

Paper 6 THE SYSTEM OF GROUND-BASED GEOPHYSICAL INSTRUMENTS AND SATELLITE MONITORING DATA AS TOOL FOR CHARACTERIZATION OF THE EARTH SURFACE MOTIONS AND THEIR INTERRELATION WITH DISTURBANCES IN OCEAN-ATMOSPHERE SYSTEM AND NEAR-EARTH ELECTROMAGNETIC ENVIRONMENT

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To estimate the risks of the powerful natural disasters interactions, impacts in the Earth environment such as earthquakes and tropical cyclones at the level of hurricane (typhoon) it is necessary to recognize maximally the Earth surface motions and their interrelation with the disturbances in the ocean-atmosphere system and near-Earth electromagnetic environment.

Earth observations by means of space-born and ground-based tools of radiophysical / geophysical monitoring provide the new methods and data systems available the important information about interrelation of mentioned processes to be revealed.

Although the long-range forerunners of strong earthquakes were preliminary described decades ago (Nersesov and Latynina, 1992) the first reliable observational results have been obtained owing to our ground-based data and satellite data comparisons.

The phenomenon explanation: powerful hurricanes may influence on the earthquake triggering, together with the evidence that hurricane transition features may be influenced by the solid Earth activity.

Moreover, the powerful events in ocean-atmosphere system having large horizontal scale are necessary to interact not only with the Earth surface, but also with higher layers of the thermosphere and near-Earth environment.

In this paper, we present the results of comparison of geophysical fields variations and seismic activity of the Earth.

The interaction between tropical cyclonic activity in the World Ocean, and seismic processes in the solid Earth can be resulted in appearing or increase in amplitude of the strainmeter measured wide-band oscillations disturbed by hurricanes which impact on the ocean bottom and provoke powerful earthquakes through the triggering effect.

The spatial / temporal tracks of powerful tropical hurricanes are coupled with place and time of earthquakes occurrence.

The examples of geophysical disturbances having near-Earth environment origin are presented and discussed too.

The comet C/2011 L4 (PanSTARRS) transit on March 2013 has been recorded by spatially distributed and in this period synchronously operating ground-based instruments.

We used the system of wide-band geophysical laser strainmeters, pendulum gravimeters, and tiltmeters in our observations. Data from four measuring sites in the East Europe were presented and analyzed.

The distance between separate instruments varies from a few hundred kilometers within local site installations, and up to thousands kilometers for a different remote sites and observatories.

The datasets of geostationary satellites GOES13 and GOES15 of Space Weather Prediction Center (NOAA USA, 1998-2015) and another satellite data have been used in complementation to the ground-based instrument recordings.

Earthquakes and hurricanes records during the recent strong earthquakes (Nepal, 25.04.2015, and Chile, 16.09.2015) were presented and analyzed.

The Investigation of the observed phenomena and the attempt to reveal the detailed interaction mechanisms of objects in the atmosphere, lithosphere, and other adjacent geospheres would give a chance to acquire more accurate information, knowledge concerning the regularity and origins of such natural disasters as earthquakes and hurricanes.

The extra precise ground-based laser interferometer and gravity-inertial techniques being supplemented by satellite observational systems can be considered as promising methods for the earthquake, hurricane and another powerful processes in the Earth environment to be monitored and predicted.

References:

Nersesov I.L., Latynina L.A., 1992, Tectonophysics v. 202, No. 2-4, pp. 221-225