Peatlands are a unique type of wetland that play a powerful role in fighting climate change. They store enormous amounts of carbon in their soil, more than forests do. However, when peatlands are drained for farming or when they dry out due to climate change, they begin to release their stored carbon into the atmosphere. These carbon emissions cause the ground to sink over time, a process known as subsidence. The goal of this project is to first detect the rate of subsidence across all of Poland's peatlands using modern satellite-based technology and then to estimate carbon emissions based on this rate of subsidence.

Traditional fieldwork methods are slow, expensive, and limited in scope, especially for large areas or over the years. That's why this project applies a cutting-edge method that uses radar data from European satellites (Sentinel-1), processed with advanced cloud computing tools, to detect even small vertical movements of the land surface. These movements can also tell us how healthy or degraded the peatlands are and how much peat may have been lost.

This research is important because peatlands are often overlooked in climate and conservation strategies, despite their enormous potential to store or release carbon. Poland has a large area of peatlands, but their current condition and carbon emissions are not well understood at the national level. This project fills that gap by creating detailed maps of peatland health and estimating how much carbon is being emitted.

The results will help scientists and policymakers make better decisions about how to protect and restore peatlands, not only in Poland but in other countries facing similar challenges. By developing and testing a scalable monitoring method, this project also contributes to global efforts to combat climate change and preserve these critical ecosystems for the future.