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# Effects of air temperature and wind velocity on the correlated dynamics of sea-ice drift

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The mobility of sea-ice sheets in the Arctic Ocean causes continuous redistribution of areas of open water with corresponding effects on both regional and global climatic characteristics through changes in the temperature and albedo. The sea-ice drift and sea-ice fragmentation are self-organizing processes [1], which are determined mostly by atmospheric effects and, to a lesser extent, by ocean currents and tidal activity [1]. This study was aimed to reveal an interrelation (if ever exists) between some feature of correlation in the sea-ice motion and changes in the air temperature and wind velocity. The source of information was the database of field observations carried out in the ice-research stations North Pole 32 (NP 32) and NP 33 established on the ice pack in 2004 and 2005, respectively. It was found that the statistics of ice-field accelerations reveals periods of correlated motion with the duration of positive deviations from a mean value up to a few hours. The correlation itself is a consequence of the permanent critical state of the Arctic sea-ice cover, which is typical for large-scale, non-equilibrium geophysical systems driven by external forcing. It was shown that the correlated drift dynamics becomes partially disturbed during freezing cycles, since the sea-ice consolidation hinders the shearing and impact interactions between ice-fields and, correspondingly, the stress release in the sea-ice cover. The prolonged periods of low-correlated dynamics could be precursors of large-scale sea-ice fragmentation due to suppressed energy discharge in the consolidated drifting sea-ice. At the same time, any interrelation between the cycles of decorrelated dynamics of the sea-ice drift and the wind velocity was not found. The latter result is in good agreement of the data of Overland et al. [3] who reported the lack of the coherence between the wind forcing and motion of ice-floes of dimensions less than $\sim 10^2$ km.

References

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