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STUDY OF TWO CARBONATE SEEPAGES FROM LOWER TO UPPER MIOCENE HIKURANGI ACTIVE MARGIN (NEW ZEALAND, NORTH ISLAND)

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The study focuses on the analysis of tubular carbonate concretions outcropping in two areas in the New-Zealand Hikurangi active margin: the Akitio syncline and Cape Turnagain. This work intends to enlighten the role of pipes involved in fluids circulation and to compare them from two former basins having evolved from lower/middle Miocene (Akitio) and upper Miocene (Cape Turnagain). In both cases, the host rock is composed of very fine-grained muddy sediments (calcareous mudstones) containing a lot of framboidal pyrites, quartz, feldspar and very few and poorly diversified fauna indicating paleoenvironmental stressed depositional settings. Concerning the tubes themselves, they differ drastically on a morphological point of view: They are cylindrical and very large in Cape Turnagain, whereas they are rugose and far smaller in Akitio. In the Akitio syncline, the biggest tubes are characterized by a lot of late cross-cutting fracturation and brecciation stages, filled by softly deformed monomict fluidized muds. More-over, association of framboidal pyrite, authigenic quartz and bitumen lining was observed in pre-fracturation/pre-injection sequence. In the case of Cape Turnagain, diagenesis sequence is highlighted by complex dissolution/cementation stages (early calcite/dolomite cementation, framboidal pyrite, aragonitic crust). Neither late fluidized infills were observed nor late fracturing. 80 stable isotope ($\delta^{18}\text{O}/\delta^{13}\text{C}$) analysis were carried on micro-samples. All these data are completed by cathodoluminescence analysis associated to major and minor chemical analysis (SEM/EDS elemental measurements) In Akitio basin, two main origins of carbonate cements and mud infilling were revealed: anaerobic oxidation of microbial CH_4 and temperature increasing in the later stages. The building of tube framework took place in early reducing environment followed by later infilling of the tubes, using the pre-existing "plumbing system". In Cape-Turnagain, early dissociation of gas hydrates below the sea floor and reduction of CO_2 as a by-product of methanogenesis are involved (Nyman, 2009). Finally, tube formation differs strongly between these two areas: they were both differently early built and they moreover experienced hotter late fluid circulation in Akitio than those of Cape-Turnagain

Key words: carbonates pipe, stable isotopes, Akitio basin, Cape Turnagain, New Zealand