

## ArCS II Strategic Goal 2: Improvement of Weather and Climate Prediction

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The Arctic environment is undergoing rapid change amidst global warming. This impact is spreading outside the Arctic, leading to an increase in extreme events in mid-latitude areas. The need for accurate weather and climate prediction is growing, including for adaptation to environmental changes in the Arctic, to prepare for disasters caused by extreme events outside the Arctic region, and to evaluate the economic benefits of Arctic utilization and development. Additionally, obtaining a perspective regarding the potential of long-term, irreversible climate changes caused by shifts in the Arctic environment is essential in order to consider the future of the global environment and human society.

To respond to these needs, it is firstly necessary to scientifically elucidate the mechanisms controlling the Arctic environment and its change, and to study how these are related to weather and climate in regions outside the Arctic. Secondly, in addition to developing numerical models to express these related processes in precise detail, we need to develop methods and data to realize weather and climate prediction on a broad range of time scales by using such numerical climate models. In our research to elucidate the mechanisms of climate change related to the Arctic region and its prediction, the key requirement at the present stage is to maintain a clear awareness of how these scientific findings can be applied to disaster prevention and adaptation on a range of time scales, and to link these to new prediction methods and new means to provide forecast information.

In Strategic Goal 2, we will elucidate the remote connection of weather and climate and assess their predictability with a view toward improving weather and climate prediction. Specifically,

- We will identify the mechanisms behind the occurrence of Arctic-derived extreme events in and outside the Arctic region, and present practical indicators of their occurrence as well as a future perspective under the progression of global warming.
- By improving the expression of Arctic climate processes, we will contribute to the sophistication of numerical climate models, and link this to improved weather and climate prediction in both the Arctic region and globally, on time scales ranging from day-to-day to multi-year, as well as expanding our ability to forecast over a longer period.
- We will elucidate the progression of warming in the Arctic region as well as the mechanisms behind warming amplification, and deepen our understanding of resulting climate change over a time scale of longer than several decades.