

Interactive comment on “Observations of water masses and circulation in the Eurasian Basin of the Arctic Ocean from the 1990s to the late 2000s” by B. Rudels et al.

Anonymous Referee #1

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This manuscript is a long, interpretative narrative based on close inspection on theta-S plots, leaning heavily but not exclusively on results from the Polar Stern 2007 "SPACE" expedition. Consequently it concentrates on the Nansen, Amundsen and Makarov Basins of the Arctic Ocean. The major topic of discussion is (generally) the Atlantic water inflows to the Arctic and their evolution as they progress around the Eurasian Basins and into the Makarov Basin, with elaborations around the issues of mixing, interleaving, contributions to dense / deep water formation etc. A specific focus is the importance of the Barents Sea inflow relative to the Fram Strait Branch.

While I find it hard to know how specifically to criticise a discursive piece such as

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this, I'm strongly inclined to recommend it for publication pretty much as is, for the reason that a qualitative analysis of this type ultimately provides a set of challenges to modellers and theoreticians to reproduce the "results" (narrative-style conclusions) in a quantitative sense.

Therefore I have only a few recommendations for modifications to the text, and these mainly concern references.

Section 2.1: I agree with Rudels that Nansen often got things right that were subsequently forgotten, and it is only relatively recently that we are "re-learning" the truth. The importance of the Barents Sea inflow is one such topic. I think the authors should, therefore, include the reference Coachman and Aagaard (1974, in *Marine Geology and Oceanography of the Arctic Seas*, Springer), as this summarises the conclusions of four previous publications (Fletcher, 1965; Mosby, 1962; Timofeyev, 1963; Vowinckel and Orvig, 1961), and demonstrates numerically (ie with transports) the extent to which the Barents Sea was under-appreciated (as it were). They all show little or no through-flow.

Second-last line on page 2705, "a change, or at least a variation". This makes no sense because change and variation are synonymous. I think I know what the authors intend (presumably a greater or lesser degree of change) but it needs to be rephrased.

Second-last line on page 2706, "polynya area around Franz Josef Land" needs a reference.

Section 7, page 2714, "Freezing and brine rejection ...", a useful reference is Anderson et al. (JGR, 1999), on which the present lead author is a co-author.

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