

ON EXPEDIENCY OF CREATION IN EURASIA NETWORK OF UNIFIED POINTS OF JOINT ASTRONOMICAL, GEODETIC AND GEOPHYSICAL DETERMINATIONS OF THEIR POSITION CHANGES

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1. INTRODUCTION

Nowadays in astronomy, geodesy and geophysics the high-precise determination of very small temporal changes of spatial and geophysical parameters is a very important scientific and practical problems. The quantities of these changes are commensurable with quantities of proper motions of observation points and with quantities of determination errors. To obtain high accuracy of separate determinations of such very small quantities, it is necessary to have special network of unified points of joint observations by different methods.

2. ORDERED, JOINT, UNIFIED AND REPEATED DETERMINATIONS

By ordered complex of unified points of joint astronomical, geodetic and geophysical determinations or observations (JAGGD points or JAGGO points) we mean such regional or global network of points of determinations, where on each point the same combination of methods of astronomical, geodetic and geophysical determinations of point position and other values are used. By points of joint determinations we mean points, where various results of observations can be reduced to the same geometrical centre of point on each epoch. By unified determinations we mean such ones, which are executed by the same programs and methods, in unified buildings and by unified instruments etc. On JAGGD point the different types of observations are expedient to execute not permanently, but in separate series, which are periodically repeated without changes of programs and methods of observations.

3. APPROXIMATE COMPLEX OF METHODS OF OBSERVATIONS AND OBJECTS OF DETERMINATIONS ON JAGGD POINTS

Minimal necessary set of determination methods in JAGGD points ought to consist high-precise determinations of: 1) geodetic coordinates by GPS-method and geometric levelling; 2) astronomical coordinates by means of a specially created zenith tube or prismatic astrolabe; 3) gravity values by means of a gravimeter; 4) gravity direction by means of a specially created instrument; 5) terrestrial surface inclination by means of a tiltmeter; 6) point proper movements by independent of basic determination methods; 7) changes of external conditions of observations. It is possible to increase scientific and practical potentialities and importance of JAGGD points network by organizing on its basis interferometric observations.

4. OVERCOMING THE MAIN OBSTACLE FOR CREATION OF JAGGD POINTS NETWORK

Minimal set of JAGGD cannot be organized at any of the already existing points for separate astronomical, geodetic and geophysical observations. The main obstacle for direct use of already existing points of separate observations is substantial difference in external conditions where determinations are carried out. Astronomical and geodetic observations are executed on the Earth surface, and geophysical ones are executed in closed underground chambers and mines. The only type of building which is suitable for JAGGD is deep vertical mine (DVM). Just DVM may be adapted for execution of different observations in and over it. DVM are very convenient also for placing of deep fundamental coordinate centres in it.

5. PECULIARITIES OF EQUIPMENT OF DVM SUITABLE FOR JAGGD POINTS CREATION

For creation of JAGGD point we need DVM with the following peculiarities. It should be build on ledge bed-rocks in ecologically safe place. It should be have complete isolation from groundwater, hardening from action of unfavorable exterior weather requirements, convenience of operation. Its depth should be about 25–50 m and inner diameter about 3–5 m. On the bottom of DVM there should be basic observation pillar with geometrical centre to which should be reduced the results of all kinds of determinations. Gravimetric, tiltmetric and other geophysical determinations should be executed directly on the pillar. In the mine entrance vicinity the additional geometrical centres should be situated. Results of all on-surface observations (geodetic, astronomical, meteorological) should be related to these centres. Between the additional centres and the main centre a simple geometrical connection should exist. On-surface entrance to DVM could be designed as astronomical pavilion with symmetrically opening roof. Topographical conditions in DVM vicinity should be favorable for executing of all types of observations on JAGGD point.

6. EXPEDIENCY OF CREATION OF UNIFIED JAGGD POINTS NETWORK IN EURASIA

In geophysics the creation of in-depth points network for only one type of determination (gravimetric, tiltmetric, seismometric or others) is quite expedient. In geodesy and practical astronomy the creation of only in-depth coordinate centres network is quite expedient also. And certainly the creation of a unified in-depth JAGGD points network is some more expedient because those points are simultaneously standard astronomical-geodetic coordinate points, and universal geophysical stations, and unique laboratories for geodynamic investigations. The creation of JAGGD points network will help to : study of the Earth figure evolution, verify geophysical hypotheses about nature of the Earth figure changes, bring together and generalize study of the Earth's figure and study of the Earth's rotation, determine all combinations of Love numbers from observations only in one point, make high-precise coordinate connection of maps of various geophysical fields to high-precise terrestrial coordinate systems and study temporal changes of parameters of those fields, compare results of geophysical determinations in terrestrial and space conditions, study temporal changes of geoid's figure, determine length of arcs between zeniths of separate pairs of JAGGD points and length of connecting them chords, study nature and predict rise of anomalous geophysical phenomena. The creation of unified in-depth JAGGD points network in Eurasia will be a huge step to creation of a global network of such points and to complex solution of global geophysical and geodetic scientific and practical problems. To study of many global geophysical and geodynamical phenomena several hundreds of unified in-depth JAGGD points will contribute more than thousands of modern diverse observations of change of different spatial and geophysical parameters.