# A 16-year record (2002–2017) of permafrost, active-layer, and meteorological conditions at the Samoylov Island Arctic permafrost research site, Lena River delta, northern Siberia: an opportunity to validate remote-sensing data and land surface, snow, and permafrost models

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Summary

Long-term observational data are available from the Samoylov research site in northern Siberia, where meteorological parameters, energy balance, and subsurface observations have been recorded since 1998. Additional data include a high-resolution digital terrain model (DTM) obtained from terrestrial lidar laser scanning. Since the data provide observations of temporally variable parameters that influence energy fluxes between permafrost, active-layer soils, and the atmosphere (such as snow depth and soil moisture content), they are suitable for calibrating and quantifying the dynamics of permafrost as a component in earth system models. The data also include soil properties beneath different microtopographic features (a polygon centre, a rim, a slope, and a trough), yielding much-needed information on landscape heterogeneity for use in land surface modelling.
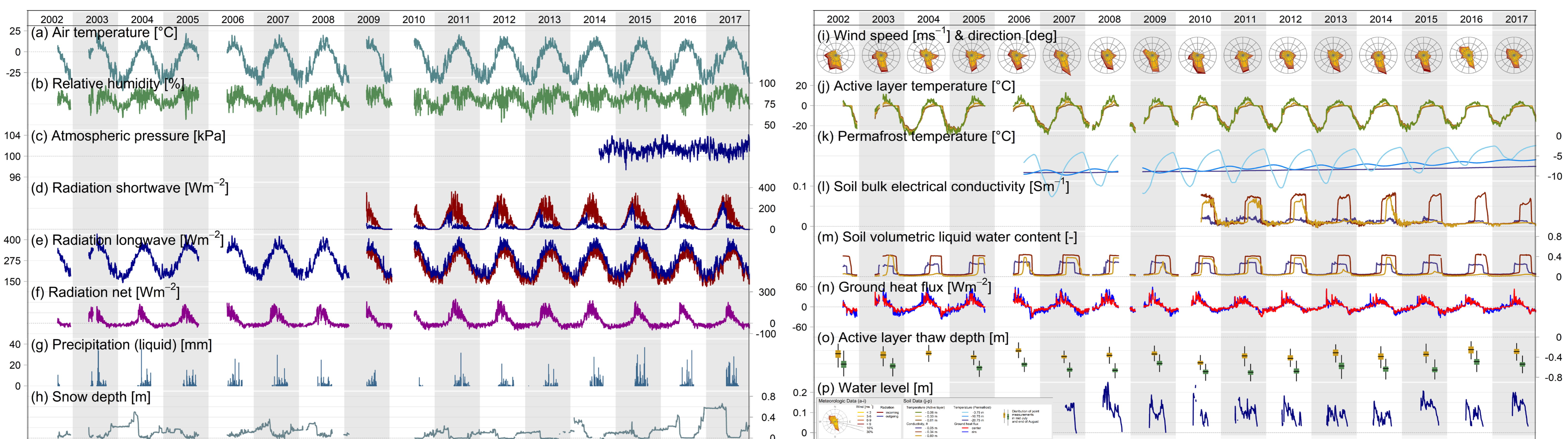
Figure 1. Time series (daily mean values) of Samoylov data presented in Boike et al. (2019): (a–i) meteorological data and (j–p) soil data. Seasonal average active-layer thaw depth (o) was measured at the 150 data points on the Samoylov CALM grid.

1998–2017

- **mean annual air temperature**: −12.3 °C
- **mean monthly air temperature**: 9.5 °C (July) and −32.7 °C (February)
- **average annual rainfall**: 169 mm
- **average annual winter snow cover**: ~0.3 m
- **maximum snow depth**: 0.8 m (2017)

- **end-of-season active-layer thaw depth:** marked interannual variation, no trend, potentially due to thaw subsidence
- **permafrost warming**: 1.3 °C (since installation in 2006, at zero annual amplitude depth at 20.75 m); the trend is one of the highest recorded in the northern circumarctic permafrost region

Figure 2. (a) Location of Samoylov in the Lena River delta, NE Siberia (Landsat-7). (b) Instrumentation and measurement sites. Research site under (c) summer (Sep 2017) and (d) spring (Apr 2014) conditions. (e) Relative vegetation heights (TLS data, Sep 2017).

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