

# July 2014 Sea Ice Outlook – AWI/OASys contribution

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## 1. Extent Projection

We estimate a monthly mean September sea-ice extent of  $3.87 \pm 0.38$  million km<sup>2</sup>.

## 2. Methods/Techniques

Sea ice-ocean model ensemble run

## 3. Rationale

For the present outlook the coupled ice-ocean model NAOSIM has been forced with atmospheric surface data from January 1948 to July 6<sup>th</sup> 2014. This atmospheric forcing has been taken from the NCEP/NCAR reanalysis (Kalnay et al., 1996). The ensemble model experiments all start from the same initial conditions on July 6<sup>th</sup> 2014. The model system is unchanged since the last year's outlook (see the reports). Compared to the NSIDC ice extent the simulated extent is underestimated in the mean by about 0.18 million km<sup>2</sup>. This bias is added to the ensemble prediction. Likely reasons for the bias are imperfections in sea ice-ocean model and the atmospheric forcing.

We use atmospheric forcing data from each of the years 1994 to 2013 for the ensemble prediction and thus obtain 20 different realizations of sea ice development for the summer of 2014. The use of an ensemble allows to estimate a probability of sea-ice extent minimum value in September 2014. The simulated ice extent for all 20 realizations is shown in Figure 1 for the period from July 6<sup>th</sup> (initialization) until end of September.

The ensemble mean of the (bias corrected) mean September value is 3.87 million km<sup>2</sup>. The ensemble standard deviation is 0.38 million km<sup>2</sup> which we provide as uncertainty estimate of the prediction. These values are pretty close to those of the June outlook 2014.

**Kalnay et al. (1996)**, The NCEP/NCAR 40-year reanalysis project, Bull. Amer. Meteor. Soc., 77, 437-470.

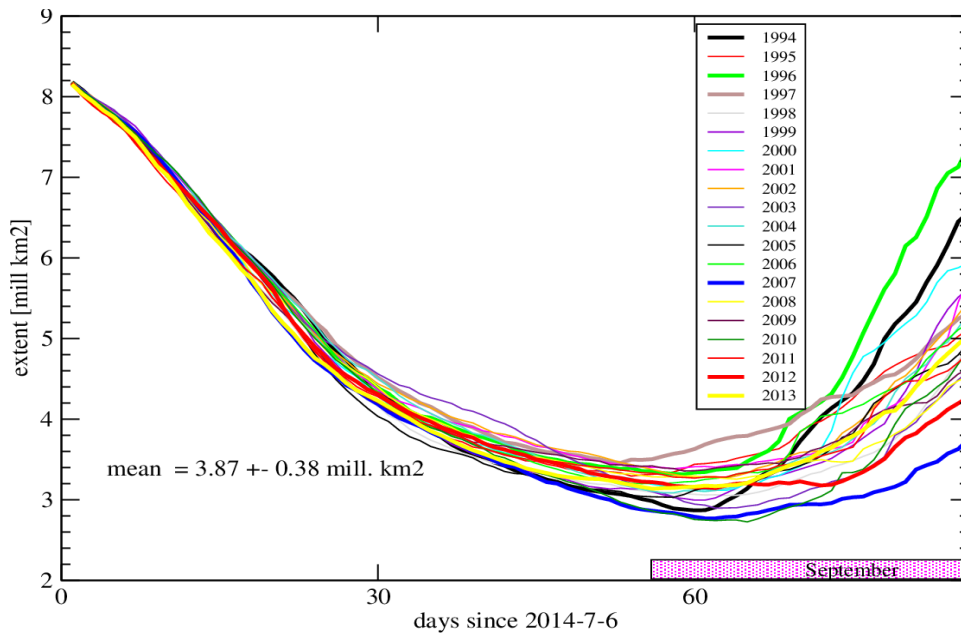


Figure 1: Simulated evolution of the ice extent [million km<sup>2</sup>] when forced with atmospheric data from 1994 to 2013 until end of September. The abscissa gives the days since the initialization of the forecast on July 6<sup>th</sup> 2014. Model-derived ice extents are averaged over day 57 to 86 (magenta box) and have been adjusted assuming a bias (see text).