

The GPS system, which has been operational for the society for over 30 years, is primarily used to determine the position of points on the physical surface of the Earth. The application of this is primarily navigation (billions of users worldwide), but the system has revolutionized geodesy in particular. Receivers on the so-called permanent stations, which record satellite signals continuously, are used to construct the reference frame, which is the basis for designating coordinates on the Earth and as references for surveyors performing field measurements. However, the ever-increasing number of these stations (currently more than 20,000) means that there are still other, sometimes completely unconventional, methods of using this system. One of such applications is the use of GPS antennas as hydrospheric sensors for studying the current terrestrial water storage (TWS). Determining this quantity from conventional observations (wells, soil moisture sensors, surface flow sensors, etc.) is very expensive and inefficient: we get a very generalized picture. The analysis of GPS-derived position time series of permanent stations may lead (after appropriate analytical procedures) to the determination of TWS, but at the place of observation, which (despite the previously mentioned 20,000 sensors) is, however, a certain limitation, related mainly to the uneven distribution of stations (or even their absence in many regions of the world). For this reason, within the framework of this project, it is planned to develop a new method for determination of TWS by application of a composite model using both GPS observations and InSAR data. The latter is a growing method for determining deformation of the Earth's surface with a spatial resolution of hundreds of meters, but a temporal resolution of 2 weeks to a month, which limits the study of rapidly varying hydrospheric effects. The combination with GPS data will provide reliable information not only at sufficient spatial but also temporal scales and can significantly contribute to the knowledge of current processes in the terrestrial hydrosphere.