

-based probing of the polar cap stratosphere: regime identification, altitude sensitivities, and contributions from different stations

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There is evidence from previous works that global ambient noise infrasound data recorded on by the IMS station network are highly sensitive to the stratospheric polar vortex and its regimes.

Vorobeve et al. (2024) used a data-driven approach to map between microbarom-band array signal processing output from the three northernmost IMS infrasound stations and the ERA5 re-analysis polar cap mean eastward wind at around 50 km altitude. This average can be seen as a proxy for the polar stratospheric circulation regime.

The current work extends this in several ways. We use the same database but include a greater number of stations. The data are also fed into a data clustering algorithm, and we explore to what extent this relates to the stratospheric circulation regimes represented in ERA5 re-analysis model data. Moreover, we assess for what stratospheric altitudes and for what IMS station combinations that we can provide the best data-driven mapping from our data to the average polar-cap eastward wind.

Our study is motivated by a long-term ambition in our research community to exploit global infrasound datasets to enhance the wind representation in high-top atmospheric models. This can have a significant impact on long-term weather forecasting and subseasonal-to-seasonal prediction.

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