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Title Monitoring thermokarst ponds in Subarctic Canada by Unmanned Aerial Vehicle (UAV)
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Theme -Theme 1: Design, Optimization and Implementation of the Observing System

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Poster title (brief) Monitoring thermokarst ponds in Subarctic Canada by Unmanned Aerial Vehicle (UAV)

Abstract - text box
Permafrost is the largest natural carbon store on Earth, estimating to represent twice the concentrations present currently in the atmosphere. Warming of the circumpolar north is accelerating permafrost thaw, with large implications for landscapes, hydrology, ecosystems and the global carbon cycle. Rapid permafrost degradation is creating widespread thermokarst lakes and ponds, acting as hotspots for large amounts of carbon dioxide (CO2) and methane (CH4) emissions, through photochemical and microbial transformations. These dynamics are affecting greenhouse gas emissions to an extent that still needs to be fully integrated in Earth System Models. Scarce attention has been given to waterbodies below 10 000 m2. Yet, these are known to be biogeochemically more active than larger lakes. Variations in the shape and spectral properties of small thermokarst lakes and ponds can provide insights into their potential for greenhouse gases emissions. UAV data acquisition using optical and multispectral sensors is being conducted in several long-term monitoring sites of Centre d'études nordiques (CEN) in Subarctic Canada, from the discontinuous (BGR) to the sporadic (SAS and KWAK) permafrost zones, with acquisitions in 2015, 2017 and 2019 and furthermore planned for 2020. The ultra-high-resolution data, together with field observations on water properties and lake depth, enables the detailed characterization of the lakes and ponds, allowing to better understand local-scale phenomena (e.g. effects of bottom color, water vegetation, vegetation surrounding the lakes, shadows and wind) that impact on coarser spatial resolution satellite imagery. This poster shows examples of results that we obtained using this approach.
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