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## Simulating infrasound waveguides in the middle atmosphere with ICON and UA-ICON: comparison with the IFS and ground-based remote sensing

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Infrasound signals are used to monitor various anthropogenic (explosions, wind farms etc.) and natural (earthquakes, volcanoes etc.) sources. In particular, infrasound is included as one of the four verification technologies used by the International Monitoring System (IMS) by the Comprehensive Test-Ban Treaty Organisation (CTBTO). To determine accurate source locations and estimate source energy, an accurate model of wind and temperature from the surface up to the lower thermosphere is necessary. Operational NWP products are necessary for routine infrasound monitoring activities. However, the use of a sponge layer above ~30 km, to insure stable NWP models, leads to biases in the middle atmosphere (MA), where the relevant infrasound waveguides for long-range propagation are found. For UA-ICON, the sponge layer is set much higher in the thermosphere. Therefore, the UA-ICON, which provides modelled atmospheric parameters up to 150 km (110 km sponge layer height), is relevant in this context.

First, to assess ICON and IFS operational analysis products, comparisons to lidar observations are made. The main differences between both products were analysed with respect to winds and temperatures in the MA, and hence with respect to the infrasound guide prediction. Second, UA-ICON simulations were performed and the outputs were compared to ICON and IFS fields to demonstrate the increased wave activity above ~30 km with UA-ICON. The added value of UA-ICON with respect to ICON and IFS products for infrasound propagation simulations is discussed. The comparisons between the remote sensing instrumental results and the models will be presented, as well as comparisons between modelled and measured infrasound propagation.