

Climate-hydrology interactions explored using an integrated groundwater-surface water hydrological model for over a 100 year period in a natural temperate zone regional catchment

Methods:

- Integrated hydrological model – HydroGeoSphere (groundwater 3D + Surface water 2D) setup for 7000km² natural catchment in NE Poland
- Forced by 1901-2010 meteorological data from the CERA-20C ensemble model
- Historical water levels data since 1880 with gaps for validation
- Time series of flood extent map from radar satellite images for validation

Results:

- Rainfall and evaporation show trends in the 110 years period, while snow remains stable
 - Effect in surface water levels and discharges
 - Effect in groundwater levels is site dependent
- Snowmelt is the major factor driving the spring floods, yet the rainfall and evapotranspiration trends are responsible for the water level and discharge variability in the last century

Major problems during the model development:

- Forcing data differences: CERA-20, ERA-20C, and 20CR
- Snow bias correction
- Very big model output + initial conditions in the time-split model runs

