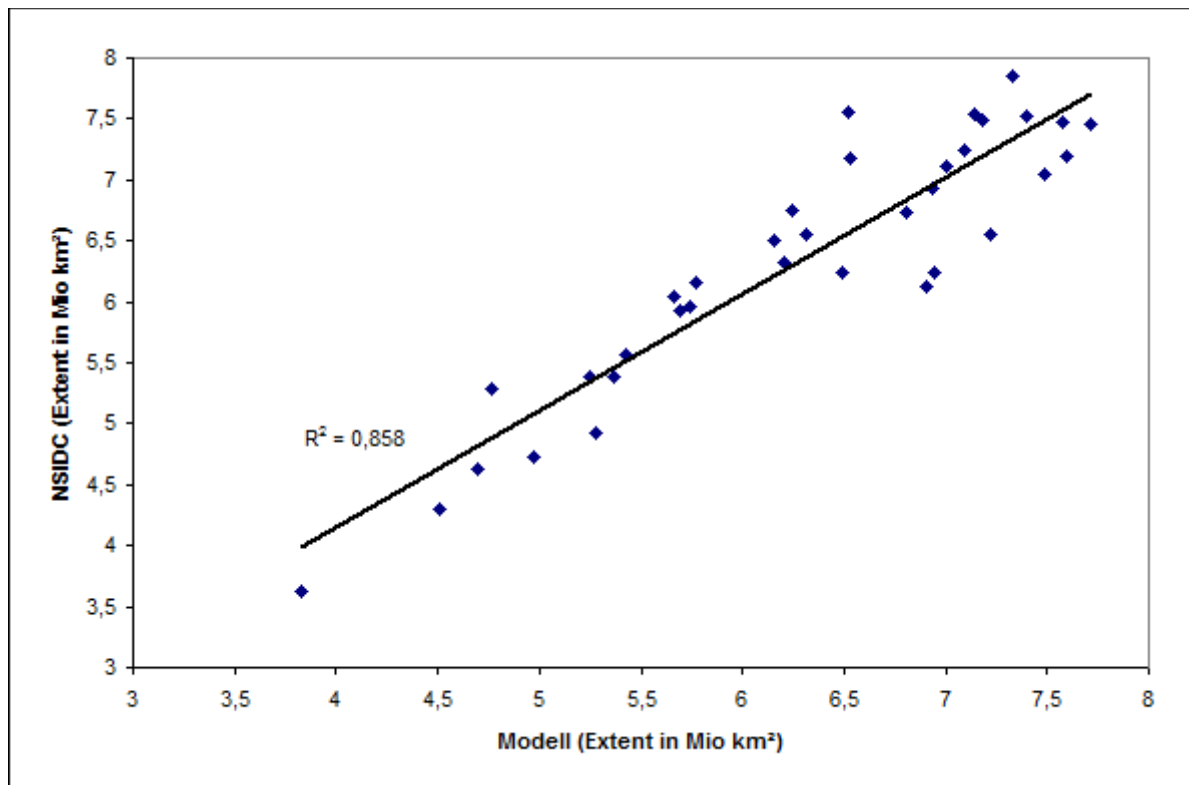


Contribution of Frank Bosse to the Sea Ice Outlook July 2015

As in the last year (<http://www.arcus.org/files/search/sea-ice-outlook/pdf/bosse.pdf>) I used two variables for a forecast of the September 2015 Sea Ice Extent: The Heat Content of the arctic ocean northward 65 deg. N from the summer of 2014 and the amount of sea ice volume (PIOMAS) in the end of the winter (28.2.15).

After using a multiple linear regression and calculating the errors from all the years 1979 to 2014 one gets this relationship:

