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Accuracy of velocities from repeated GPS surveys: relative positioning is concerned

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Over more than a decade, researchers have been interested in studying the accuracy of GPS positioning solutions. Recently, reporting the accuracy of GPS velocities has been added to this. Researchers studying landslide motion, tectonic motion, uplift, sea level rise, and subsidence still report results from GPS experiments in which repeated GPS measurements from short sessions are used. This motivated some other researchers to study the accuracy of GPS deformation rates/velocities from various repeated GPS surveys. In one of the efforts, the velocity accuracy was derived from repeated GPS static surveys using short observation sessions and Precise Point Positioning mode of GPS software. Velocities from short GPS sessions were compared with the velocities from 24 h sessions. The accuracy of velocities was obtained using statistical hypothesis testing and quantifying the accuracy of least squares estimation models. The results reveal that 45-60 % of the horizontal and none of the vertical solutions comply with the results from 24 h solutions. We argue that this case in which the data was evaluated using PPP should also apply to the case in which the data belonging to long GPS base lengths is processed using fundamental relative point positioning. To test this idea we chose the two IGS stations ANKR and NICO and derive their velocities from the reference stations held fixed in the stable EURASIAN plate. The University of Bern's GNSS software BERNESE was used to produce relative positioning solutions, and the results are compared with those of GIPSY/OASIS II PPP results. First impressions indicate that it is worth designing a global experiment and test these ideas in detail.