

Technical Report

Check of 1992-2012 ASI SIC time series for inconsistencies

by Stefan Kern

Date: 2013-03-06

Purpose:

ASI Sea ice concentration data are provided by IFREMER for 1991 until today. Between 2008 and 2009 the sensor changed from SSM/I onboard DMSP-F13 to SSM/IS onboard DMSP-F17. The purpose of this document is to show whether there are inconsistencies at this transition.

ASI SIC as provided with daily temporal and 12.5 km grid cell resolution were

- filtered with a sliding 5-day median filter
- interpolated spatially and temporally to remove most of the gaps and to interpolate missing days

Daily 1992-2012 ASI SIC data were processed. For each hemisphere an area with perennial (persistent) sea ice and an area with seasonal sea ice was selected. Those for the northern hemisphere are located North of Greenland at 85.5N / 97.5W and in the central Hudson Bay at 60.5N / 86.5W; those for the southern hemisphere are located in the southwestern Weddell Sea at 73.5S / 49W and in the southwestern Ross Sea at 75S / 175E. These locations were selected based on sea ice cover movies produced by Felicia at ICDC.

For all 4 locations a 5x5 grid cell box centred at the grid cell closest to these locations (computed with transformation of the lat/lon coordinates into x-/y-coordinates) was used to compute a) the mean SIC, b) the SIC standard deviation SDEV, and c) the skewness of the SIC within this box. Figures 1 and 2 (see below) show the time series of the SIC for the Arctic and the Antarctic locations, respectively.

Next the seasonal cycle is calculated on a daily basis for all four regions for all three parameters. Subsequently the seasonal cycle is subtracted from the actual values to obtain the residuals. The seasonal cycles for northern and southern hemisphere data for SIC and SIC-SDEV are shown in Figures 3-6.

Based on these seasonal cycles the most stable time period of the year in terms of SIC and SIC SDEV was selected; for the northern hemisphere this is February / March, for the southern hemisphere this is July / August. Data of the residuals from these months were extracted and used to compute a mean annual winter-time residuals of the SIC and SIC SDEV as well as the SIC Skewness. These mean values are shown in Figure 7-10; SIC skewness has been omitted. These figures show no indication for a jump or inconsistency between 2008 and 2009, when the transition between DMSP-13 and DMSP-F17 happened.

Results of the comparison is summarized in images in the Check_ASI_ARC.zip and Check_ASI_ANT.zip data archives.

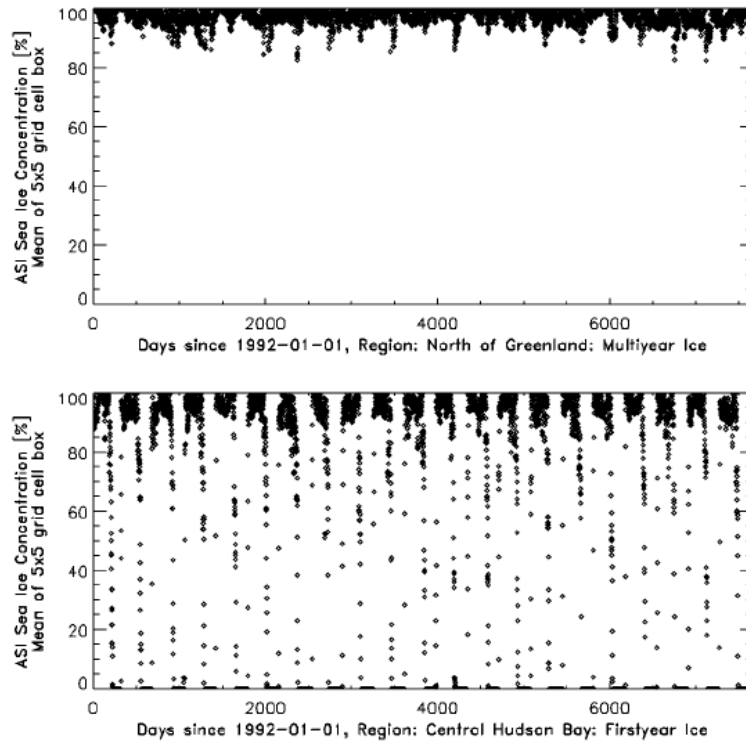


Figure 1: Time series of the mean SIC for the Arctic for the MY ice region (top) and the FY ice region (bottom); length of the time series is 01-01-1992 to 31-12-2012.

