

Committee of Experts on Global Geospatial Information Management

Eleventh session

New York, 23, 24 and 27 August 2021

Item 6 of the agenda

Global geodetic reference frame (for discussion and decision)

Statement provided by:

Cadastre committee of the Republic of Armenia

Statement:

**World Geodetic
coordinate system WGS-84**

With consideration of advantages and feasibility of geodetic networks, created using satellite technologies and aimed at meeting the International geodesy and cartography standards the field of geodesy and cartography of Armenia has initiated works on introduction of WGS-84 World Geodetic Coordinate System since 2002.

WGS-84 - World Geodetic Coordinate System is an Earth-fixed terrestrial reference system realized through amendment of Doppler basic system, navigation satellite system, parameters of initial point and scale of coordinates as well as based on such a pathway of its rotation, which will result in coincidence of initial meridian with 0-point meridian determined by the International Time Bureau. The WGS-84 system is a global Earth-centred system.

The WGS-84 ellipsoid calculated in 1984 varies in its parameters from the Krasovsky's reference ellipsoid considered as basic for CS-42 coordinate system and has its own calculation area.

For the purpose of solution of navigation and other engineering problems, provision of geodetic points' coordinates, topographic maps of different scales as well as other data in WGS-84 to civil organizations there has been required to recalculate the geodetic reference points from CS of 1942 to WGS-84 system by providing mathematical accurate relevance between the above mentioned coordinate systems.

Since 2007 in the Republic of Armenia there has been received values of parameters of transition into the Topocenter (local) coordinate system on certain reference ellipsoid, which is located in such a way that that the root-mean-square deviation of the surfaces of the ellipsoid and geoid in the given area is minimal. Moreover, deviations in large areas of the earth's surface can be significant, which practically does not affect small areas.

To obtain the transition parameters in the systems, the geodetic coordinates of the equilibrium points of two systems in the region with the main dimensions of the ellipsoids have been used and are still being used as the main key point.

The level of accuracy of the transition parameters depends on the number of points included in both systems and on the characteristics of their allocation.

Committee of Experts on Global Geospatial Information Management

Eleventh session

New York, 23, 24 and 27 August 2021

Item 6 of the agenda

Global geodetic reference frame (for discussion and decision)

At the end of 2007, more than 300 basic points with GPS stations of the national geodetic network already implemented in the region (all the mentioned observations were carried out in real time, with dual-frequency GPS stations, more than 12 hours duration for each point) were observed from the points of the State Geodetic Triangulation Network.

During the establishment of the I and II levels of state height network activities in the region a monitoring has been implemented by additional GPS stations. As a result, the mentioned benchmarks, except the Baltic Normal Height System 1977 also got the height of ellipsoidal geodetic of WGS-84 system.

The results of the above mentioned surveying data served as the basis for creating a local model of the quasigeoid, obtaining the differences in heights of normal and ellipsoidal surfaces of WGS-84 (geoid wave size).

Having the ratio of the results of ellipsoidal geodetic coordinates in two systems of the state triangulation network, using Helmert's formulas, the main transition coefficients are received with equal divisor of the planned positions of the nearby points' linear coordinates.

In 2013, a network of 12 permanent ARMPOS reference stations was established. Moreover, 8 geodetic points were involved in the same process. Coordinates were calculated in the framework of International Standard Reference (ITRF2008 / IGS08).

As a result they were converted into the ARMREF 02 system using the reference coordinates of some permanently operating Reference Stations (CORS).

ARMREF02 system is the state geodetic reference system of Armenia, it complies with the World geodetic reference system (ITRS) through the epoch of ITRF2000 2002.9.

Currently, works are carried out to install new GNSS basic points, to monitor them and through a large number of point network to receive more accurate values of the parameters of the quasigeoid transition.

Submitted on:

8/17/2021