C, Sr isotopes, cap carbonates and iron formation, Neoproterozoic Seridó Belt, NE Brazil

A.N. SIAL[1], C. GAUCHER[2], V.P. FERREIRA[1], M.S. CAMPOS[1], R.C. NASCIMENTO[3] AND M.M. PIMENTEL[4]

[1]NEG-LABISE, Dept. Geol. UFPE, Recife, 50670-000, Brazil (*correspondence sial@ufpe.br)
[2]Facultad de Ciencias, Univ. de la Republica, Montevideo, Uruguay
[3]Univ. Fundação do Amazonas, Manaus, Brazil

BIF´s associated with Neoproterozoic glaciations are an important pillar of the Snowball Earth hypothesis and are regarded as accumulation of Fe^{+2} in ice-capped anoxic ocean. BIF´s at Jucurutu (Mina do Bonito), Florânea (Cabeço da Mina) and São Mamede (Riacho Fundo) towns, Seridó Belt (itabirite and Fe ores, amphibole-itabirite, and tremolite schist), NE Brazil, are overlain by Jucurutu marbles. Diamictites at Ouro Branco and Serra dos Quintos are stratigraphically situated between Jucurutu and Seridó Fms. and exhibit clasts up to 0.6 m long in fine-grained clay matrix. At Cruzeiro da Maniçoba locality, pink dolostones (Seridó Fm.) with fining- and thinning upward succession probably represent a cap carbonate.

Marbles from the Jucurutu Fm. at Mina do Bonito exhibit $\delta^{13}C$ values from -12 to -5‰ in the first 20m, and a shift to positive values (+4 to +10‰) upsection. $\delta^{13}C$ values for carbonates that overlain itabirites at Riacho Fundo and at Cabeço da Mina are all positive. The difference of C isotope behavior between basal carbonates at Mina do Bonito (negative) and Riacho Fundo and Cabeço da Mina (positive) may reflect topographic control during deposition. The pink dolostones at Cruzeiro da Maniçoba show $\delta^{13}C$ values around -4‰. Positive $\delta^{13}C$ values (~ +9‰) in marbles of the Seridó Fm. have been observed elsewhere. Carbonates of the Jucurutu and Seridó Fms. show negative $\delta^{13}C$ values in their bases followed upsection by positive values, typical of cap carbonate deposition. It is likely that BIF´s of the Jucurutu Fm. were deposited in glacial environment and the overlying carbonates, in the aftermath of one of the Cryogenian glaciations. $^{87}Sr/^{86}Sr$ ratios for Jucurutu Fm. carbonates ~ 0.7074 and for Seridó Fm., between 0.7074 and 0.7076 suggest deposition in the Sturtian, although similar values also occur in ferruginous deep-waters in the Ediacaran. Seridó Belt marbles make a case where primary C and Sr isotope values seem to have been preserved in carbonates metamorphosed at the amphibolite facies.

Quantitative application of CT-scanning in characterizing reservoir rocks and flow in porous media

SHAMEEM SIDDIQUI

Petroleum Engineering Department, Texas Tech University, Lubbock, TX (shameem.siddiqui@ttu.edu)

CT (computerized tomography) is a very powerful technique for visualizing different materials in a non-destructive manner. Although CT-scanning has been around since the early ‘70s, it took more than ten years before it started being used by the engineers and geoscientists for understanding the flow of hydrocarbon fluids in porous media and also to characterize reservoir rocks. In the last 30 years tremendous development has taken place and these app;ications into rock property evaluation and fluid flow visualization. Unlike the medical industry, CT applications in petroleum and geosciences research have focused mainly on quantitative data rather than simply qualitative ones. Quantitative CT data have been used successfully to measure density and porosity, predict shift between core and log depths, calculate pore volume compressibility, evaluatuate multiphase flow behavior including verification of the three phase extension of the Buckley-Leverett theory[1], quantifying mineral contents[2] (through dual-energy CT), evaluating treatment efficiency of acid injection in rocks, evaluating rock heterogeneity and its effect on fluid flow. In this paper an extensive review of the successful applications of CT in the areas of oil and gas production and hydrology has been discussed including the recent trends of using smaller and smallaer samples, such as small fragments of rocks called drilled cuttings. The paper also discusses the computational challenges in predicting and calculating rock and rock and fluid interaction properties based on pore network models generated using micro CT generated images of cuttings. The paper also discusses the important issue of upscaling, which is needed to make use of the micro scale data for their real application in numerical reservoir simulation and classical reservoir engineering calculations.

[1] Siddiqui, Hicks & Grader (1996) *Journal of Petroleum Science & Engineering* **15**(1), 1–21. [2] Mees, Swennen, Van Geet & Jacobs (eds) (2003) Applications of X-ray Computed Tomography in the Geosciences. Geological Society. Special Publication **215**, London, pp. 1–243.