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Present temperature, precipitation and rain-on-snow climate in Svalbard

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Potentially high-impact warm and wet winter conditions have become increasingly common in recent decades in the arctic archipelago of Svalbard. In this study, we document present 2m temperature, precipitation and rain-on-snow (ROS) climate conditions in Svalbard and relate them to different atmospheric circulation (AC) types. For this purpose, we utilise a set of observations together with output from the high resolution numerical weather prediction model AROME-Arctic. We find that 2m median temperatures vary the most across AC types in winter and spring, and the least in summer. Southerly and southwesterly flow is associated with 10th percentile 2m temperatures above freezing in all seasons. In terms of precipitation, we find the highest amounts and intensities with onshore flow over open water. Sea ice appears to play a strong role in the local variability in both 2m temperature and precipitation. ROS is a frequent phenomenon in the study period, in particular below 250 m ASL. In winter, ROS only occurs with AC types from the southerly sector or during the passage of a low pressure centre or trough. Most of these events occur during southwesterly flow, with a low pressure center west of Svalbard.