Geophysical Research Abstracts
Vol. 20, EGU2018-11803, 2018
EGU General Assembly 2018

Persistence, length scale, trend and variability of the Arctic sea ice thickness

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The ocean/sea-ice reanalyses are likely the main source of Arctic sea ice thickness information in terms of spatio-temporal coverage, taking into account that observations are still sparse in time and space. In this study we make use of fourteen reanalyses in order to better document the Arctic sea-ice thickness regarding its time scale (persistence), length scale, trend as well as seasonal and interannual variabilities. A first assessment reveals a complex relationship between reanalyses, in which errors are not necessarily linked to different specifications, and key parameters inherent from each dataset, as for instance the atmospheric forcing used to build the systems. On the other hand, the fact of whether or not the reanalyses assimilate sea-ice data plays a clear role in the time and length scales of the ice thickness. Both time and length scales are larger in systems which do not assimilate data. For reanalyses which do assimilate date, time and length scales seem to be directly related to the mean ice thickness of the system: relatively thicker ice leads to longer time and length scales. The long-term reanalyses also reveal an increase in the amplitude of the thickness seasonal cycle, while wavelet analyses suggest a common significant band of variability centered at 11-years.