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# Monitoring runoff and nutrient transport in the coastal zone of a Danish lowland river

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Denmark has a very long coastline compared to its total area, and therefore large parts of the lower river reaches are influenced by tidal and coastal backwater effects. In general the gradients of these lowland rivers are very low, and furthermore thousands of small watercourses are flowing directly to the sea along the coastline. This situation makes it impossible to gauge the runoff to many fjords and marine inland waters utilizing traditional monitoring techniques, and consequently, even though Denmark is covered with several hundreds of gauging stations, only 50 percent of the country is gauged. Models are today used to estimate the total runoff and loads of nutrients to coastal waters. One of the major problems in the calibration of the models is however, the lacking of data from the lower part of rivers influenced by tidal and coastal backwater.
In order to investigate the possibilities of improving the Danish gauging network and to test the models used for runoff estimation in the ungauged areas, a new monitoring station was established in the summer of 2011 in the River Skjern very close to the outlet in Ringkobing Fjord at the west coast of Jutland. The hydraulic conditions are here affected by tidal and backwater effects and the nutrient transport may be influenced by stratified flow conditions. The catchment area to the new station is 2455 km2, and the width of the channel is 70-80meters. The velocity distribution is measured in the profile by both horizontal and vertical multi cell Doppler sensors. Conductivity (salinity), turbidity and water temperature are measured by sensors in 2 levels, near bottom and in the upper part of the depth profile. Time integrated water samples are collected also in 2 levels with a 2 hour interval and analyzed for total nitrogen, nitrate, ammonium, total phosphorous, and phosphate. The wind speed and direction is registered at the station.
The preliminary results show a strong correlation between the water velocities and the wind especially during the winter storms coming mainly from the vest and northwest. Also the nutrient concentrations and the suspended sediments are changing heavily during and following the storm events, and stratification and intrusion of brackish water from the fjord is registered. Data from the new monitoring station and the model outputs will be compared and evaluated.