S12 - A HYDROCARBON SEEP FAUNA FROM THE UPPERMOST JURASSIC OF SPITSBERGEN, SVALBARD

Nakrem, Hans A.[1], Hammer, Øyvind [1], Hurum, Jørn H. [1] and Little, Crispin T.S.[2]

[1]Seksjon for Geologi, Naturhistorisk Museum, Universitetet i Oslo, Postboks 1172 Blindern, NO-0318 Oslo, Norway

[2]School of Earth and Environment, University of Leeds, Leeds LS2 9JT, UK

e-mail: *h.a.nakrem@nhm.uio.no*

Fourteen Upper Jurassic carbonate seep mounds have been mapped in Spitsbergen, Svalbard. The largest being 3-4 m high and 5-6 m wide. Analyzed material includes yellow to brown coloured zoned (botryoidal) carbonate, fissure-infilling sparite, and various fossils. The macrofauna consists mainly of small to medium sized bivalves, rare brachiopods as well as worm tubes. Bivalves include at least nine species, including *uculana*, *Nucinella* (the largest known specimens of this genus), *Oxytoma*, *Pseudolimea*, *Entolium*, a solemyid, a large lucinid, arcticids and a possible thyasirid, which, if correctly identified, is the oldest representative of this family. Large accumulations of *Buchia* are present in all mounds as well as in the dark surrounding shale. Gastropods are not common, but a species of *Amberleya* has tentatively been identified. Brachiopods are represented by terebratulid, rhynchonellid, and lingulid species. Vestimentiferan and serpulid worms tubes are also present. The microfauna consists mainly of uncompacted agglutinated and calcareous foraminiferans. Embedded ammonites and large wood pieces are considered not to be related to hydrocarbon seepage. Stable isotope analyses show highly negative $\delta^{13}C$ values (~ -43‰ VPDB) in the zoned carbonate whereas the sparite, ammonite and bivalve samples have $\delta^{13}C$ ~ -22‰. The ^{13}C depletions indicate a methanogenic carbonate origin, in the range typical of thermogenic, rather than biogenic methane. $\delta^{18}O$ ~ -18‰ in the sparite, ammonite and bivalve material indicates precipitation and recrystallization involving hydrothermal fluids, either synsedimentary, or in connection with sill emplacements in the Cretaceous. The carbonate data will be compared with data from surrounding shale samples.

S15 - LINKS BETWEEN CLIMATE, BIOPRODUCTIVITY AND BIODIVERSIFICATION DURING THE EARLY PALAEOZOIC

Nardin, Elise[1], Le Hir, Guillaur

[1]Institute of Geology and Mine

[2]IPGP, F-75252 Paris, France

[3]LMTG, CNRS-IRD-UPS, Obs

[4]LSCE, CNRS-CEA-USVQ, F

e-mail: *elnardin@gmail.com*

From:
Nakrem, H.A., Hammer, Ø., Hurum, J.H. & Little, C.T.S. 2010. A hydrocarbon seep fauna from the uppermost Jurassic of Spitsbergen, Svalbard. Programme and Abstract, 3rd International Palaeontological Congress, London, June 28 - July 3, p. 291

Diversification of the marine biosphere is intimately linked to the evolution of the biogeochemical cycles of carbon, nutrients, and primary productivity. Evolving food quantity and quality was primarily a function of broad tectonic cycles that influenced not just carbon burial, but also nutrient availability and primary productivity. Primary production (PP) and phytoplankton in the surface ocean are the base for almost all marine food webs. PP is influenced by the intensity of light, the pCO_2 atmospheric, and the availability of the most important nutrients, i.e. nitrogen and phosphorus. The Early Palaeozoic biodiversification could have been provoked by a sudden increase of nutrient supply and of primary productivity. At that time, excluding changes in ocean dynamics, the nutrient cycling was probably only influenced by the geodynamics events such as volcanicity and orogeneses, because of the quasi-absence of land plants. The goals of this work are to reconstruct the Early Palaeozoic climate and to test the hypothesis of the impact of the primary productivity on the diversity increase of benthic fauna during the most important biodiversification event of the Phanerozoic. Preliminary results show a net decrease of the atmospheric pCO_2 during the Ordovician, to reach a relatively low level in the Late Ordovician-Early Silurian. This decrease is linked to the increase of volcanic rock weathering and to the palaeogeographical changes. PP increases during the Cambrian-Middle Ordovician times, following the increase of volcanic rock weathering. This PP rise coincides with the general increase of taxonomic diversity.