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TITLE: The Influence of Global Climate Changes on Storm-Tracks of Northern Hemisphere

ABSTRACT BODY: Non-stationary eddies in mid-latitude storm-tracks are an important mechanism of energy, moment and moisture transfer in climate system [1]. Baroclinic eddies bring heavy rains and other hazard weather phenomena in the middle latitudes, play an important role in the global energy and the hydrological cycle. Recently, the increase of a cyclones rate at high latitudes with their frequency decrease in the second half of the 20th century was discovered using reanalysis data [2,3]. However, there is still no common point of view about how storm-track's distribution and intensity will be changed under the climate change influence [4,5].

In our work we investigate a variation of transient eddies general propagation tracks as a result of the global climate change effect. Using global large-scale intermediate complexity model of climate system [6] the numerical experiment was provided for the time period from 850 to 3000 year with a scenario of greenhouse gases influence on climate. From 850 to 2005 this impact was set according to the protocol “Historical simulations” of CMIP5 [7]. For 21th century anthropogenic effects were set according to the most aggressive scenario RCP 8.5 [8]. For the period 22-23 centuries CO2 concentration was on the level of 2100 year, and for 24-30 centuries it returned to pre-industrial value linearly in time of 100 years. Using a filter [9] we defined three variation intervals: low-frequency, medium-frequency and high-frequency. In our work we paid attention to medium-scale waves (i.e. 2-8 days). Two seasons were chosen: winter and summer. For each season we considered average fields of parameters characterizing poleward heat flux at 700 mb and transient eddies variance at 250 mb. Besides of the sensitivity of storm-track dynamic we considered some other features of “warm” climate.

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Reference:

1. Hoskins, B.J. and P.J. Valdes. On the existence of storm-tracks. J Atmos Sci, 47, pp. 1854–1864, 1990.
2. Lambert, S.J. and J.C. Fyfe. Changes in winter cyclone frequencies and strengths simulated in enhanced greenhouse warming experiments: Results from the models participating in the IPCC diagnostic exercise. Climate Dynamics, 26:713–728, 2006.
3. Geng, Q. and M. Sugi. Variability of the North Atlantic cyclone activity in winter analyzed from NCEP-NCAR reanalysis data. J Climate, 14:3863–3873, 2001.
4. Bengtsson, L., K.I. Hodges, and N. Keenlyside. Will extratropical storms intensify in a warmer climate? J Climate, 22:2276–2301, 2009.
5. Brayshaw, D.J., B. Hoskins, and M. Blackburn. The basic ingredients of the North Atlantic storm track. part i: land-sea-contrast and orography. J Atmos Sci, 66 pp. 2539–2559, 2009.
6. Fraedrich K., Jansen H., et al. The Planet Simulator: Towards a user friendly model // Meteorologische Zeitschrift. 2005. Vol. 14, N. 3. P. 299-304.
7. http://climate.uvic.ca/EMICAR5
8. Meinshausen M., Smith S., et al. The RCP Greenhouse Gas Concentrations and their extension from 1765 to 2500 // Climatic Change.– 2011.– Special Issue on RCPs.
9. Blackmon M.L. A climatological spectral study of the 500 mb geopotential height of the Northern

Hemisphere // J. Atmos. Sci.1976. V. 33, N. 8. P. 1607-1623.

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