



## **Using Copernicus earth observation services to monitor climate change impacts and adaptations**

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In the last years, earth observation made a big leap towards an operational monitoring of the state of environment. Remote sensing provides for instance information on the dynamics, trends and anomalies of snow and glaciers, vegetation, soil moisture or water temperature. In particular, the European Copernicus initiative offers new opportunities through new satellites with a higher temporal and spatial resolution, operational services for environmental monitoring and an open data access policy. With the Copernicus climate change service and the ESA climate change initiative, specific earth observation programs are in place to address the impacts of climate change. However, such products and services are until now rarely picked up in the field of policy or decision making oriented climate impact or climate risk assessments. In this talk, we will present results of a study, which focus on the question, if and how remote sensing approaches could be integrated into operational monitoring activities of climate impacts and response measures on a national and subnational scale. We assessed all existing and planned Copernicus services regarding their relevance for climate impact monitoring by comparing them against the indication fields from an indicator system for climate impact and response monitoring in Germany, which has lately been developed in the framework of the German national adaptation strategy.

For several climate impact or response indicators, an immediate integration of remote sensing data could be identified and been recommended. For these cases, we will show practical examples on the benefit of remote sensing data. For other indication fields, promising approaches were found, which need further development. We argue that remote sensing is a very valuable complement to the existing indicator schemes by contributing with spatial explicit, timely information but not always easy to integrate with classical approaches, which are oriented towards consistent long term monitoring. Furthermore, we provide specific recommendations for the Copernicus services to ensure a consistent climate change monitoring in future and we indicate options and limitations for integrating service products into practical assessment and monitoring activities.