Geophysical Research Abstracts, Vol. 8, 04441, 2006
SRef-ID: 1607-7962/gra/EGU06-A-04441


# Use of the classification of the Northern Hemisphere atmospheric circulation for the analysis of the Natural Hazards

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## Introduction

Climate changes are characterized by increases over time in extra-tropical cyclone activity during the latter half of the $20^{th}$ century in the Northern Hemisphere [2]. It resulted in an increase in the frequency of the meteorological extremes and Natural Hazards

The work discusses the connection of the frequency of meteorological extremes, of the catastrophic mudflows activity and of the snow avalanching with the atmospheric circulation of the Northern Hemisphere.

## Methods and data

More than six hundred cases of the meteorological extremes in Russia over the period 1991-2004 [1] and. more than 1500 cases of them in the different regions in the Northern Hemisphere over the period 2001-2005 have been analyzed. The tendency of change of meteorological extreme frequency in coming decades has been evaluated. The heavy showers over the western and eastern coasts of Black Sea which form the natural hazardous processes as floods, mudflows, landslides for period 1951-2004 [6] have been studied. All the known mudflows happened during the XX century in the mountain systems of the Carpathians, Crimea, Caucasus, Middle Asia and East Siberia [4] also have been studied. More than 1300 incidents of catastrophic avalanches for the period 1995 - 2001 are considered in Northern Hemisphere and sequences of data on avalanches in continental regions of the Magadan area, in Khibinies, and around Davos [5].

To reveal the circulation types forming the weather conditions for Natural Hazards beginning and change of their frequency was the purpose of this work

The classification of elementary circulation mechanisms (ECM) for the Northern Hemisphere by B.L. Dzerdzeyevskii [3] was used. This classification gives opportunity to analyze the circulation conditions in a certain region of the Northern Hemisphere. The daily time-series of ECM for the period 1899-2005 [7] and the cases of Natural Hazards for the whole period of the observations have been analyzed in this work. The catalogues including dates of Natural Hazards and ECM, promoting their formation, were composed.

**Conclusions.**

The ECM forming Natural Hazards in each region have been revealed. The ECM simultaneously forming several Natural Hazards in different regions of the Northern Hemisphere have been also revealed. They were two northern meridional ECM – 9a and 12a – and two southern meridional ECM – 13w (winter) and 13s (summer). Their duration is increases in coming decade. As result the frequency of the Natural Hazards over the Northern Hemisphere at least dos not decreases in the near future.

**Acknowledgements:** The work has been produced within the Projects 05-05-64354 and 05-05-64544 of the RFBR (Russian Foundation for the Basic Research).

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