Regional sea ice outlook for Greenland Sea and Barents Sea - update based on data until the end of June 2012

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The monthly mean sea ice extent for June 2012 based on Norwegian ice charts produced primarily from passive microwave satellite data and supplemented with high resolution SAR imagery since 2007, is compared with the corresponding monthly means for June for the years 2008-11 (Fig. 1), and with 30, 20, and 10 year averages for monthly means for the periods 79-08, 80-99 and 99-08 (Fig. 2). The sea ice regimes in the Greenland Sea and in the Barents Sea are substantially different. Sea ice in the Greenland Sea is dominated by ice drifting with the Transpolar Drift and the East Greenland current out of the Arctic Basin southwards (see e.g. Spreen et al. 2009; Vinje et al. 1998), whereas sea ice in the Barents Sea consists to a high degree of seasonal ice formed in the same area during the past winter (see e.g. Vinje and Kvambekk 1991).

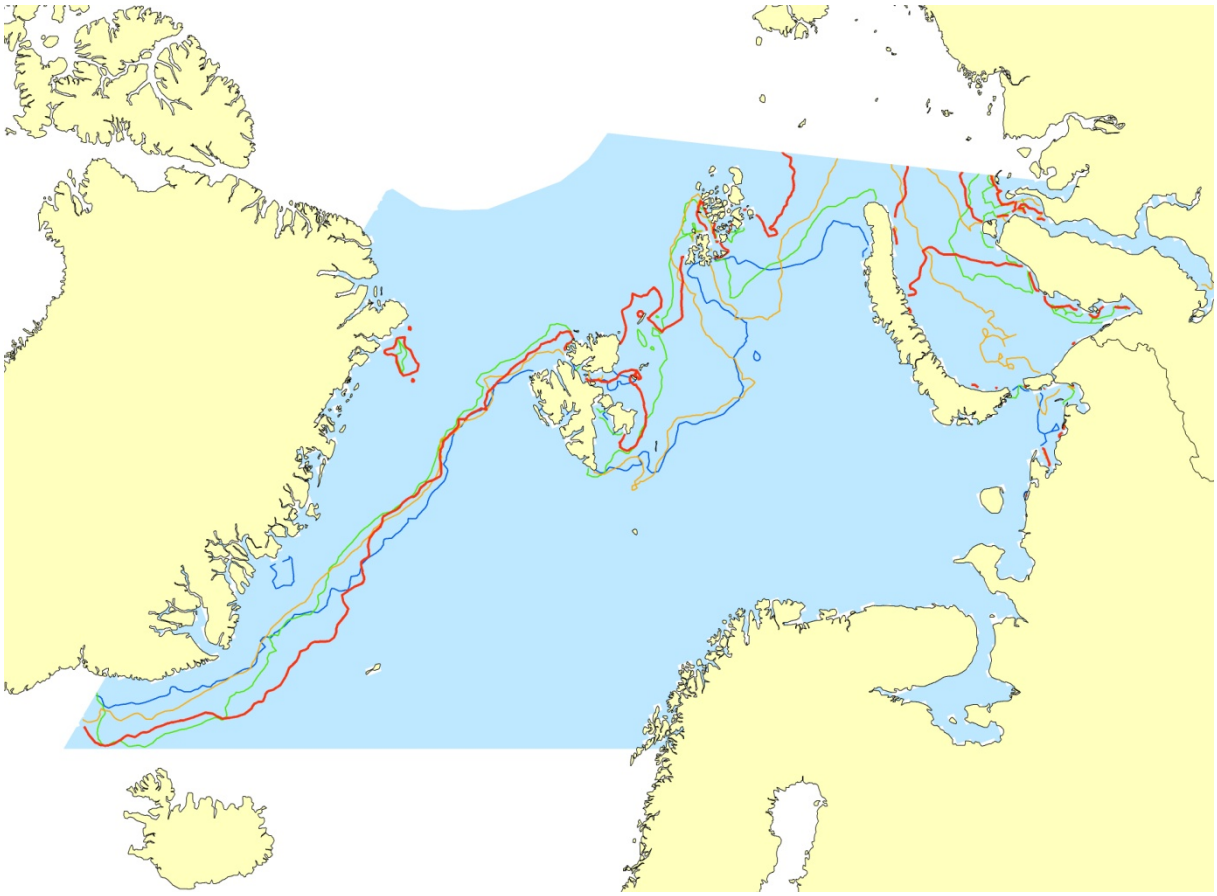

Fig. 1: Ice extent (monthly means, June) southern border of 30% ice concentration, in the Greenland Sea / Fram Strait and Barents Sea, based on passive microwave satellite data (red = June 2012, orange = June 2011, green = June 2010, blue = June 2009).

Sea ice extent in Fram Strait was larger in June 2012 in the south, but otherwise similar to recent years (Fig. 1). On a regional scale, there is relatively little variability in Fram Strait sea ice extent for June during the last four years, except the south and close to Svalbard. Near Svalbard, the June 2012 data in the map (Fig. 1) shows open water up to Nordaustlandet, similar to June 2010.

In the Barents Sea, June 2012 has least ice compared to earlier recent years (Fig. 1). Between Svalbard and Franz Josef Land, extent is most similar to June 2010, however, the area close to east Svalbard shows even less ice than two years ago. East of Franz Josef Land, the extent is lower than all three previous years (June data). Here, the ice edge extends far into the Kara Sea and towards the transition to the Arctic Basin in the north. The development fits to the observations from earlier this year with least ice extent near Novaja Semlja.

When comparing the ice extent from this year with decadal and multi-decadal means (Fig. 2), the Fram Strait exhibits only very little variation. The extent for June 2012 is larger than decadal means in the south, and less near Svalbard, otherwise differences are insignificant. In the Barents Sea, June 2012 extent is substantially less than the decadal means for June, however, this intercomparison has to be taken with care, since characteristics from monthly means and decadal means from monthly mean data cannot be compared directly. From the data for individual years (Fig .1 and earlier regional outlook contributions) we know that the interannual variability for that subregion is high.

