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Precise Point Positioning (PPP) - an alternative processing technique to estimate the tropospheric wet delay of GNSS signals

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Microwave signals of the GNSS satellites (GPS, GLONASS and in future GALILEO) are time delayed when passing the atmosphere. Based on this signal delay, e.g. the humidity distribution within the troposphere can be determined. It has already been shown that delivery of the Zenith Wet Delays derived from a network solution with hourly resolution and accuracy of 1mm PW is achievable. In the case of very large networks along with an increased number of observation and computational demands, an alternative processing technique has to be applied – Precise Point Positioning (PPP). In this presentation we investigate how the atmospheric precipitable water content derived from GNSS data can be assimilated within an operational Nowcasting system (INCA) and how PPP results compare to the network solution. It is to be expected that the accuracy of the PPP estimates decreases due to several effects (satellite clocks, biases, no ambiguity resolution), but independency from the reference station data will significantly shorten the latency of the results (few min), and provide the regional/national service to enhance the prognosis in the numerical forecast model. It has been proved that e.g. passing weather fronts can be analysed much better by introduced GNSS derived tropospheric wet delays because this data is influenced by changes in humidity in the free atmosphere, whereas the data at the meteorological ground stations reacts to these changes with a considerable time delay. This allows to forecast heavy rainfall causing potentially local floodings more reliable and to narrow down the affected region.