

Practical Considerations for Determining Euler Pole Parameters for the Terrestrial Reference Frames in the United States

Jacob Heck and Dru Smith (USA)

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SUMMARY

As part of its mission to maintain the National Spatial Reference System (NSRS), the U.S. National Geodetic Survey (NGS) plans to modernize the NSRS in 2022. As part of this modernization, NGS will define four new terrestrial reference frames for the North American, Pacific, Caribbean and Mariana tectonic plates based upon IGS14 and the Euler Pole Parameters of the stable parts of those plates.

However, the determination of the rotation of the so-called “stable” part of any tectonic plate requires that several issues be resolved as part of the overall solution. These include defining the part of the plate considered “stable”, the treatment of non-rotational horizontal secular and episodic motions, the availability of and quality of geodetic data for each tectonic plate, the use of non-GNSS methods in Euler pole determination and the stability of the Euler pole itself. The Pacific and North American plates each have many Continuously Operating Reference Stations (CORS) that can be used in the determination of plate motion. The Mariana and Caribbean plates, however, are much more sparse in their CORS data availability and therefore present unique challenges when it comes to determining the Euler pole parameters. This paper provides the current state-of-the-art for each of these issues for each of the four plates; with each plate being chosen since it contains a significant part of the United States and its Territories.