# Warming trend in the Dome Fuji region of East Antarctica over the past three decades

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Temperature changes in the interior of East Antarctica in recent decades remain uncertain. Here we present a monthly mean near-surface temperature data set for the last 30 years at Mizuho, Relay Station, and Dome Fuji, where historical records of the automatic weather stations (AWSs) have been corrected and gaps have been filled using reanalysis data. Since the 1990s, multiple AWSs have been installed along the route to Dome Fuji, and observations have continued to the present day. First, all systematic errors in the early days of the AWS systems were identified and corrected. Then, multiple AWS records were integrated to create time series for each station. The percentage of missing data was approximately 20% for Relay Station and 30% for Dome Fuji over three decades (see Fig. 1). At Mizuho, the missing rate was about 50%, more than twice as high as at Relay Station. Missing observations are estimated using monthly 2-m temperature (T2m) from the global reanalysis data. We found that the impact of the AWS temperatures on the ERA5 T2m is negligibly small in the east DLM interior, so we used the ERA5 T2m for infilling gaps of compiled temperature record.

The reconstructed record from Relay Station (Dome Fuji) reveals a statistically significant warming of 0.50±0.41 (0.45±0.41) ℃ per decade over the last three decades. The warming trend was not observed in the all months, but there was a clear warming in the months of January, October, and November, with the largest warming in October. Interestingly, these months correspond to the months in which the number of extremely warm days has increased statistically over the last three decades. We found that the inter-annual variability in monthly temperature was matched to the changes in the number of extremely warm days. Most of the high temperature events were recorded during the period when a high-pressure system over the Enderby Land transports warm coastal air towards Dome Fuji. This pattern is consistent with the spatial correlations between SAT at Relay Station (Dome Fuji) and the 500 hPa geopotential height (Z500) field from 1993 to 2022. In addition, the atmospheric circulation trend shows the Z500 anomaly strengthening over the Enderby Land. These suggest that more frequent occurrence of extreme temperature events is attributed to the positive trend in annual mean temperature in the interior region of East Antarctica.

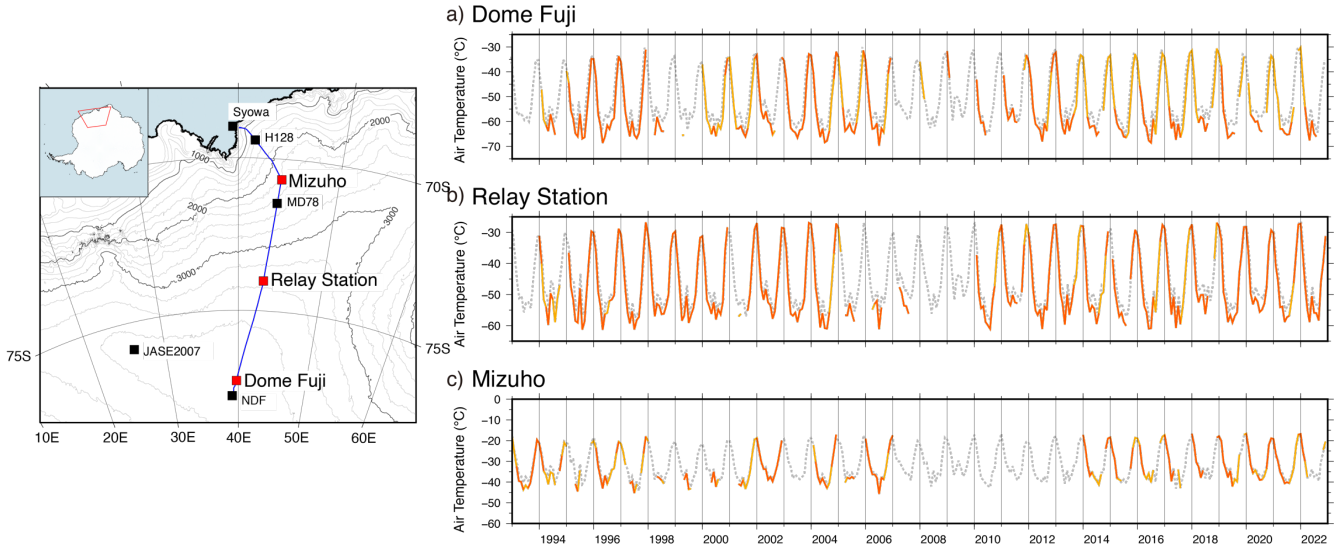


Figure 1. A map of the Dome Fuji region in the East Antarctica (Left) and monthly mean temperature time series from the corrected AWS observations (red and orange lines) and monthly 2-m temperature from ERA5 (dashed gray).

**References**

Kurita et al., Near-surface air temperature records over the past thirty years in the interior of Dronning Maud Land, East Antarctica, Submitted to the Journal of atmospheric and oceanic technology (2023).