CORS Coordinate Policy

National Geodetic Survey

Approved by the Executive Steering Committee

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The National Geodetic Survey (NGS) publishes coordinates for CORS in several reference frames including the current global reference frame from the International GNSS Service (IGS) and aligned to the International Terrestrial Reference Frame (ITRF), and the latest plate-specific realizations of the North American Datum of 1983 (NAD 83) defined by NGS.

I.   Global Reference Frame Coordinate Revisions

The IGS is the principal organization responsible for computing and monitoring coordinates in the current global reference frame for all CORS and GNSS stations in the IGS network. The IGS routinely computes and monitors the current global reference frame coordinates for the subset of CORS in their network, as well as many other globally distributed GNSS stations. The IGS frames are aligned in origin, orientation and scale to match the multi-technique ITRF. IGS coordinates consist of positions and velocities. Discontinuities are added whenever necessary to introduce a new set of coordinates following an episodic event, which occurs when there is a break or jump in a position time series. Most are due to displacements caused by earthquakes or equipment changes. Like all sets of coordinates, they are expressed at a reference epoch and only apply during a certain specified time interval corresponding to the last prior and the next following discontinuities. Changing global reference frame positions and velocities for published past time periods is not necessary or allowed. Specific details for a discontinuity at an IGS station are expressed in a Solution (Software/technique) INdependent EXchange (SINEX) format via the discontinuity block. For information on the IGS08 discontinuities, please see: ftp://igs-rf.ign.fr/pub/discontinuities/soln_IGS08.snx

II.   NAD 83 Reference Frame Coordinate Revisions

NGS does not follow the same convention as the IGS does when publishing changes to coordinates and velocities at a CORS. The IGS will introduce a discontinuity at a specific epoch while NGS will revise the published (official) set of positions and velocities for a CORS. NGS will review and/or revise the published (official) NAD 83 positions and velocities for a particular CORS if one or more of the following situations occur:

a)   The antenna at a CORS has been replaced.

b)   The position/velocity of a CORS has been changed due to displacement by a nearby earthquake.

c)   An error was discovered during the computation of the CORS positions/velocities.

d)   CORS positions/velocities need to be computed and published at a different epoch.

e)   NGS has determined through analysis that the computed horizontal and/or vertical positions have deviated, over a period of time (longer than two weeks), from the predicted positions by a noticeable amount (usually a few centimeters).

Predicted positions are computed by using modeled (estimated) velocities to advance a set of positions at a published epoch to a new epoch. Deviations between computed and predicted positions usually occur when the period between the published and new epoch is large, for example 10 or more years, or if the velocities used to advance the positions are not accurate and do not reflect what geophysical phenomena are occurring at the CORS or region of interest.

f)   The IGS has introduced a discontinuity for the CORS in the current global reference frame.

NGS will carefully monitor the published NAD 83 coordinates for a particular CORS if NGS suspects or has prior knowledge that the changes to the coordinates may be due to:

a)   Seasonal variation.

b)   Change in hydrologic or other loading.

c)   Change in subsidence or other geophysical phenomena.

d)   A receiver firmware upgrade or other related equipment change.

If after further analysis, the long term deviation of the coordinates from the published values is indeed permanent, NGS will revise the published NAD 83 coordinates for the CORS.

III.   Additional Information

When NGS adopts a new set of reference frames for CORS stations, the previous reference frames are no longer supported and the coordinates are no longer revised.   The updated coordinates should not be used to process historic data for such stations. As an example, if historic data were submitted to OPUS, then the OPUS program would use coordinates that were valid and published during the same time as when the data were collected.

If the physical location of the antenna of a CORS has moved by a significant amount (more than a few centimeters), NGS will rename the site and adopt new coordinates for it as soon as practical. In practice, coordinates for an antenna are referenced to the antenna reference point (ARP).