

# Sea ice outlook 2012

July Report based on June Data

Alexander Beitsch, Lars Kaleschke, Stefan Kern

Institute for Oceanography, KlimaCampus, University of Hamburg

Contact: lars.kaleschke@zmaw.de, Tel. +49 40 42838 6518

July 5, 2012

## 1 Extent Projection

We estimate a September 2012 monthly mean extent of  $5.0 \pm 0.4$  million square kilometers.

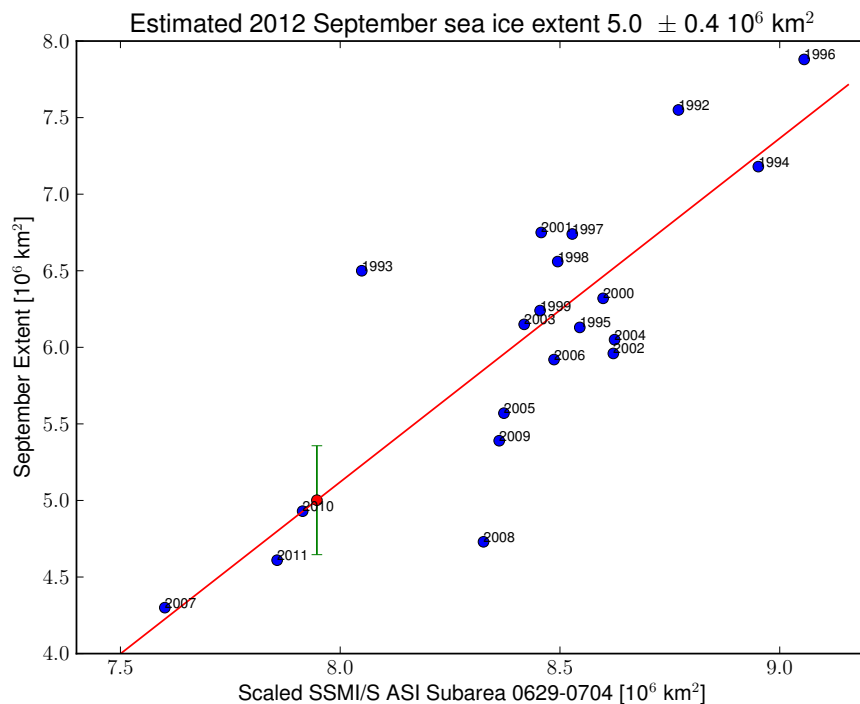


Figure 1: September 2012 sea ice extent estimate.

## 2 Methods and Techniques

The estimate is based on SSMI/S and SSM/I sea ice concentration data on a 12.5 km grid derived using the ARTIST Sea Ice (ASI) algorithm (Spreen et al., 2008; Kaleschke et al., 2001). We used two different sea ice concentration data sets: one based on SSM/I sea ice concentrations for the years 1992–2011 (see <http://cersat.ifremer.fr/>); sea ice concentrations for 2012 are based on near-real-time SSMI/S sensor data records (see Figure 2). A five day median filter is applied to the data to reduce noise from atmospheric influence and to fill possible data gaps. Thus, any dates given below are not exactly for the individual day but include the previous four days.

To obtain an estimate, we regress the ice area from the Arctic subregion shown in Figure 3 with the previous years and their September mean extents. As shown in Figure 3, the considered region contains the central Arctic and some of the Arctic marginal seas but excludes the multi-year sea ice region north of Greenland and the North Pole. To be able to regress the near-real-time SSMI/S sea ice area with the mean September sea ice extent two scalings are applied: first, the 11–15 September five day median filtered SSM/I sea ice area of the Arctic subregion for years 1992–2011 are regressed with the according mean September sea ice extent taken from NSIDC (Fetterer et al., 2002, updated 2009) (Figure 4); second, the near-real-time SSMI/S and SSM/I ice concentrations are scaled to each other to account for the small differences between the two datasets (Figure 5). Using these scalings, the mean September sea ice extent is estimated from the current five day median sea ice area and the sea ice area of the same five day period of years 1992–2011 (Figure 1).

