



## **Trend analysis of Arctic sea ice extent**

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The extent of Arctic sea ice is a fundamental parameter of Arctic climate variability. In the context of climate change, the area covered by ice in the Arctic is a particularly useful indicator of recent changes in the Arctic environment. Climate models are in near universal agreement that Arctic sea ice extent will decline through the 21st century as a consequence of global warming and many studies predict a ice free Arctic as soon as 2012.

Time series of satellite passive microwave observations allow to assess the temporal changes in the extent of Arctic sea ice. Much of the analysis of the ice extent time series, as in most climate studies from observational data, have been focussed on the computation of deterministic linear trends by ordinary least squares. However, many different processes, including deterministic, unit root and long-range dependent processes can engender trend like features in a time series. Several parametric tests have been developed, mainly in econometrics, to discriminate between stationarity (no trend), deterministic trend and stochastic trends. Here, these tests are applied in the trend analysis of the sea ice extent time series available at National Snow and Ice Data Center. The parametric stationary tests, Augmented Dickey-Fuller (ADF), Phillips-Perron (PP) and the KPSS, do not support an overall deterministic trend in the time series of Arctic sea ice extent. Therefore, alternative parametrizations such as long-range dependence should be considered for characterising long-term Arctic sea ice variability.