

Characterizing 1–5-Day Stratospheric Waves Using Strateole-2 and ERA5

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Motivation & questions

- How well does ERA5 reproduce the timing and magnitude of 1–5-day variability observed by TSEN?
- Does ERA5 performance depend on wave frequency?
- Are ERA5 biases geographically dependent?

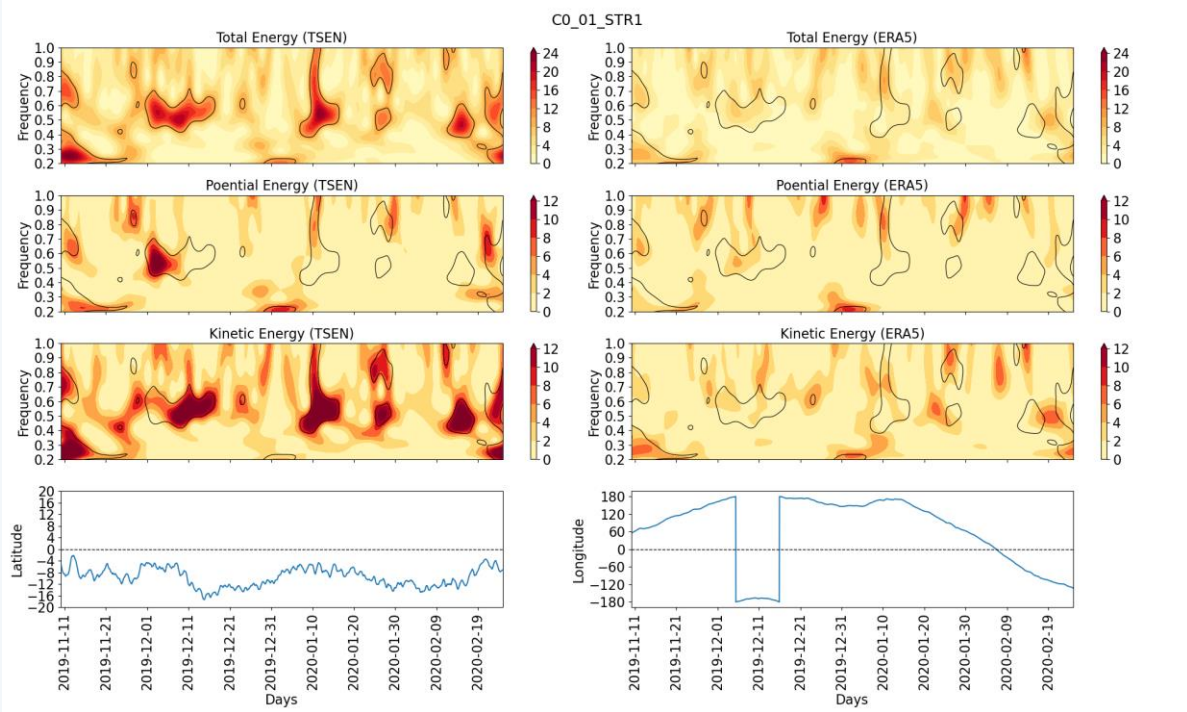
Data & method

- Strateole-2 C0 (2019–2020) and C1 (2021–2022) balloon observations.
- ERA5 hourly model-level fields interpolated to each observed balloon position and time.
- S-transform applied to temperature and wind time series; focus on 0.2–1 Cpd frequency band (1–5 days period).

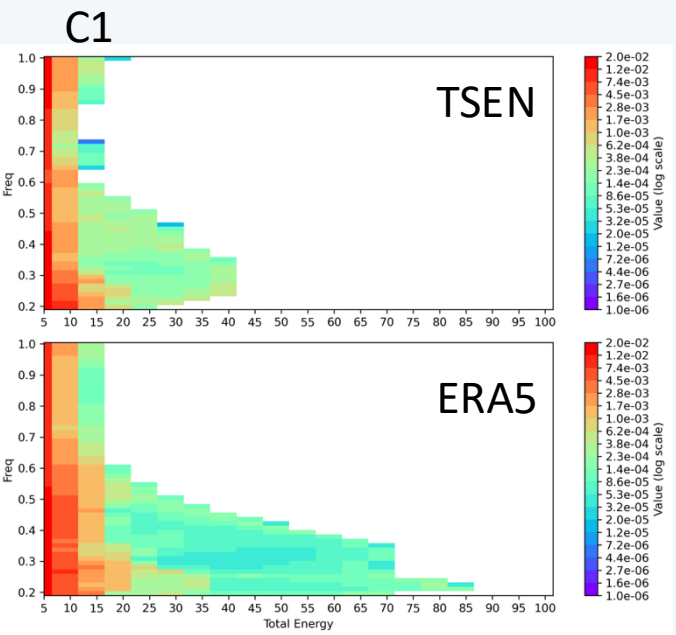
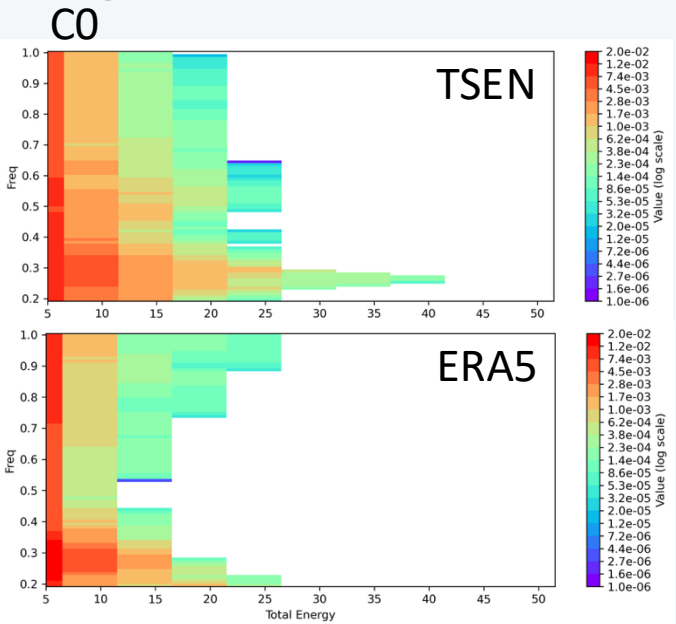
Main findings

- ERA5 captures the timing and approximate frequency of many observed wave-energy events.
- ERA5 generally has lower total energy; the difference is especially apparent in KE.
- The ERA5–TSEN difference is frequency dependent, with notable discrepancies at intermediate frequencies.

Example: time–frequency structure



Energy–frequency distributions



Geographic dependence of ERA5/TSEN energy

