

## **RESCUE: Response of the Earth System to overshoot, Climate neUtrality and negative Emissions**

### **Description**

The RESCUE project will improve knowledge and understanding in area of this call: Climate and Earth System responses to climate neutrality and net negative emissions by pursuing two overall objectives:

- Quantify the climate and Earth system responses to pathways achieving climate neutrality by Carbon Dioxide Removal (CDR) deployment with and without temperature overshoot, and
- Assess the potential role of CDR in reducing net GHG emissions, as well as its potential environmental risks and co-benefits.

RESCUE will expand existing knowledge on CDR methods to design a suite of new global temperature stabilization scenarios at several target values to achieve the first objective. New model developments will deliver improved climate projections with explicit representation of CDR portfolios for these scenarios. The analyses will be devoted to finding suitable pathways to climate neutrality considering multiple aspects of the Earth system response: mean climate and extremes, sea-level rise, global carbon cycling, biodiversity, and ecosystem services. Particular attention will be paid to the reversibility of induced changes by comparing scenarios with and without temperature overshoot.

The second objective will be achieved by analyses assessing various factors determining overall effectiveness, impacts and co-benefits of CDR portfolios. These factors include CDR-specific CO<sub>2</sub> uptake, CDR-induced biogeophysical climate feedbacks, CDR-derived non-CO<sub>2</sub> radiative forcers, and the interaction between socio-economic and environmental impacts (e.g. biodiversity). Moreover, a dedicated analysis will provide key criteria for developing a monitoring system for the effectiveness of CDR portfolio deployments and their potential side effects. Stakeholders will be closely engaged throughout the project to ensure policy relevance and final update of the results which will be made freely available via existing climate services.

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