

Update of ITRF densification in Cyprus using IGS repro3 products

Chris Danezis (Cyprus University of Technology), Miltiadis Chatzinikos (Cyprus University of Technology) and Christopher Kotsakis (Aristotle University of Thessaloniki)

Abstract. The aim of this paper is to present an updated multi-year solution of the CYPOS network based on the ITRF2014 frame and the IGS repro3 products and processing standards. The CYPOS national network operates since 2008 in support of the Cyprus Positioning System under the auspices of the Department of Lands and Surveys, and it consists of seven permanent GNSS stations equipped with different types of receivers/antennas at an average distance of about 60 km. The NICO Cypriot station which belongs to the IGS network is also included in our data processing, along with 34 additional reference stations from the EUREF-EPN and IGS networks which are located mostly in the continental part of Europe.

Daily RINEX files from the aforesaid stations, spanning a total period of almost ten years (2012-2021), were processed using the Bernese GNSS software in conjunction with the latest IGS repro3 products in the ITRF2014 frame. A number of auxiliary scripts were applied in the processing steps to investigate various data/network-quality metrics and the precision of the GNSS measurements at the Cypriot stations. The daily solutions obtained from Bernese (SINEX files) were used as input to a time-series stacking procedure in order to compute the final solution for the positions and velocities at the CYPOS stations in the ITRF2014 frame. The results of our stacking solution are externally validated through comparisons with the official ITRF positions and velocities at the used EPN stations, showing an agreement level of 1-2 mm (for the positions) and < 1 mm/yr (for the velocities). Finally, the comparison with a previously estimated multi-year solution of the CYPOS network in the ITRF2008 frame shows minimal differences at the sub-mm level, thus confirming the high quality of the ITRF realizations in the region of Cyprus. This research was carried out in the framework of the CyCLOPS project (RIF/INFRASTRUCTURES/1216/0050), which is funded by the European Regional Development Fund and the Republic of Cyprus through the Research and Innovation Foundation.