Geophysical Research Abstracts
Vol. 14, EGU2012-13026, 2012
EGU General Assembly 2012
© Author(s) 2012

A recent bifurcation in Arctic sea-ice cover

T. M. Lenton (1) and V. N. Livina (2)

(1) College of Life and Environmental Sciences, University of Exeter, UK (t.m.lenton@exeter.ac.uk), (2) School of Environmental Sciences, University of East Anglia, Norwich, UK (v.livina@uea.ac.uk)

Arctic sea-ice has experienced striking reductions in areal coverage, especially in recent summers, and summer ice cover is forecast to disappear later this century. This has fuelled debate over whether Arctic sea-ice has already passed a 'tipping point', or whether it will do so in future, with several recent model studies arguing that there is no bifurcation involved because the loss of summer sea ice is highly reversible. Recently developed methods can detect and sometimes forewarn of bifurcations in time-series data, hence we applied them to satellite data for Arctic sea-ice cover. Here we show that a new low ice cover state has appeared from 2007 onwards, which is distinct from the normal state of seasonal sea ice variation, indicating a bifurcation has occurred (from one attractor to two). There was no robust early warning signal of critical slowing down prior to this bifurcation, indeed the normal state of sea-ice cover became more stable in the decade beforehand. However, all indicators show destabilisation since 2007. Internal climate variability is likely responsible for triggering recent transitions between the two ice cover states. Several positive feedbacks between the atmosphere, ocean and sea-ice cover could be contributing to separating the two states for Arctic sea-ice cover, as they may have done at a regional scale in the past. Our results reveal a recent bifurcation in Arctic sea-ice cover, and suggest that further abrupt changes may lie ahead.