Theme 2: Prediction of Climate Change and Effect of Mitigating Solutions

1. **'PRECISE - PREdiction of Ice Sheets on Earth', DKK 41,791,111 over 6 years**

   Main applicant: Christine Schøtt Hvidberg, Niels Bohr Institute, University of Copenhagen

   Co-applicants:
   Hilmar Gudmundsson, Department of Geography and Environmental Sciences, Northumbria University

   Joachim Mathiesen, Niels Bohr Institute, University of Copenhagen

   Ruth Mottram, National Centre for Climate Research, Danish Meteorological Institute

   Brief description:
   Sea level rise is one of the most dangerous risks of global warming, threatening coastal communities across the world and potentially flooding hundreds of millions of people annually by the year 2100. Projections of sea level rise are uncertain with a metre-scale uncertainty in the projections from the International Panel of Climate Change (IPCC), and not including additional uncertainties related to ice sheet-instability processes. This uncertainty presents a major challenge for planning adaptation strategies and assessing mitigation solutions. PRECISE will develop current ice flow models used for projections to enable them to react to extreme weather and more melting in a future warmer climate. New descriptions of crevasses and porous ice will be used, and climate feedbacks will be estimated using AI and new data. The goal is to provide robust projections of sea level rise for IPCC assessments with quantified uncertainties and to communicate the results to relevant stakeholders.

2. 'Global Wetland Center', DKK 59,890,858 over 6 years

Main applicant: Guy Schurgers, Dept. of Geosciences and Natural Resource Management, University of Copenhagen

Co-applicants:
Maija Bertule, Centre on Water and Environment, DHI

Stéphanie Horion, Department of Geosciences and Natural Resources Management, University of Copenhagen

Christian Igel, Department of Computer Science, University of Copenhagen

Brief description:
Wetlands contain large amounts of carbon. Wetlands around the globe are under pressure and have been drained for agricultural use, which has caused this carbon to be released as carbon dioxide, a potent greenhouse gas. Protecting and managing wetlands can help to reduce the emission of carbon dioxide. However, rewetting of these areas also enhances emissions of methane and nitrous oxide, two other greenhouse gases. In the Global Wetland Center, we will use a combination of field observations and experiments, modelling, satellite-based observations and technologies based on AI to understand the interactions between hydrology and biogeochemistry at a global scale. We will develop novel models to quantify the greenhouse gas balances, and contribute to developing management strategies that can decrease the emission of greenhouse gases from wetlands, thereby supporting a global shift towards climate neutrality.

3. 'Center for Ice-sheet and Sea-level Predictions (CISP)', DKK 37,020,114 over 6 years

Main applicant: Shfaqat Abbas Khan, DTU Space, Technical University of Denmark

Co-applicants:
William Colgan, Department of Glaciology and Climate, Geological Survey of Denmark and Greenland

Kurt Kjær, Globe Institute, University of Copenhagen

Helene Seroussi, Thayer School of Engineering, Dartmouth College

Brief description:
Global temperature has increased by 1°C over the past century. This has resulted in a sea-level rise of between 16 and 21 cm. This sea-level rise is mainly due to the expansion of warming sea water and the melting of glaciers and ice sheets. The UN expects global sea levels to rise a further 63 to 161 cm by 2100. Poor scientific understanding of the future stability of the Greenland and Antarctic ice sheets casts substantial uncertainty over longer-term projections of sea-level rise. Our interdisciplinary and international Center for Ice Sheet and Sea-Level Prediction (CISP) will make cutting edge computer simulations of ice-sheet evolution until the year 2300, under difference climate scenarios. By directly addressing poor scientific understanding of ice-sheet stability, CISP will reduce uncertainties in future regional and global sea-level changes, and thus deliver the crucial knowledge required by climate adaptation and planning strategies in coastal communities around the world.