

The goal of the project is to elaborate the method for the calculation of carbon balance applying soil-vegetation parameters calculated in-situ, and then derived from the newest radar and optical satellite Sentinel-1/2/3 data. The study will be conducted at Biebrza National Park in the Middle and South Basins. The carbon flux will be measured by chamber method at chosen wetland's habitats (excluding forests). At the same areas soil moisture will be measured using TDR method (TRIME-FM unit), LAI will be measured with LI-COR 2200 Plant Canopy Analyser, radiometric temperature (IR Radiometer Exotech), wet and dry biomass and vegetation water content will be assessed in the laboratory. In-situ measurement will be conducted during satellites overpasses. At the same time meteorological parameters as solar radiation, air temperature, wind speed and direction, precipitation, will be measured at meteorological stations. Ground measurements and satellite observations will be used in statistical analyses in order to develop methods for calculation of wetlands ecosystem soil-vegetation parameters. The soil-vegetation parameters derived from optical satellite data Sentinel-2/3 will be as follows: surface temperature, heat fluxes, soil moisture, vegetation indices (Red Edge Diff Veg Index, NDVI, EVI and other developed during research), LAI, biomass, vegetation cover. Also, latent and sensible heat fluxes will be assessed applying surface temperature calculated from Sentinel-3 data. The satellite microwave Sentinel-1 data will be applied for the assessment of soil and vegetation moisture. The indices derived from Sentinel-2 data will be used in statistical analyses along with in-situ measured biomass, LAI, height of the vegetation. The satellite derived soil-vegetation parameters will be used for the modelling of carbon balances. The important objective of planned research will be to define the impact of individual processes occurring in the "biome-atmosphere" system on carbon balance of wetlands. The elaborated method will allow to assess the impact of biomass and soil moisture on carbon exchange at wetlands ecosystem. Obtained results will be compared with in-situ measurements from ESA-IGiK Eddy Covariance station in order to calibrate the satellite data and indicate the derivation precision. The combination of the most advanced RS technology and modelling of carbon balance will provide new possibilities for the innovative monitoring and management wetland areas with unique combination of nature development and climate protection. The project will introduce the COPERNICUS service on national scale what is also an important reason for choosing proposed research topic.