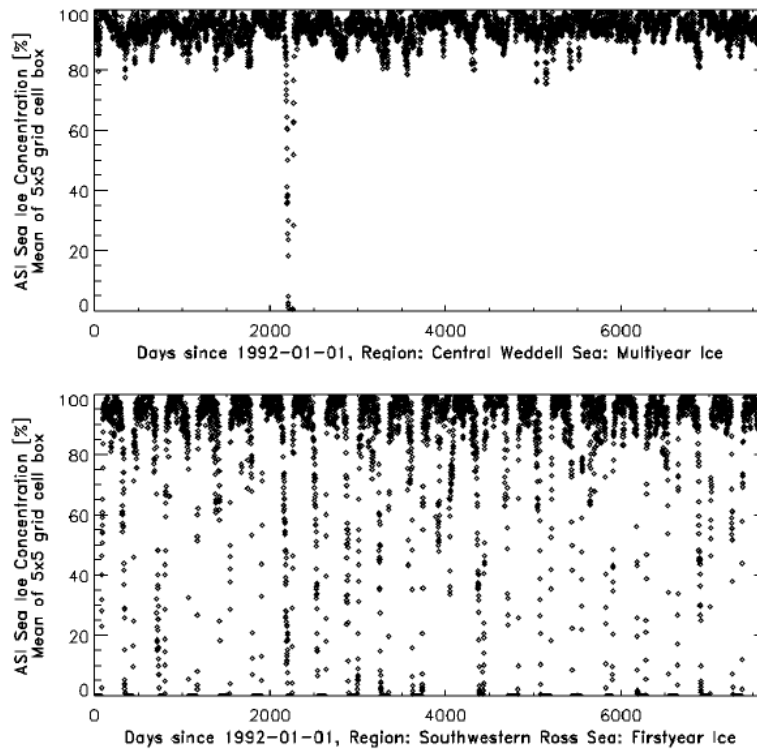


Figure 2: Time series of the mean SIC for the Antarctic for the MY ice region (top) and the FY ice region (bottom); length of the time series is 01-01-1992 to 31-12-2012.