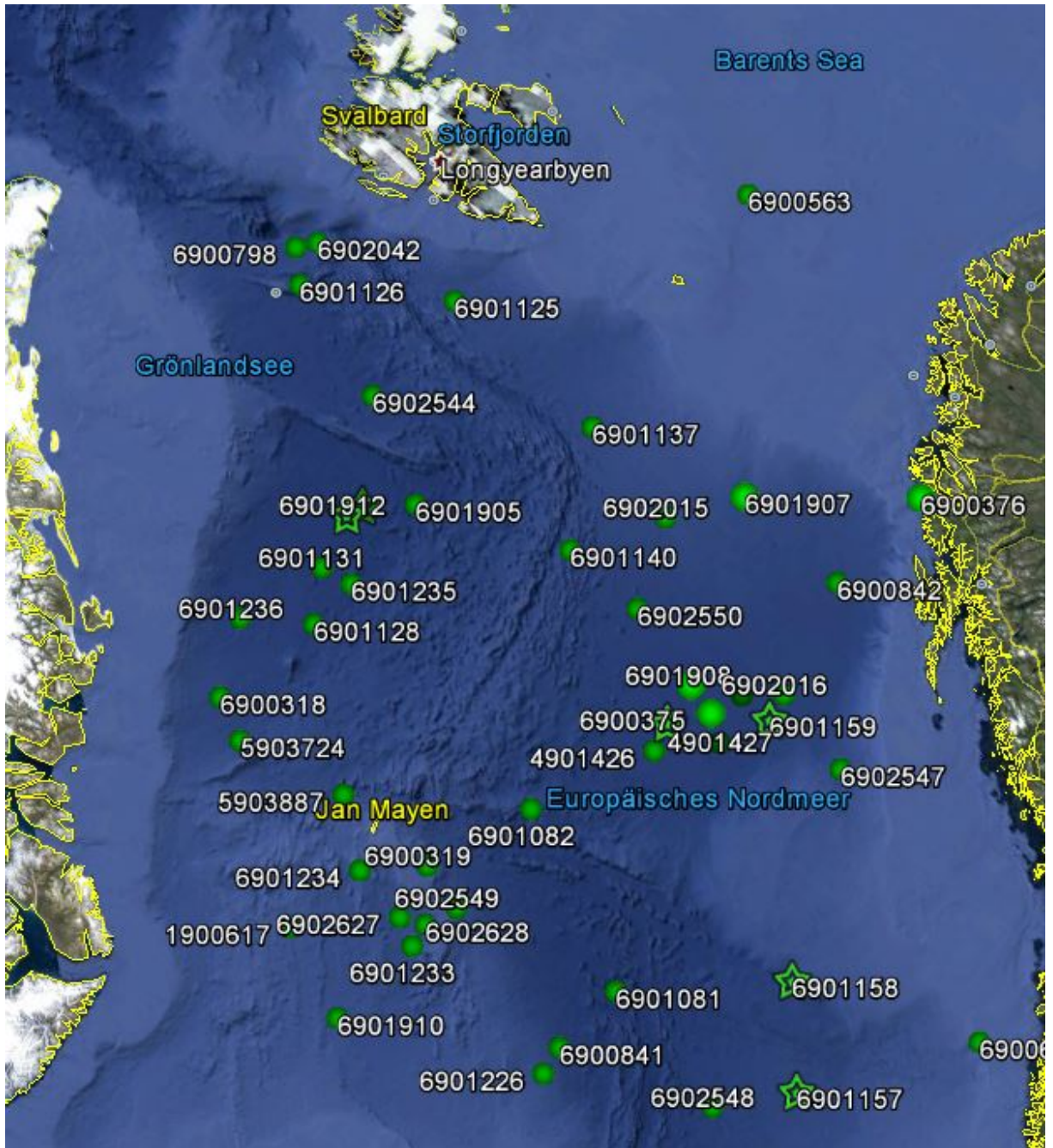


There is only one outlier: 1996.

My forecast for the September Extent is 5.6 +/- 0.4 Mio km². The uncertainty is the standard deviation of the errors.