## 3 Rationale

The prediction skill depends on the selected training area. The skill increased when we removed some of the seasonal ice covered areas in our analysis.

From previous hindcast experiments we know that reliable forecasts seem to be possible from mid-June onwards. However, some predictive skill exists already at the end of May.

## 4 Executive Summary

The KlimaCampus’s outlook is based on statistical analysis of satellite derived sea ice area. We introduced the following method: use of near-real-time (SSMI/S) sea ice concentration data combined with long data sets (SSM/I: 1992–2011), a time-domain filter that reduces observational noise, and a space-domain selection that neglects the outer seasonal ice zones.

The daily estimate of the September extent, the anomaly of the current day and a time series of daily estimates since May 2012 can be found on our ftp-server: <ftp://ftp-projects.zmaw.de/seaice/prediction/2012/>

*Acknowledgments.* We thank CERSAT (<http://cersat.ifremer.fr/>) for the SSM/I data.

## References

- Fetterer, F., K. Knowles, W. Meier, and M. Savoie (2002, updated 2009). *Sea Ice Index, 1972-2009*. Boulder, Colorado USA: National Snow and Ice Data Center. Digital media.
- Kaleschke, L., C. Lüpkes, T. Vihma, J. Haarpaintner, A. Bochert, J. Hartmann, and G. Heygster (2001). SSM/I Sea Ice Remote Sensing for Mesoscale Ocean-Atmosphere Interaction Analysis, *Can. J. Rem. Sens.*, 27(5), 526-537.
- Spren, G., L. Kaleschke, and G. Heygster (2008). Sea ice remote sensing using AMSR-E 89-GHz channels, *J. Geophys. Res.*, 113, C02S03, doi:10.1029/2005JC003384.

