

Absolute Gravity Measurements and their Applications at the Station Pecný, Czech Republic

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Abstract

In present the most precise absolute gravimeters are the FG5 gravimeters. The high accuracy of gravity data collected by this instrument ($\approx 10 \text{ nms}^{-2}$) allows for a detection of long periodic and secular geodynamic phenomena. The absolute gravimeter FG5 No. 215 has been used for repeated gravity measurements at the Geodetic Observatory Pecný. An annual variation of gravity was detected analysing a series of gravity measurements. The amplitude of this annual gravity variation is 27 nms^{-2} and the maximum gravity value appears at the beginning of March. To explain seasonal variation of gravity, effects of the ground water level and soil moisture have been computed. The reliable elimination of hydrological effects was accomplished with the help of soil moisture measurements through the 15 cm top layer outside the observatory. From these observations the soil moisture up to the depth of 6 m was modelled. After applying corresponding corrections the dispersion of the reduced gravity series decreased by about 45 %.

Geo-analýza horizontálních pohybových tendencí na východním Slovensku

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(The geo-analysis of the horizontal movement tendencies in the Eastern Slovakia)

Abstract

Knowing the field of recent geologically constrained strain rates in Central Europe is crucial to reconstruct the tectonic evolution of this area. Accurate time series of (possibly) permanent GPS stations are required to infer the local velocity and the associated strain rate field. This requirement is especially recognized within the CERGOP project, where several research groups from Central Europe institutions co-operate in GPS based research.

The contribution from the Institutes of Geodesy (FCE BUT and FCE SUT) results not only in supplying of the GPS data but in structural evaluation of this data, too. The example of the complex analyses and interpretation of the horizontal deviation tendencies measured through GPS campaigns (Papčo and Mojzeš, 2002) with the set of geo-data information from the eastern part of Western Carpathian (Eastern Slovakia) is presented.

This article demonstrates possibilities of geophysical data in process of verification and evaluation of horizontal movement tendencies, gathered during three GPS observation "campaigns", in area of West and High Tatra Mountains (Papčo and Mojzeš, 2002; Czarnecki et al., 2002).

On the example of Muráň–Malcov transcurrent tectonic system it is possible to find components explaining the different orientation of horizontal movement vectors at GANO GPS Station. The results of analyses of complex geo-data set offer detail and regional structural model explaining the micro-structural deformation in the Gánovce block, located between Kežmarok–Malcov, Vikartovce and Vrbov faults. This hypothetical kinematical and structural-tectonic model can be tested in next periods.

(text in Czech)

Nové príležitosti z pohľadu hlbokých prospektov definovaných na základe reprocessingu seizmických dát na východnom Slovensku

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(Opening of the new deep prospect opportunities on the base of the reprocessed seismic data in the Eastern Slovakia)

Abstract

The eastern part of the Outer Flysch belt of the West Carpathians belongs to the areas where the expected hydrocarbon prospectivity depends on the most modern technologies and processing. The reason of this requirement is laying in identification of the deep seated prospective horizons. Such prospecting horizons are located in the depth interval between 5 to 7 km. The reprocessing of old seismic sections with registration up to 12 sec opened new possibilities for evaluation of this area.

(text in Slovak)

GIS – prostředek pro integrované studie výzkumu lokalit uvažovaných pro hlubinné úložiště radioaktivních odpadů

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(GIS – tool for integrated studies of the radioactive repository research)

Abstract

Analysis of satellite and aerial images of 6 selected localities on the territory of the Czech Republic was a part of the "Realization of geological and related activities focused on evaluation and delimitation of areas suitable for location of deep-mined repository sites" project announced in 2003 as a public tender. Verification of rock massive homogeneity and elaboration of complex detailed morphotectonical study of studied areas followed by compilation of hypothetic kinematical model were the aims of the analysis.

Satellite radar images RADARSAT, satellite optical images LANDSAT 7 ETM+, black & white aerial photographs DMT and archives data of number of applied geosciences (airborne geophysical measurements, gravity, seismic activity etc.) were utilized. Comparison of information content of RADARSAT and Quick-Bird satellite images was drawn at selected locality in terms of the future monitoring of the site. Geomatica Ortho-Engine SW package was used primarily for data processing. Resulting interpretation was presented in maps of 1:25 000 and 1:50 000 scale in S-JTSK coordinate system.

(text in Czech)

Rekonštrukcia sedimentárnych panví východoslovenského flyšového pásma na základe balancovaných rezov

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(Restoration of the Eastern Slovakia flysch sedimentary basins on the base of balanced sections)

Abstract

The Eastern Flysch Belt zone of Slovakia is created by a fold-and-thrust belt of considerable displacement. The mainly deformed Cretaceous-Tertiary deep-water flysch sediments are usually divided into two units – Magura and Dukla – Krosno units. The seismic reflection sections and many deep seated boreholes confirmed thrust character of units, that are detached from their Mesozoic substrata along a single, large décollement at about 5–7 km depth.

The balanced modelling has been realized at two sections (Profile 1 and 3). The results revealed that at Profil 1 (western – Lipany – Cígelk) on complete length after deformation the restored Magura unit length was 32,4 km. The restored length of next units (Dukla and Krosno units) is 36,1 km. The shortening of the Magura unit and the Dukla – Krosno units were 5,15 km and 12,55 km respectively.

At Profil 3 (eastern – Humenné – Hankovce – Svetlice) the complete length after deformation is 40,9 km. The restored length of the Magura unit was 62,80 km and Dukla – Krosno units were 102,80 km. The shortening of the Magura unit is 39,6 km and Dukla – Krosno units is 61,90 km.

(text in Slovak)

Pánev Logone Birni – přechodová část mezi západoafrickým a centrálnoafrickým riftovým systémem

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(Logone Birni Basin – transition part between West and Central African Rift System)

Abstract

Logone Birni Basin is at the intersection of the West African Rift System and the Central African Rift System. It is a part of the generally named Chad Basin. It is near of the very profitable Doba Basin where the giant Doba oil field has been discovered. In the region of the Chad Basin more than 15 oil and gas discoveries have been found. A pipeline is under construction for evacuating the Doba oil production to Kribi terminal in Cameroon.

Geofyzika's acquisition Program started in 1997 year with 2D seismic survey, combined with the gravity measurements. More as 1000 km 2D reflection seismic profile were measured. Evaluation of the seismic data was realized with support of the Ministry of Environment of Czech Republic. Processed Grav/Mag Data and unified Remote Sensing map were created for the surrounding area. On the several examples will be demonstrated the shallow and very prospective horizons in the two parts of Logone Birni Basin.

(text in Czech)