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Uncertainties in Numerical Weather Forecasting Models and infrasound simulations as observed by the ARISE project

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The middle and upper atmosphere is a highly variable environment at subseasonal time scales. This variability influences the general atmospheric circulation especially through the propagation and breaking of planetary and gravity waves in the stratosphere and mesosphere. The ARISE (Atmospheric dynamics Research InfraStructure in Europe) project integrates complementary instruments such as infrasound stations of the International Monitoring System developed for the verification of the Comprehensive nuclear-Test-Ban-treaty, lidar and radar networks and satellites. One main objective is to determine the origin of the uncertainties in Numerical Weather Prediction (NWP) models, such as the operational analyses distributed by the European Centre for Medium-Range Weather Forecasts (ECMWF) used for infrasound propagation modeling. It is shown that the variability from tropical convection, wind over mountains, stratospheric warming events and gravity wave activity strongly contribute to the uncertainties. The different scales of the disturbances and their seasonal evolution are studied. Significant differences in the uncertainties are observed in regions that are subject to different conditions, depending on wave activity. The ARISE perspective is to provide new data sets for model assessment, assimilation in medium range weather prediction models and in operational infrasound simulations.

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