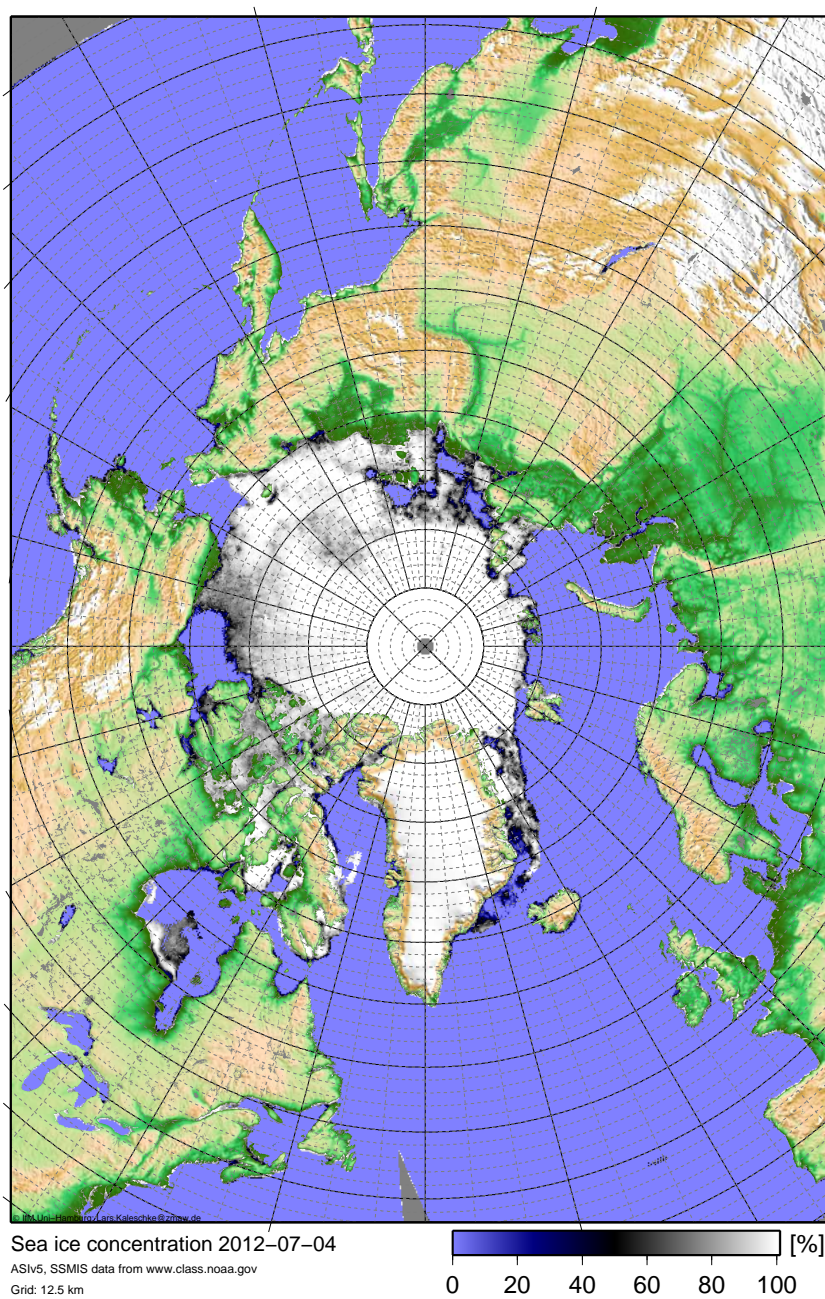


Figure 2: SSMI/S sea ice concentration for July 4, 2012, based on SSMI/S data and processed with ASI algorithm.

Sea ice concentration anomaly 2012-07-04 (5-day median)  
w.r.t. 1992-2011 mean

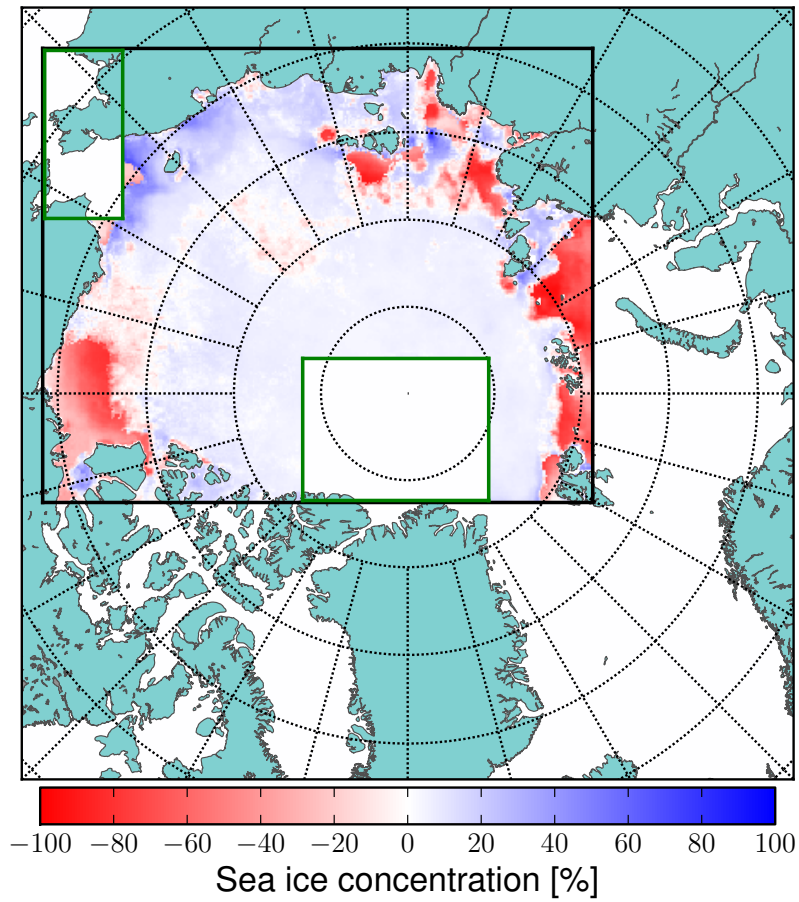


Figure 3: 2012 sea ice concentration anomaly derived from SSM/I and SSMI/S data. The anomaly is calculated with respect to the years 1992–2011. The black rectangle indicates the subset for calculation of the SSMI/S sea ice area. The green rectangles indicate areas that are not taken into account.