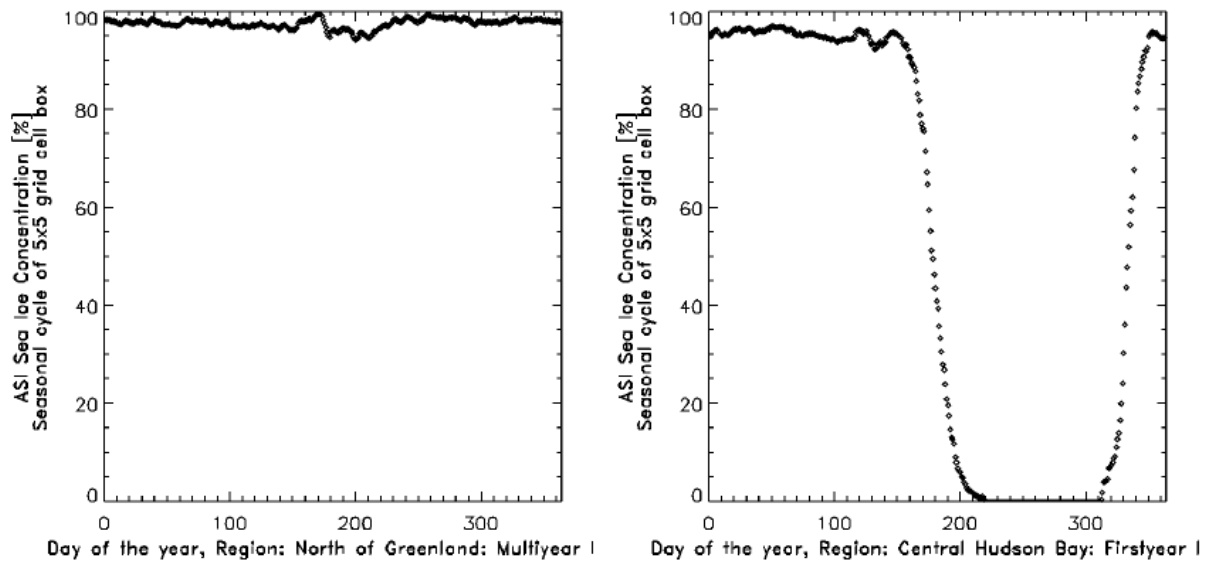


Figure 3: Seasonal cycle of ASI SIC for the Arctic for MY ice (left) and FY ice (right) as computed from 21 years (1992-2012).

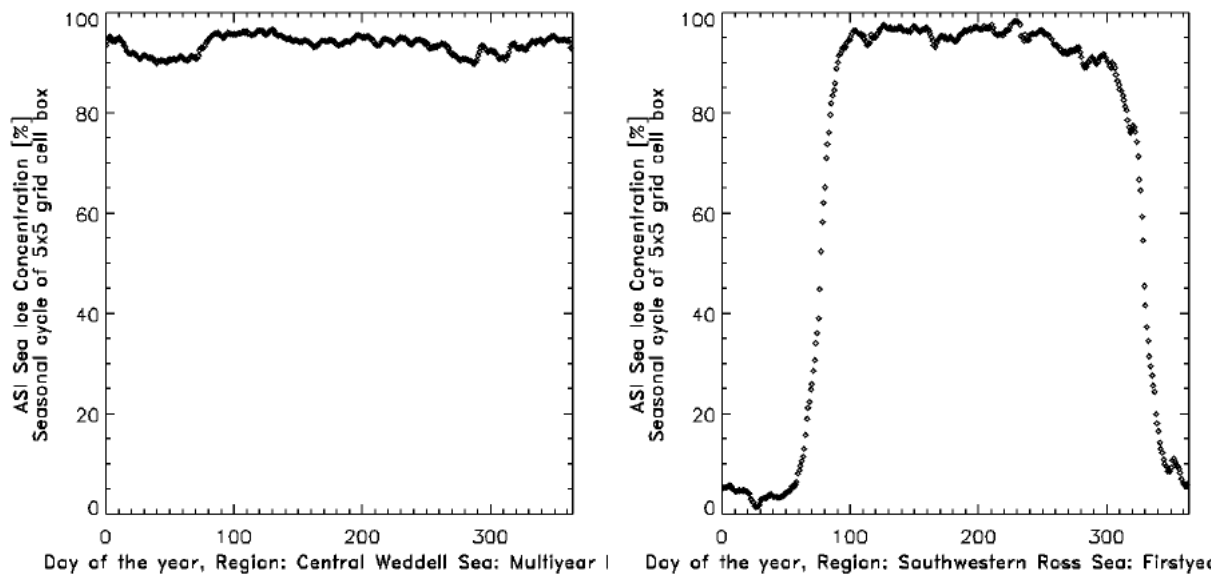


Figure 4: Seasonal cycle of ASI SIC for the Antarctic for perennial ice (left) and FY ice (right) as computed from 21 years (1992-2012).

