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# ***Interactive comment on “A simple approach to providing a more consistent Arctic sea ice extent timeseries from the 1950s to present” by W. N. Meier et al.***

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This paper describes an extension of the record of Arctic sea ice extent. By using an hybrid passive microwave record as a bridge spanning an earlier historical chart-based information (the Hadley dataset) and the more recent, widely-used multichannel satellite passive microwave record, the authors have extended the period of record from 33 years to 59 years. This longer record helps in placing the recent decline of sea ice into a longer temporal context, and the authors document the dependence of the trend on the length of record and on the calendar month. The derived information represents the most rigorous assessment to date of sea ice variations and trends over

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the past ~60 years. In this respect, the paper is a valuable contribution.

The procedure for combining the different sources of information is heavily dependent on the validity of the "bridge" dataset, known as the XPM, which anchors the dataset consolidation process. The authors seem to have done the consolidation in as sound a manner as possible, given the constraints on the different datasets, especially the earlier historical chart-derived data. The constraints and limitations are laid out clearly, so readers are given the proper perspective on the contribution represented by the merged information. One piece of information that is described less than clearly is the variance. Were the variances of the different datasets included in the consolidation process, or was the procedure based solely on differences of means for calendar months? An explicit clarification would be helpful.

With regard to the variances, I notice in the time series of Figure 4 that the seasonal cycles of the first four years, 1953-1956, of the chart-based data are suspiciously similar with large amplitudes. These four years of the Hadley dataset derive from a different data source (the Danish Meteorological Institute yearbooks) than the other years. The text could have included such information about the different sources of the Hadley-era data; the sources are listed in the cited paper by Walsh and Johnson (1979, *J. Phys. Oceanogr.*).

Finally, a nagging issue in this type of data synthesis is the tendency for the passive microwave data to "miss" some of the summer sea ice when melt produces wet surfaces. There have been enough reports of ships in sea ice where passive microwave images show open water that this is a concern. The older charts on which Hadley is based utilize ship reports and aerial reconnaissance which, if anything, should be biased the other way, i.e., towards overestimates of ice extent. This issue seems to deserve some comment, especially since the known biases are consistent with the direction and seasonality of the trend.

TCD

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