

## ***Interactive comment on “The early twentieth century warming and winter Arctic sea ice” by V. A. Semenov and M. Latif***

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Semenov and Latif use the results of a climate model experiment to infer a reduction of Arctic sea ice in the 1920s and 1930s. The experiment was motivated by the purported lack of observational evidence for the sea ice reduction during this time period, when the Arctic warmed substantially.

There are several lines of observational evidence that provide direct support for a large reduction of Arctic sea ice extent in the early 20th Century. The first is provided by Ifft (1922, *Monthly Weather Review*, p. 589), who describes the exceptional ocean state, including reduced sea ice coverage, in the North Atlantic in the early 1920s. To quote Ifft (1922), "The Arctic seems to be warming up. Reports from fishermen, seal hunters, and explorers who sail the seas about Spitzbergen and the eastern Arctic all point to

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a radical change in climatic conditions and hitherto unheard-of high temperatures in that part of the Earth's surface...Ice conditions were exceptional. In fact, so little ice has never before been noted. The expedition all but established a record, sailing as far north as 81 degrees 29' in ice-free waters. This is the farthest north ever reached with modern oceanographic apparatus".

The second line of evidence comes from the synthesis of North Atlantic sea ice data by Divine and Dick (2006, *J. Geophys. Res.*, 111, C01001). The time series of sea ice observed in the Greenland Sea, shown in Figure 6 of that paper, displays a major retreat of the ice edge by about 200 km between 1910 and 1930, particularly in April and June. (The study does not provide time series for the mid-winter months). In comparison with the ice retreat following the Great Salinity Anomaly of the 1960s, Divine and Dick (2006) state "...such a retreat is not something extraordinary over the period considered. An even more abrupt retreat of ice edge was observed in the first half of the 20th century between 1910 and 1940 in April-August in the Greenland Sea and August in the Barents Sea". The authors note that the 1910-1940 had the smallest ice extent since 1850.

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