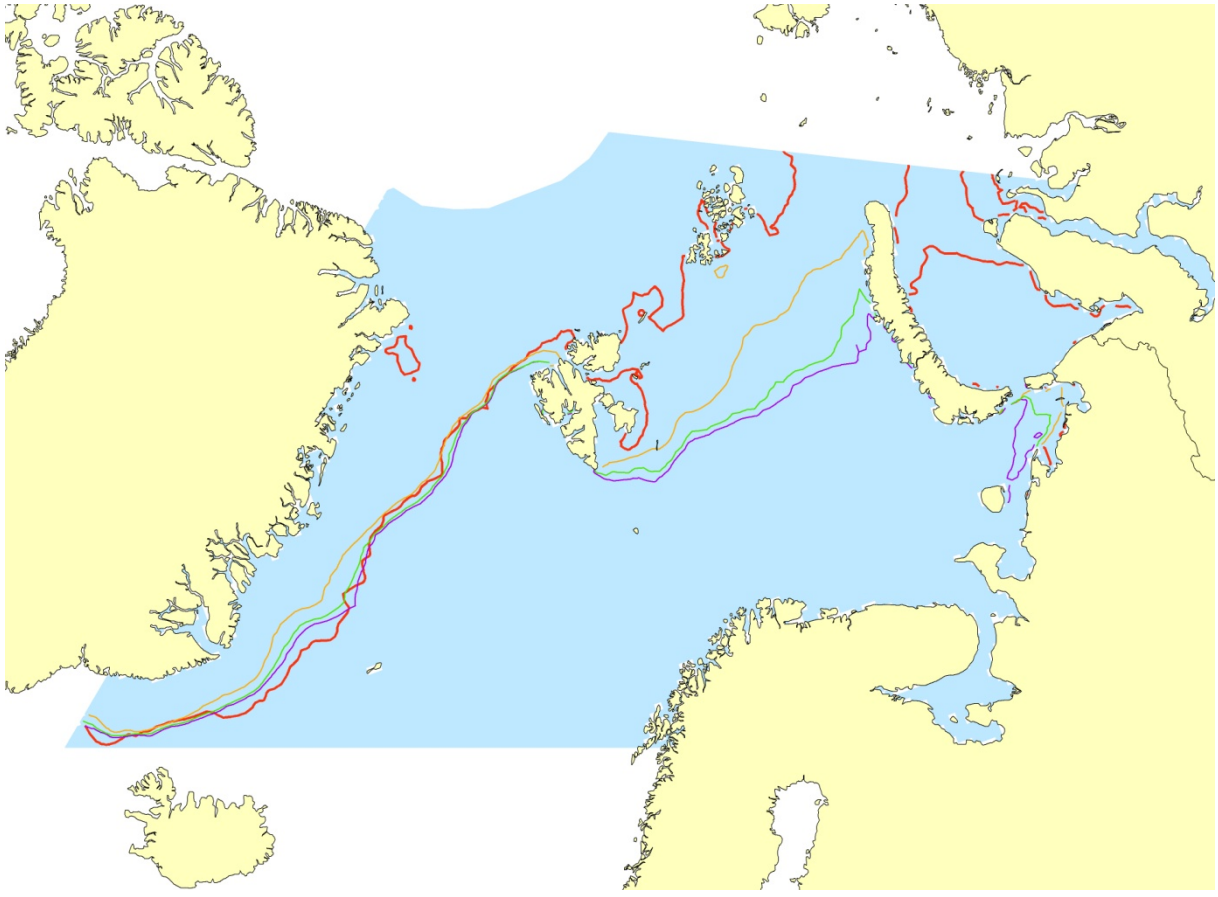

Fig. 2: Ice extent (monthly means, June) southern border of 30% ice concentration, in the Greenland Sea / Fram Strait and Barents Sea, based on passive microwave satellite data (red = June 2012, orange = mean June 1999-2008, purple = mean June 1980-1999, green = mean June 1979-2008).

Ice concentration data from the Norwegian Ice Service ice charts were analysed to produce monthly ice area values for the Svalbard region, 0° to 40° East longitude, 72° to 82° North latitude. These were compared against climatic variables, including sea surface temperature (SST) for the West Spitsbergen Current, and Arctic Oscillation (AO) index values, to develop a linear regression model for future ice area from which the prediction for September ice area for the area is derived.
Monthly SST data was acquired from the NOAA Extended Reconstructed SST V3b (http://www.esrl.noaa.gov/psd/data/gridded/data.noaa.ersst.html) dataset, and AO index values from the NOAA National Weather Service (NWS) Climate Prediction Center (CPC) (http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/ao.shtml).