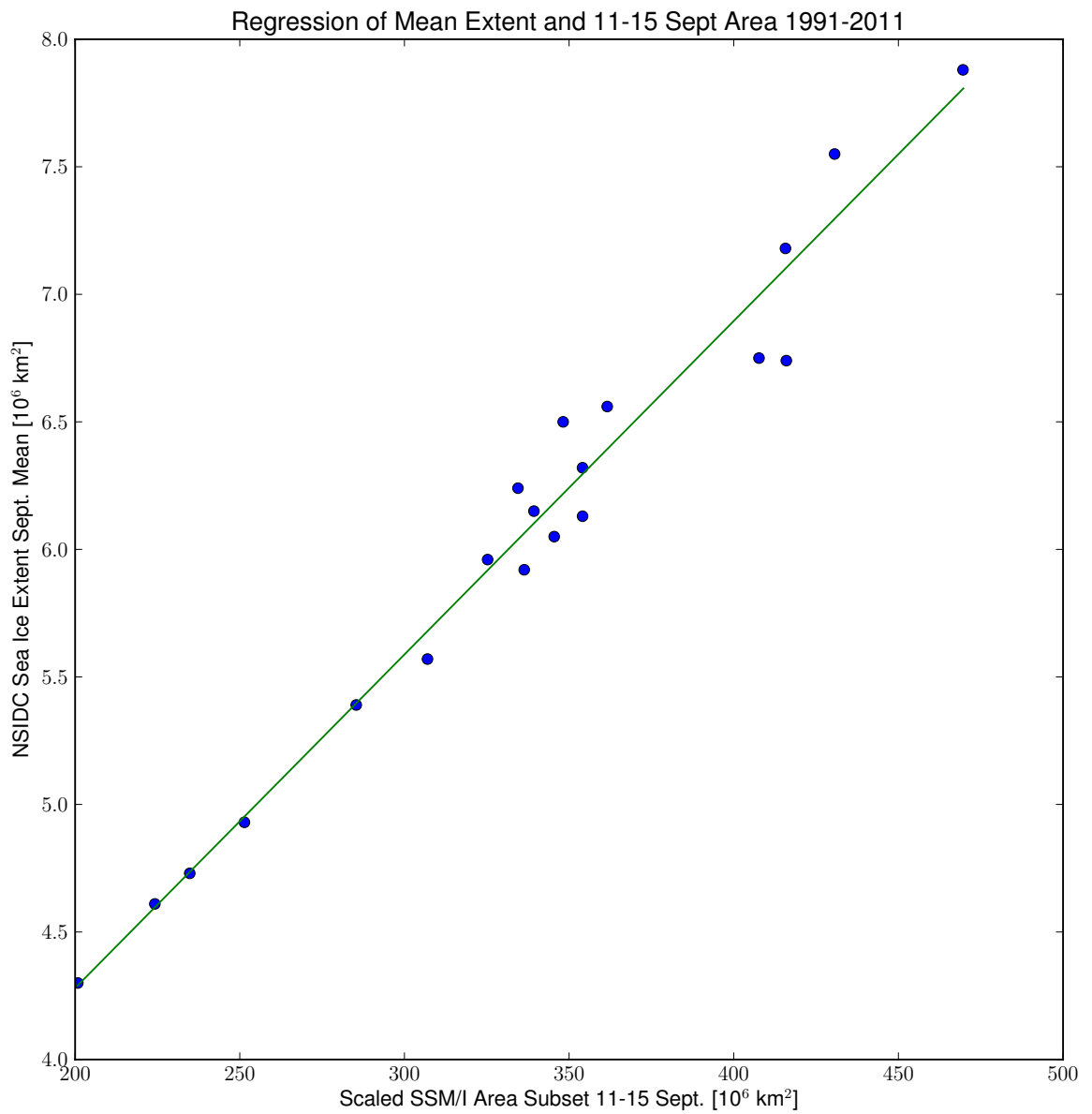


Figure 4: Regression of regional (region shown in Fig. 3) five-day median filtered SSM/I ASI area and total NSIDC September mean extent.

