



## **Hydrogeological response to tele-seismic events with underground water level precision monitoring data**

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Underground water level precision monitoring has been being carried out in the IDG RAS experimental area "Mikhnevo" in step with barometric pressure measuring since February of 2008. Seismic events registration is being realized with small aperture seismic array "Mikhnevo" and STS-2 seismometer. Complex processing of original hydrological and seismic data allows to mark out hydrological responses to large earthquakes ( $M_w > 7.5$ ) seismic waves propagation throw aseismic region - central area of Russian Plate.

GPO "Mikhnevo" is located within South part of Moscow artesian basin in the North-East part of Prioksko-Terrasny biosphere reserve out of intensive anthropogenic impact zone. Wellbore unseals index aquifer in the interval of 91-115 m. An aquifer is characterized with season level variations. Water containing rocks are presented with nonuniform fractured limestones.

In IDG RAS step-by-step methodic of experimental data handling was devised. First preliminary comparison of 1 Hz frequency seismic and hydrological data is being carried out for hydrogeological response to large earthquakes ( $M_w > 7.5$ ) seismic waves propagation marking out. On basis of these data main types and parameters of waves registered in seismic and hydrological data are being identified and representative periods for geological medium response to tele-seismic events analysis are being selected.

In the area of GPO "Mikhnevo" we traced geological response to disastrous earthquakes that took place 02/27/2011 near Central Chile Coast and 03/11/11 near Honshu Island east coast that is presented being smoothed in underground water level. Tele-seismic events differs in intensity, signal duration and post-seismic effect. Significant water level harmonic oscillations are coupled with surface and S-waves arrival, where vertical component prevails. First hydrological responses were registered in the time of S-wave propagation 28 minutes after Honshu earthquake beginning and 39 minutes after Chile earthquake beginning with low-grade amplitude 19 mm and 5 mm accordingly. Surface wave propagation presented on a plot is coupled with water level variations with peak amplitude 24 mm and 15.8 mm accordingly. On the whole hydrological response corresponds to ground displacement.

After disastrous earthquakes post-seismic underground water level response was registered. 2.5 hours after Chile earthquake 4 mm stepwise level increase was registered that is believed to be connected to next wave train arrival. Over a 6 hours after Honshu earthquake 12-13 mm level rise is traced and than smooth level fall is registered 6-8 mm less than initial level. Before earthquakes water level was stable that is why we suppose that seismic waves propagation impact did led to traced post-seismic effects.

Water level and ground velocity precision monitoring results were used for background parameters observation and signal distortion periods marking out. This periods can be connected to geological medium response to disastrous earthquakes. Post-seismic underground water level variations were observed 02/27/2010 and 03/11/2011 that is supposed to be evidence of probable altering of filtration links structure on microlevel.