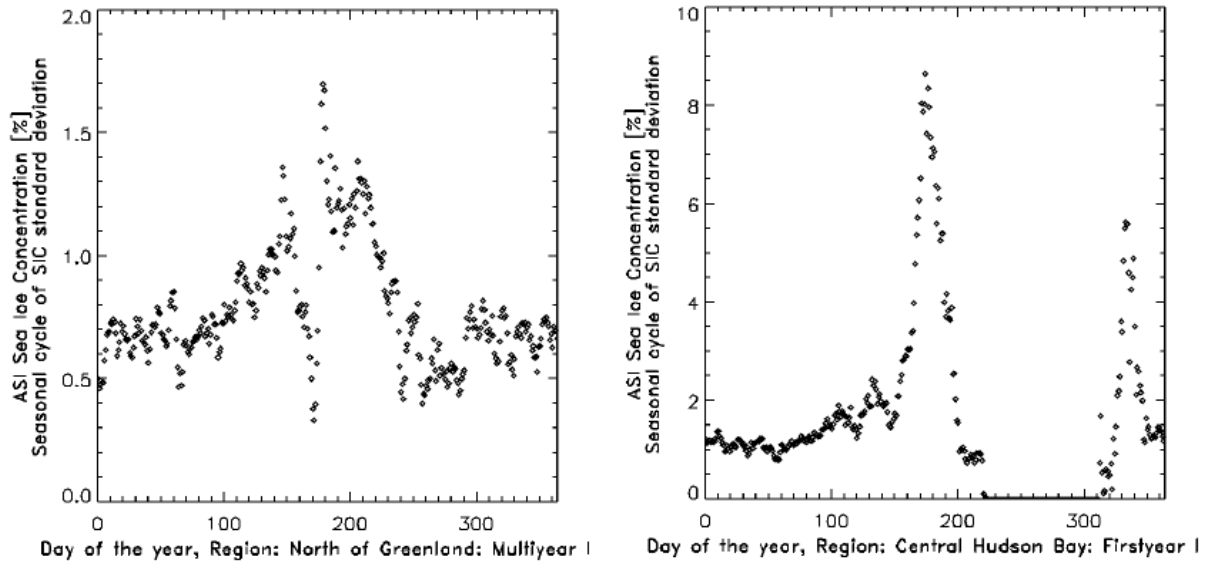


Figure 5: Seasonal cycle of ASI SIC SDEV for the Arctic for MY ice (left) and FY ice (right) as computed from 21 years (1992-2012).

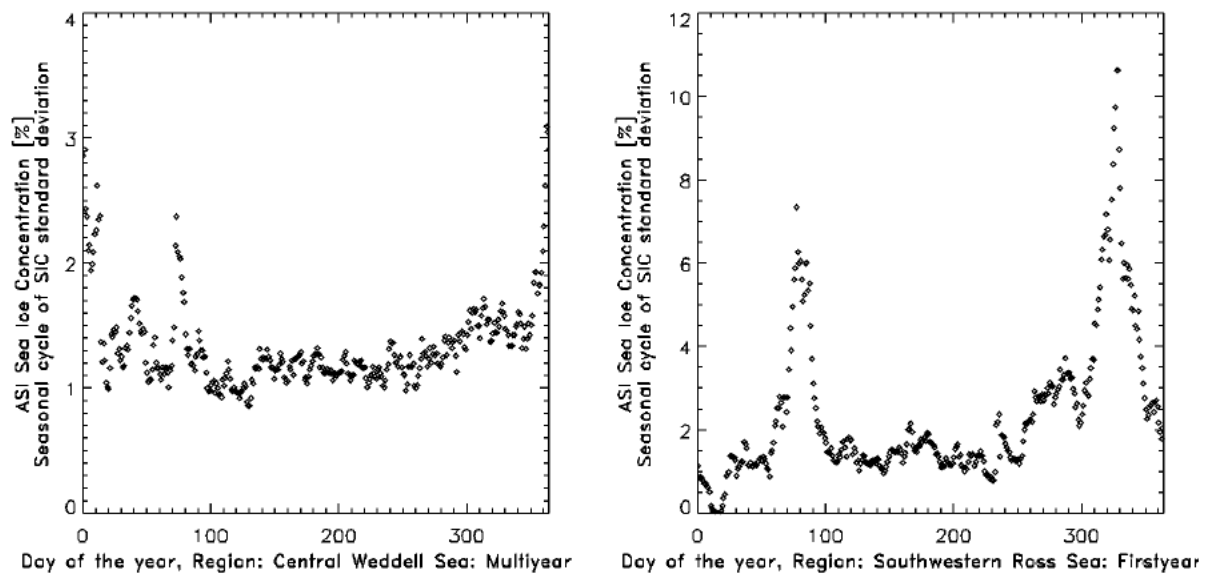


Figure 6: Seasonal cycle of ASI SIC SDEV for the Antarctic for perennial ice (left) and FY ice (right) as computed from 21 years (1992-2012).