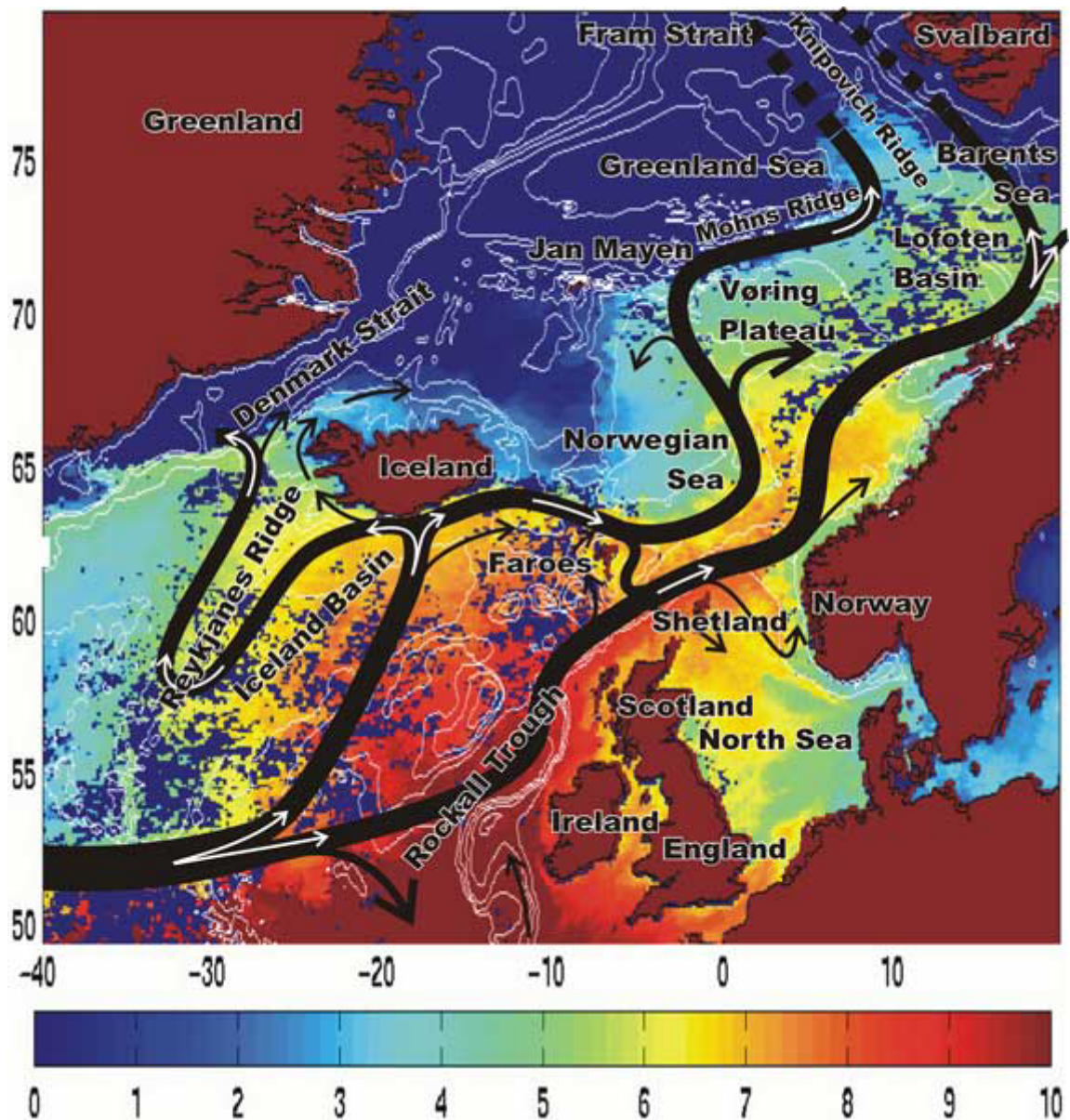
Data acquisition:

The data for the heat content of the upper 700m northward 65° N come from Argo profiling floats in the European part of the arctic ocean.



Source: Google Earth with “Argo Layer”

According to DOI 10.1029/2002GL015002 the floats give a good summary about the inflow of Atlantic waters into the arctic basin:



Source: Orvik, Niiler (2002), Fig. 1

The data are available via "Climate Explorer" (Thanks to Geert Jan van Oldenborgh)

Physical explanation

The influence of the Atlantic inflow on the arctic sea ice is well known, i.e.

http://www.researchgate.net/profile/M_Khutorskoi/publication/257849802_Thermotomographic_Model_and_Oil-and-Gas_Forecasting_for_the_Sedimentary_Cover_of_the_Laptev_Sea_Shelf/links/54e2d8450cf296663797b2c8.pdf

The inflow of Atlantic waters transports 6 Sv (DOI: 10.1007/978-1-4020-6774-7).

These waters are widely transported through almost every part of the Arctic Ocean:

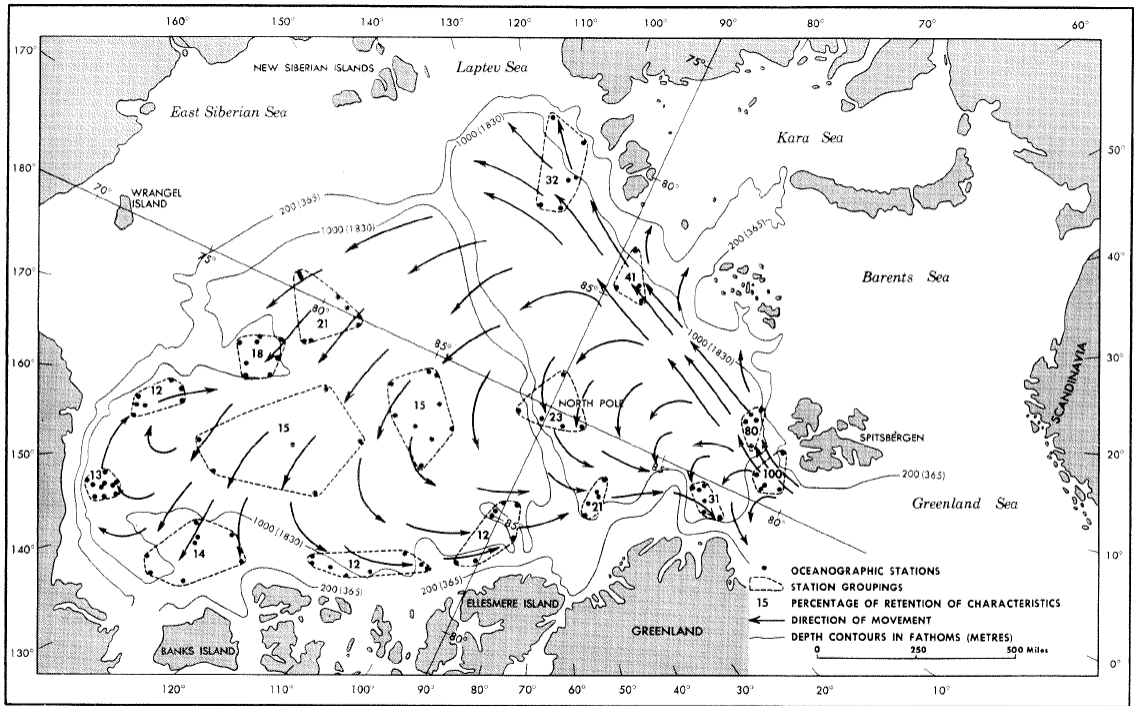
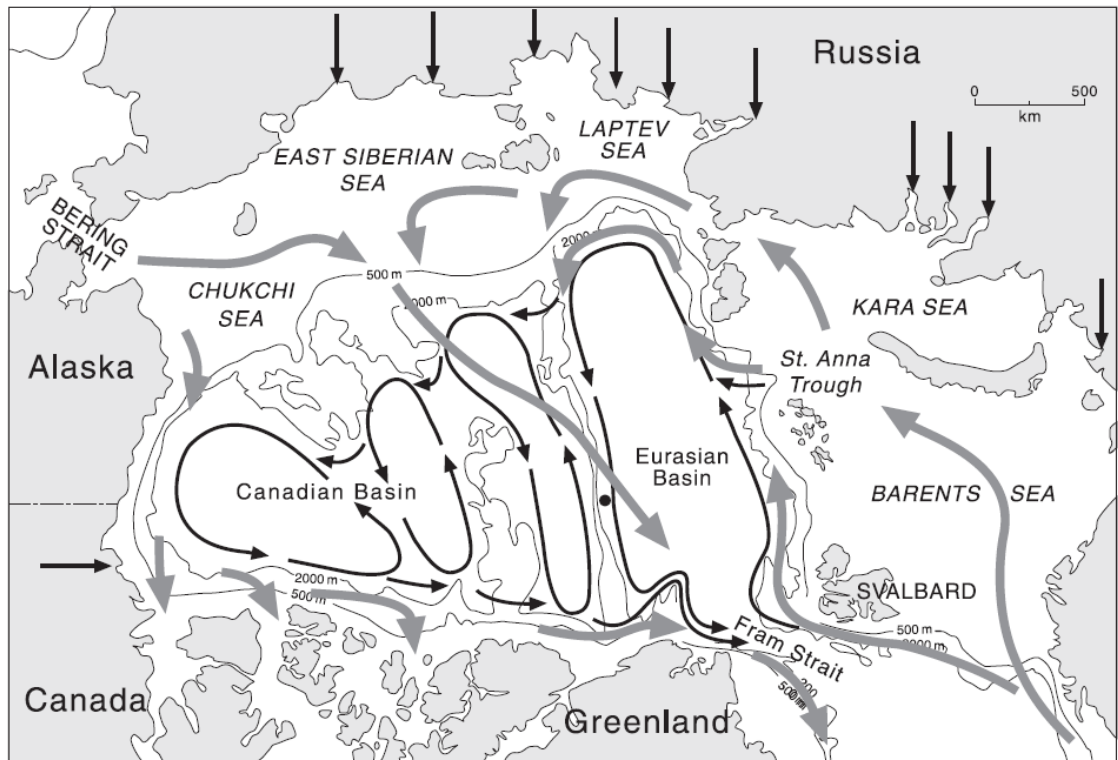


Fig. 3. Circulation of Atlantic water inferred from the percentage retention of characteristics.

Source: <http://pubs.aina.ucalgary.ca/arctic/Arctic16-1-8.pdf>

The inflow through the Bering Street is only local: the Canadian Archipelago is influenced partly, this is a minor part of the arctic.



Source: Jones 2001: Polar Research 20(2)

See also: DOI: 10.1029/2009GL041621

The very important role of the northern Atlantic for the arctic sea ice is also referred in Zhang et.al 1998.

The most important part of the September-sea ice extent depends on the bottom melting (http://psc.apl.washington.edu/zhang/Pubs/Steele_etal_2009JC005849.pdf), only minor on top- melting.

The one year lag is described in <http://www.pnas.org/content/112/15/4570.short> , summary : <http://www.gfdl.noaa.gov/news-app/story.110> where is mentioned a very good agreement of the Sea Ice Extent of the Atlantic part of arctic with the AMOC when AMOC leads by one year (see part 3 of the figure).