Summary of lecture by Tore Furevik

The Blue Arctic - projections and implications from reduced Arctic sea ice

1) Recent changes in Arctic sea-ice
   - Arctic sea-ice extent has decreased during the last 30 years, reaching an observed minimum in September 2007.
   - The reduction is observed in all seasons.
   - Accelerated decline during the last decade.
   - Sea-ice thickness is also reduced; modal thickness being 0.9 m in 2007 compared to 2.5 m in 1991 (Haas et al., 2008).

To understand the recent sea-ice decline and especially the 2007 minimum, several candidates were examined. Anomalous atmospheric circulation with a strong high over western Arctic and a low over the Eurasian Arctic lead to warmer air masses being imported from the Pacific (Kay et al., 2008), but also higher wind speeds which caused strong ice export through the Fram Strait (Smedsrud et al., 2008). In addition, more heat was also advected towards the Arctic by the different branches of the Norwegian Atlantic Current (Skagseth et al., 2008).

2) Towards a blue Arctic
   - IPCC models do not capture recent trend in Arctic sea-ice.
   - Abrupt features ('tipping points') common in model simulations related to the ice-albedo feedback and increased oceanic heat transport (Holland et al., 2006).

3) Impacts on air-sea interaction
   - A reduced sea-ice cover will have numerous impacts on air-sea interactions including vertical mixing, heat- and CO_2 fluxes, and the location of deep (dense) water production.

4) Implications for lower latitudes
   - Despite that Arctic sea-ice covers only 3% of the global area in winter, changes in ice extent affects atmospheric circulation (e.g. Kvamstø et al., 2004) and northern hemisphere temperature and precipitation (Chiang and Bitz, 2005).
   - Reduction of sea-ice in largest in summer, but influence on heat fluxes is largest in winter due to the atmosphere-ocean temperature gradient (Bader and Seierstad, 2008).
   - A more seasonal Arctic ice cover might stabilize the Thermohaline circulation due to more brine release during ice growth.