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Data-adaptive harmonic decomposition and prediction of regional Arctic sea ice extent

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Decline in the observed Arctic sea ice extent (SIE) conveys profound socio-economic implications and is an area of active scientific research. Of particular interest are reliable methods for SIE forecasting on subseasonal time scales, from early summer into fall when sea ice coverage in the Arctic reaches its minimum. Here we apply data-adaptive harmonic (DAH) decomposition and inverse stochastic modeling techniques for the description and prediction of the Arctic SIE. The DAH decomposition identifies narrowband, spatio-temporal data-adaptive modes over four key Arctic regions. The time evolution of these modes can be efficiently modeled and predicted by a set of coupled Stuart-Landau stochastic differential equations. Retrospective forecasts show that resulting multilayer Stuart-Landau model (MSLM) is quite accurate in predicting September SIE; moreover, the DAH-MSLM approach provided real-time predictions that were highly competitive in the submissions into 2016/2017 Sea Ice Outlook.

References

1. Chekroun, M. D., and D. Kondrashov, 2017: Data-adaptive harmonic spectra and multilayer Stuart-Landau models, Chaos, 27, 093110: doi:10.1063/1.4989400.

2. Kondrashov, D., M. D. Chekroun, X. Yuan, and M. Ghil, 2018: Data-adaptive Harmonic Decomposition and Stochastic Modeling of Arctic Sea Ice, In: Tsonis A. (eds) Advances in Nonlinear Geosciences. Springer, doi:10.1007/978-3-319-58895-7_10.