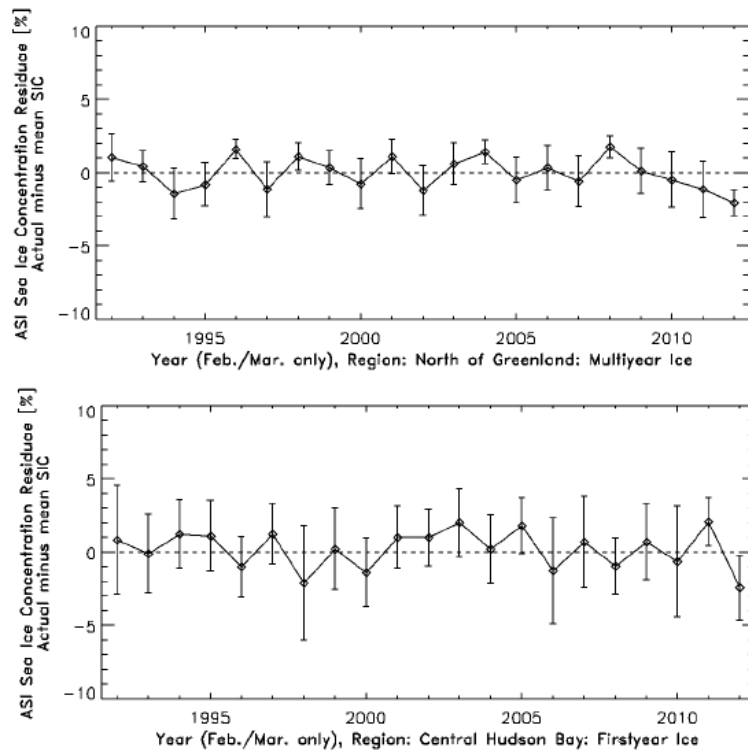


Figure 7: Timeseries of the winter-time (Feb./Mar.) mean residual SIC of ASI SIC for the Arctic for MY ice (top) and FY ice (bottom).

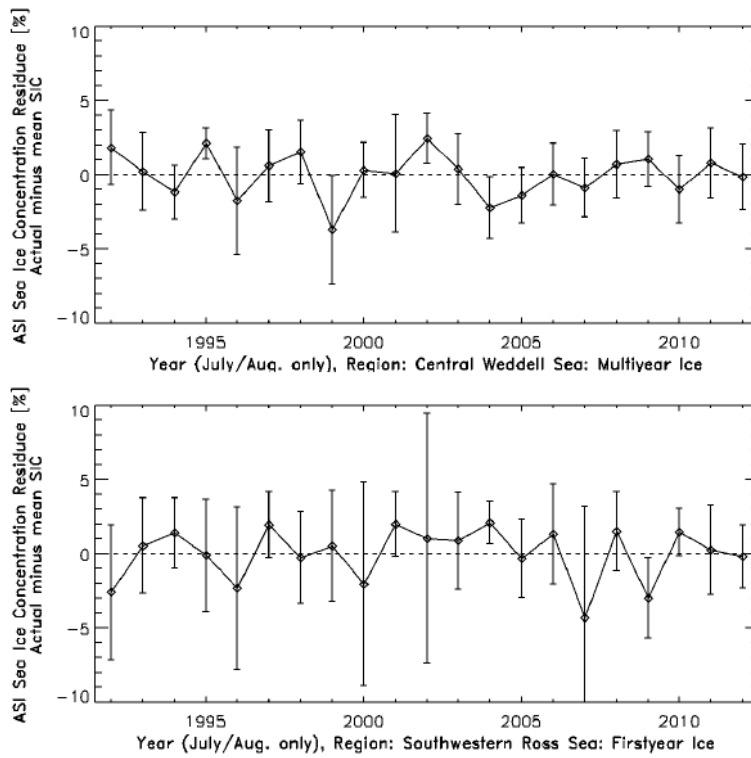


Figure 8: Timeseries of the winter-time (July/Aug.) mean residual SIC of ASI SIC for the Antarctic for perennial ice (top) and FY ice (bottom).

