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Land-Atmosphere Interactions in Cold Environments (LATICE): The role of Atmosphere - Biosphere – Cryosphere – Hydrosphere interactions in a changing climate

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Climate change is impacting the high latitudes more rapidly and significantly than any other region of the Earth because of feedback processes between the atmosphere and the underlying surface. A warmer climate has already led to thawing of permafrost, reduced snow cover and a longer growing season; changes, which in turn influence the atmospheric circulation and the hydrological cycle. Still, many studies rely on one-way coupling between the atmosphere and the land surface, thereby neglecting important interactions and feedbacks. The observation, understanding and prediction of such processes from local to regional and global scales, represent a major scientific challenge that requires multidisciplinary scientific effort. The successful integration of earth observations (remote and in-situ data) and model development requires a harmonized research effort between earth system scientists, modelers and the developers of technologies and sensors. LATICE, which is recognized as a priority research area by the Faculty of Mathematics and Natural Sciences at the University of Oslo, aims to advance the knowledge base concerning land atmosphere interactions and their role in controlling climate variability and climate change at high northern latitudes. The consortium consists of an interdisciplinary team of experts from the atmospheric and terrestrial (hydrosphere, cryosphere and biosphere) research groups, together with key expertise on earth observations and novel sensor technologies. LATICE addresses critical knowledge gaps in the current climate assessment capacity through:
i) Improving parameterizations of processes in earth system models controlling the interactions and feedbacks between the land (snow, ice, permafrost, soil and vegetation) and the atmosphere at high latitudes, including the boreal, alpine and artic zone.
ii) Assessing the influence of climate and land cover changes on water and energy fluxes.
iii) Integrating remote earth observations with in-situ data and suitable models to allow studies of finer-scale processes governing land-atmosphere interactions.
iv) Addressing observational challenges through the development of novel observational products and networks.

The poster presents the LATICE concept, its main research areas and activities.