



STRUCTURAL INVESTIGATIONS OF NATURAL GAS HYDRATES COLLECTED IN DIFFERENT MARGIN SEDIMENTS USING SYNCHROTRON DIFFRACTION

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Natural gas hydrates occur globally in marine sediments, in permafrost regions or in the continental ice sheets. Fluid flow and free gas circulating in margin sediments may be stored under the form of gas hydrates (clathrate). Gas hydrates accumulations are generally combined with bacterial mats or chemosynthetic communities typical of cold seep environments. The former synthesizes methane than can be trapped in clathrate hydrates or feeds on methane from deepwater. We are actively involved in the study of processes governing the origin, formation and stability of methane hydrates. In a previous work, we performed a physical and chemical characterization of gas hydrates and associated methane plumes from samples collected in the Congo-Angola margin using combined techniques (gas chromatography, nephelometry) and micro-Raman spectroscopy on the solid samples (1). We present here the preliminary results of high-resolution powder X-ray diffraction measurements using the synchrotron radiation at ESRF on ID31 in Grenoble (France). This structural study is carried out on natural methane hydrates from three different environments: Hakon Mosby Mud Volcano in Norwegian Sea, Congo-Angola margin and Nigeria basin. The collected samples exhibit a preponderance of structure I (sI) (cubic lattice with space group $Pm\bar{3}n$) and ice Ih which is inherently present in variable amounts in all samples. We compared their lattice parameters and their relative abundances (sI / ice Ih) at 80 K. Preliminary results on the temperature evolution of those structural parameters are presented. In a next step, other natural gas hydrates will be collected and investigated

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(1) Charlou et al, Chem; Geol. 205, 405-425 (2004)