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XRF elemental study of EPICA Dome C basal ice : Evidence of long term in situ processes

M. de Angelis (1), Marie-Christine Morel-Fourcade (1), Jean Susini (2), Jean-Louis Tison (3)

(1)Laboratoire de Glaciologie et Géophysique de l'Environnement, CNRS/UJF, Saint Martin d'Hères, France, (2) European Synchrotron Radiation Facility, Grenoble, France, (3) Université Libre de Bruxelles, Bruxelles, Belgium (ange@ lgge.obs.ujf-grenoble.fr / Fax : +33 4-76-82-42-01)

The XRF micro-probe technique developed in the ID21 beam-line of the European Synchrotron Radiation Facility is mainly devoted to sulfur studies. This methodology was recently adapted to ice samples *(Fourcade et al., 2005)* and used to investigate the ice accreting at the ice-water interface of the sub-glacial lake Vostok (Antarctica) providing innovating and useful information on ice properties and on mechanisms involved in ice formation *(de Angelis et al., 2005)*. Information from basal ice studies may be useful for ice flow modelling, core dating as well as the understanding of bedrock properties. We present here data concerning the EDC (Dome Concordia, Antarctica) basal ice, where fine inclusions were observed.

One sample containing a visible inclusion has been carefully investigated. Ice was very clean outside the inclusion. We observed in the inclusion very fine aluminosilicate particles coexisting with scattered agregates of much larger calcite particles which exhibit homogeneous sizes and regular shapes. This strongly suggests that pure calcite was produced by in situ precipitation processes following the long term migration and pre-concentration in quasi-liquid phase of soluble calcium rich dust. Most of the calcite particles were partly covered by gypsum due to interaction with sulphuric acid mostly of biogenic origin also pre-concentrated in the inclusion. While large concentrations of methane-sulphonate were found by ion chromatography in basal samples, only sulphate forms were found in the inclusion, indicating that long term redistribution does not influence in the same way all sulphur species. Lastly, successive carbonate precipitation and acidic attack may have had an impact on the CO_2

ice content which remains to be evaluated.