ID: **P1.1-251** Type: **e-Poster**

state of the atmosphere throughout the seasons: comparison of numerical weather prediction models for infrasound observations at regional distances

Tuesday, 29 June 2021 09:45 (15 minutes)

Since the year 2000 the German Aerospace Center (DLR) facility near Heilbronn, Germany, has conducted main engine tests of the European ARIANE-5 rocket.
Infrasound signals from these tests have regularly been observed during the last two decades at IMS station IS26 at a range of about 320 km in easterly direction.
While a majority of these tests produced signal observations when carried out during the winter season between October and April, there is an almost complete lack of observations during the summer season. When comparing numerical weather prediction models for summer and winter seasons, or times with detections or non-detections, then these models differ significantly in the sound speed profiles producing either a strong stratospheric duct or a lack thereof. This is also reflected by the effective sound speed ratio, mostly exceeding a value of 1 for detections and less than 1 for non-detections. However, a significant portion of profiles with non-detections, nearly a quarter or 20 out of 88 cases, show a sound speed profile that should enable infrasound signal observations. The reasons for the lack of observations are addressed in this study.

Promotional text

Infrasound signals from ARIANE-5 engine tests over two decades are investigated regarding the state of the atmosphere and the detectability at IMS infrasound station IS26

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Session Classification: T1.1 e-poster session

Track Classification: Theme 1. The Earth as a Complex System: T1.1 - The Atmosphere and its Dynamic