Data was input into the Weka data mining software (http://www.cs.waikato.ac.nz/ml/weka/) to experiment with different methods for predicting future ice area values. The time series extension to this software provides a linear regression model to determine the best fit to the data by predictor variables at large number of time lags. Sea ice area for the Svalbard area evaluates as:

ist_svalbard =	0.182	* Month=oct,jul,nov,jun,dec,jan,may,feb,apr,mar +
	-0.1197	* Month=jul,nov,jun,dec,jan,may,feb,apr,mar +
	0.2615	* Month=nov,jun,dec,jan,may,feb,apr,mar +
	-0.1153	* Month=jun,dec,jan,may,feb,apr,mar +
	0.1132	* Month=dec,jan,may,feb,apr,mar +
	-0.0737	* Month=may,feb,apr,mar +
	0.0522	* Month=feb,apr,mar +
	0.7751	* Lag_ist_svalbard-1 +
	-0.1102	* Lag_ist_svalbard-2 +
	0.0734	* Lag_ist_svalbard-4 +
	0.0689	* Lag_ist_svalbard-10 +
	0.0847	* Lag_ist_svalbard-11 +
	-0.1044	* Lag_ist_svalbard-12 +
	2.5	

For September 2012 this produces a prediction of 164,313 km^2. This would be the seventh lowest ice area for the Svalbard area in the 46-year record.

References

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Erratum in previous outlook contribution (regional outlook based on April and May data 2012): Figures are partly mixed up in in-text citations, however, the figure captions do fit to the respective figures. We apologize.