Summary report of the ACIA2 project:

Processing and archiving of long-term monitoring data of fast ice thickness and ice distribution in Kongsfjorden

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Throughout a 2-month period in the second half of 2005, Kongsfjorden sea ice data were processed and archived, according to the proposal which was submitted in summer 2005. The processing of the data included digitizing of ice maps, calculation of ice extent time series in defined areas within Kongsfjorden, and implementation of snow and ice thickness from *in situ* measurements in those datasets. As a result, total ice extent and ice mass balance data could be calculated from the monitoring measurements (see examples for 2004 in Figs. 1 & 2).
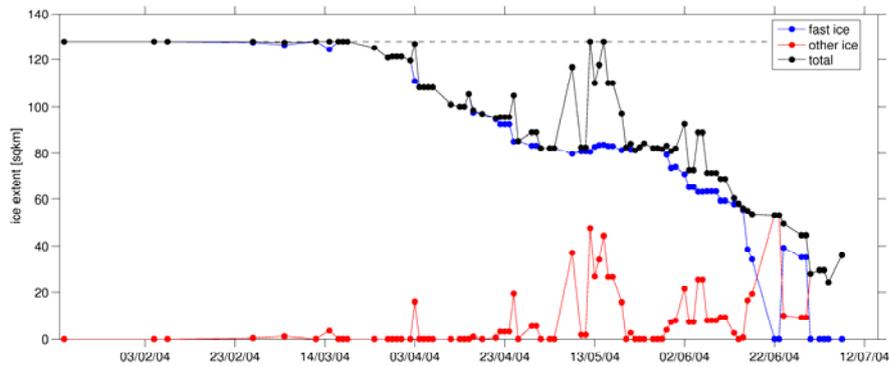

Fig. 1: Ice extent for inner Kongsfjorden in winter and spring 2004. See legend for ice types.
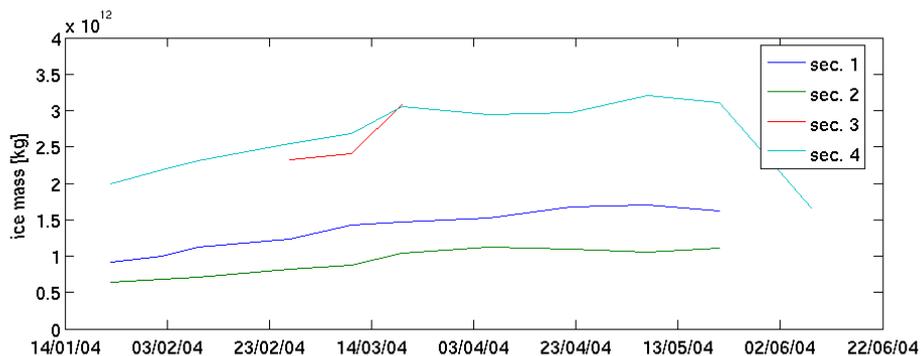

Fig. 2: Ice mass time series for Kongsfjorden in winter and spring 2004.

The entire inner part of Kongsfjorden was covered by fast ice in early 2004 until late March. However, the maximum ice mass was reached in May, showing that in that case the ice thickness is contributing more to the ice mass in Kongsfjorden than the ice extent. Corresponding calculations were also done for 2003 and 2005.

The work in this ACIA2 project also improved the ongoing monitoring, since during processing issues became visible where improvements can be applied. As an example, the

nomenclature for observing and drawing ice maps from Zeppelinfjellet by NPI engineers was modified and simplified, allowing for better ice classification, and data processing and archiving. The project work leaves also the tools and programs which were applied, as a legacy for the processing of data in the years to come.

A scientific publication about the results from the years 2003-05 is now accepted for publication (Gerland and Renner, Annals of Glaciology Vo. 46), and a poster was presented at the IGS Conference on "Cryospheric Indicators for Global Climate Change", in Cambridge, UK in August 2006.

In the further work, the role of fast ice formation for the freshwater cycle at Kongsfjorden can be quantified by further processing of ice mass balance data, using existing knowledge of the salinity depth structure vs. time in Kongsfjorden (e.g. Gerland et al. 1999, Nicolaus et al. 2003; Gerland et al. 2004). In general, the main aim regarding the fast ice monitoring in Kongsfjorden is to continue the observations so that the existing time series becomes a long time series, thereby making possible to distinguish between interannual variability and longterm climate variability, and to validate models. Only with long time series individual years can be characterized relative to other years in the past.