Meteorological challenges for renewable energy in the High Arctic

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Proven renewable energy solutions for the Arctic do not exist

- In Longyearbyen, Svalbard, 78° N, coal as an energy source ends in autumn 2023
- Replaced temporarily by diesel
- Gradual transition to renewable energy
- Local industry: potential solutions for 1,500 Arctic off-grid societies

But what works in the Arctic?


S. Coulson

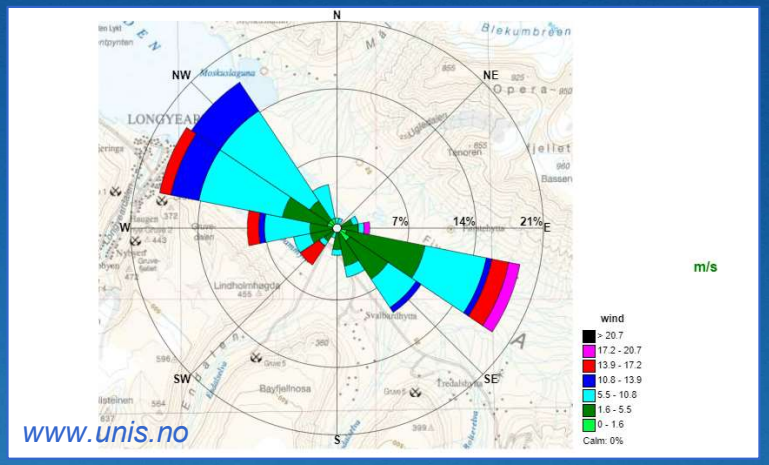
Role of UNIS

i. Energy potential

ii. Impact of the Arctic climate

iii. Impact on the unique nature

iv. Educational and societal actor



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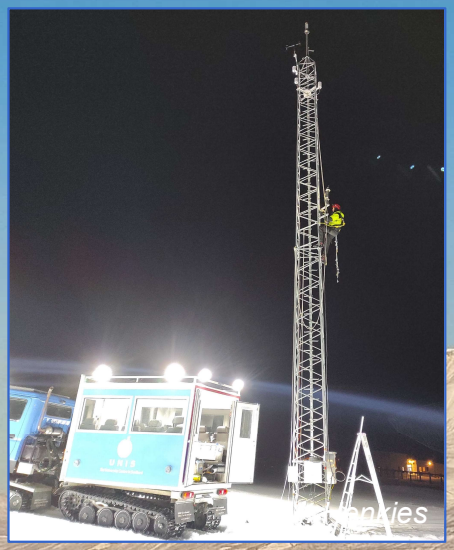
Specific meteorological processes for the Arctic

- Greater heterogeneity of complex local scale processes than elsewhere
- Less is known about Arctic processes
- Long periods with polar night / midnight sun
- Snow drift / icing
- Models more uncertain than at lower latitudes



Examples of ongoing research

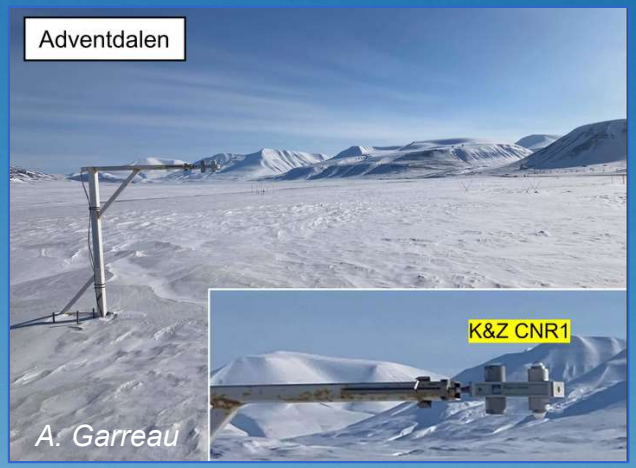
Local summer wind flows

Henkies et al. 2023, to be submitted

- The Arctic fjord breeze, a combined sea-breeze and up-valley wind increase the wind speed
- Surprisingly strong and frequent
- Diurnal variation
- Can also persist several days

Solar potential from long-term measurements

Garreau et al. 2023, to be submitted



- Poster vERE.3:
- *Garreau et al.*: From solar radiation estimation to solar energy potential in the High Arctic

Future plans

- Development of an Arctic energy research and test centre based in Svalbard together with local partners
- Co-operation with industry: If solutions work in Svalbard, they can be exported to the whole Arctic
- Courses in cold climate renewable energy (M.Sc. and Ph.D.) from autumn 2024