Geophysical Research Abstracts
Vol. 14, EGU2012-10650, 2012
EGU General Assembly 2012

The difference between summer and winter Arctic sea ice change as a fingerprint of anthropogenic climate change

V.A. Semenov (1,2,3), L. Behrens (1), T. Martin (1), M. Latif (1), and W. Park (1)

(1) Helmholtz Centre for Ocean Research Kiel, Ocean Circulation and Climate Dynamics, Kiel, Germany (vsemenov@geomar.de, +49 431 6004056), (2) A.M. Obukhov Institute of Atmospheric Physics RAS, Moscow, Russia, (3) Lomonosov Moscow State University, Russia

The observed September Arctic sea ice extent (SIE) declines about two times faster than the March SIE. Coupled climate models driven with enhanced greenhouse gases (GHG) concentrations in general reproduce the observed sea ice decline during the last 40 years and higher melt rate in summer. The mechanism responsible for this seasonal difference is under debate. The Arctic sea ice reduction has accelerated during the 21st century. One possible reason may be superimposed natural decadal variability. Here, we analyze sea ice variability in the CMIP3 models using control and GHG simulations. It is found that decadal to multi-decadal natural variations of the Arctic SIE in most models are characterized by considerably larger changes in winter. This is valid for both control and climate change experiments after subtracting long term trends. Remarkable difference in seasonal behavior supports the hypothesis that anthropogenic forcing is the major driver of the Arctic sea ice decline in the recent decades. The difference between summer and winter SIE variation on multi-decadal time scale may thus serve as a fingerprint of anthropogenically forced changes. The mechanisms for the different SIE seasonal variations are discussed.