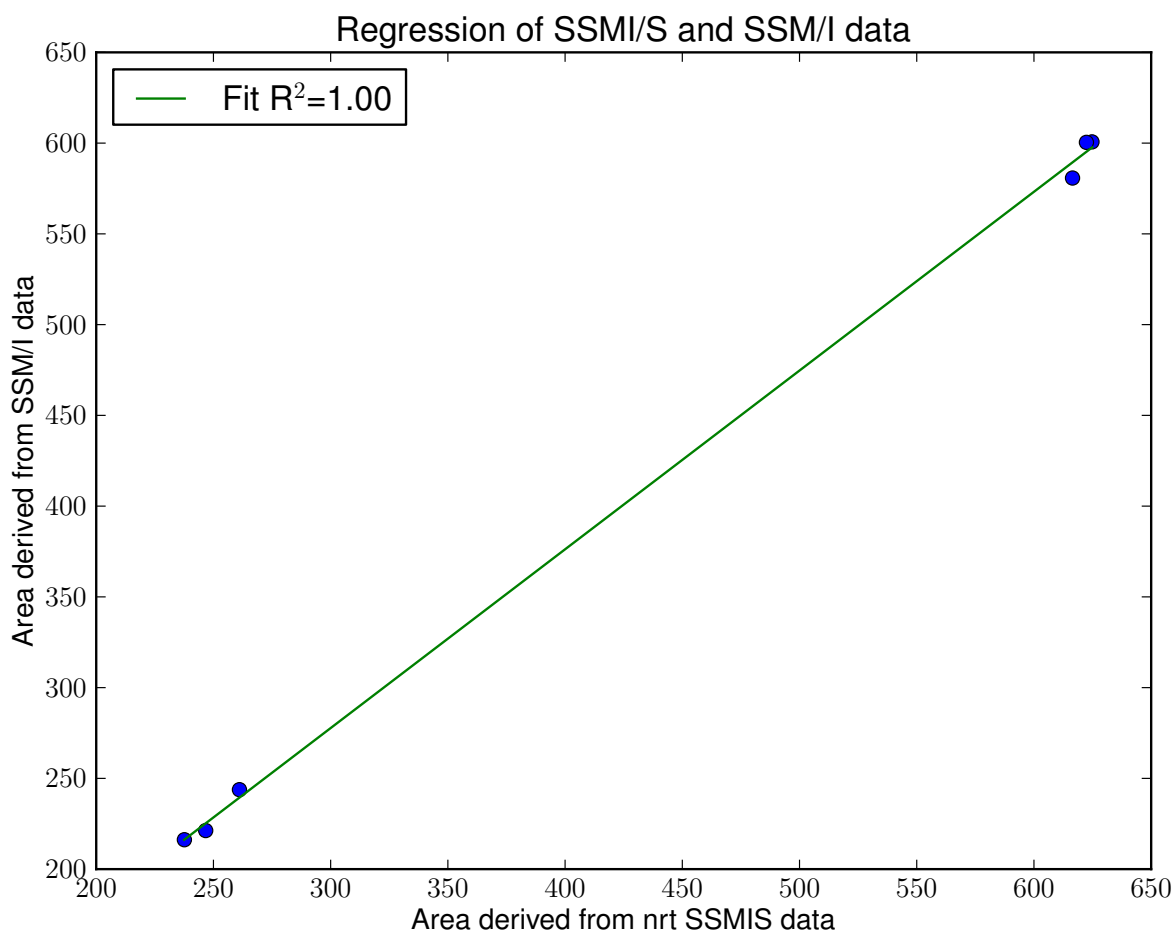


Figure 5: Regression of near real time SSMI/S and SSM/I data.