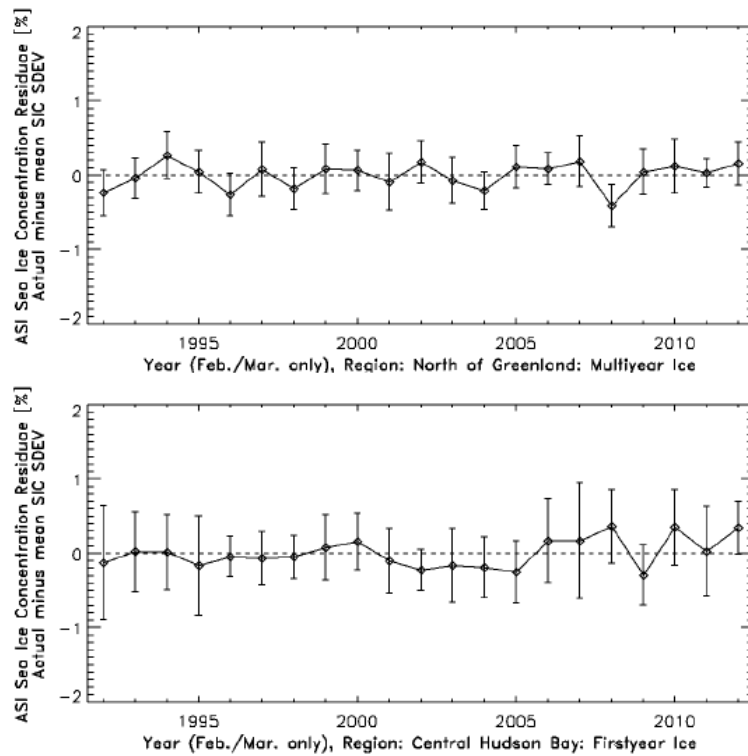


Figure 9: Timeseries of the winter-time (Feb./Mar.) mean residual SIC SDEV of ASI SIC for the Arctic for MY ice (top) and FY ice (bottom).

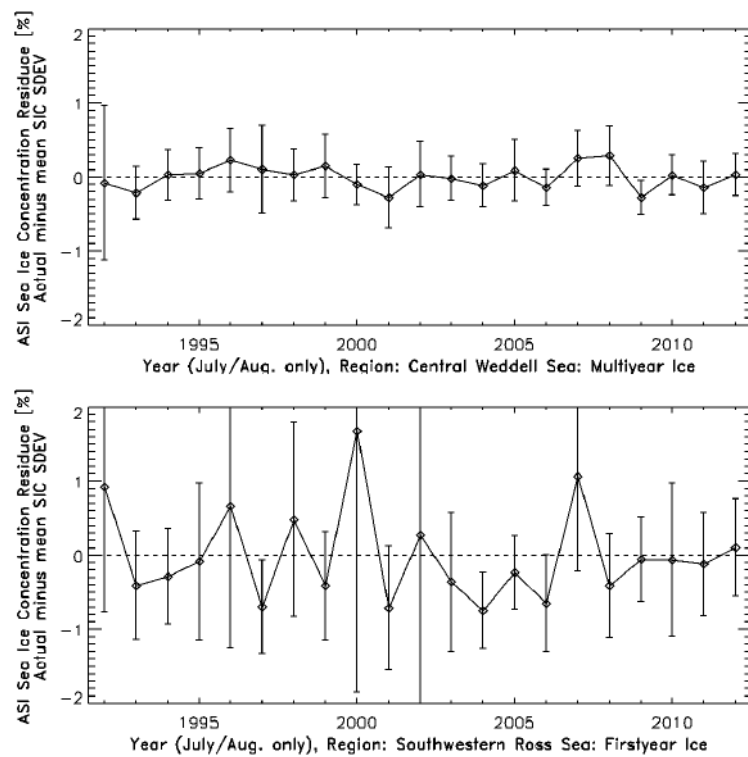


Figure 10: Timeseries of the winter-time (July/Aug.) mean residual SIC SDEV of ASI SIC for the Antarctic for perennial ice (top) and FY ice (bottom).