betancur (Colombia), and Dr. Emilia Bocanegra (Argentina), Dr. Gerson Cardoso da Silva Jr. (Brazil), Christian Herrera (Chile), Emilio Custodio, and Marisol Manzano (Spain) will figure as co-leaders.