Object. Gravity surveys taken in 2015 and 2016 provide the unique time series of quasi-regular measurements on monthly basis. In the measurements evaluated with a standard set of corrections (IAG suggested models) remains a strong annual signal in both series as well as the local hydrological signal. The removal of outliers visibly improves the presented notions on the correlation of gravity results obtained with the A10-020 and hydrological loading effects.

The use of selected correction models to elaborate AG measurements with special emphasis on hydrology will be discussed considering data from local hydrological sensors as well as from global hydrological models, e.g. GLDAS. These models will be used to evaluate the observed gravity variations with the A10-020 absolute gravimeter. Gravity changes due to hydrology for the area of Poland as well as for recommendation of methodology for data elaboration will be presented.

Summary and conclusions
- Seasonal gravity variations due to hydrological loading significantly exceed uncertainty of gravity determination in a modern gravity control. Besides gravity, the epoch of its determination should be recorded. Gravity control should thus be considered as a dynamic reference for relative gravity survey.
- Available hydrological models can be used to project gravity for given periods and allow evaluating of hydrological gravity variations.
- The selection of absolute gravimetric models for hydrological effects determined using hydrological models results in a substantial improvement in the consistency of the obtained gravity values.
- Further studies considering other available hydrological models are required.

Recommendations for gravity control establishment and evaluation
- Perform absolute gravity determinations on all designed stations in a possible shortest time frame.
- Consider the use of relative stations from hydrological hydrological surveys or the use of absolute gravimeters.
- Reduce measured absolute gravity values to a zero \( z \) epoch of the hydrological variation for any given station - way to obtain a more consistent gravity reference throughout a given country.

Case study: Borowa Gora Geodetic-Geophysical Observatory
One of the base stations (noted as BGO) of the modernized gravity control is located in Borowa Gora Geodetic-Geophysical Observatory (layout of the relevant OBS infrastructure is presented in Fig. 4). There is another open field station (noted as 156) at the Observatory which is a part of the Borowa Gora geodetic test network. Since 2008 regular monthly gravity measurements with the A10-020 are performed at this station. In 2015 the infrastructure of the Observatory has been supplemented with a variety of hydrological sensors allowing to evaluate local hydrological modeling and compare it with a larger scale hydrological modeling. The hydrological sensors locations along with absolute gravity stations are presented in Fig. 4.

Gravity measurements on an open field station 156 were corrected for the standard set of corrections, i.e. tides load ocean, atmospheric pressure (Fig. 5). The remaining signal shows a visible annual variation reaching peak to peak values of 200-250 nm/s. In order to evaluate the gravity signal before removing 3 epochs of the gravity determinations that were considered as outliers. Table 1 presents the basic statistics of gravity determinations with the A10-020 along with the hydrological signals with the A10-020 corrected model. The standard deviations of gravity determinations with the A10-020 corrected model and local hydrological signal both indicate the variability of the signal.

References

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This ID system is required to be acknowledged. Use the function of identifying stations in the process of evaluating gravity observations and calculations.