



HAL
open science

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

Samuel Kristoffersen, Constantino Listowski, Robin Wing, Gerd Baumgarten, Sergey Khaykin, Alain Hauchecorne, Julien Vergoz, Alexis Le Pichon

► To cite this version:

Samuel Kristoffersen, Constantino Listowski, Robin Wing, Gerd Baumgarten, Sergey Khaykin, et al.. Simulating infrasound waveguides in the middle atmosphere with ICON and UA-ICON: comparison with the IFS and ground-based remote sensing. EGU General Assembly 2024, Apr 2024, Vienna, Austria. pp. EGU24-7854, 2024, 10.5194/egusphere-egu24-7854 . insu-04515464

HAL Id: insu-04515464

<https://insu.hal.science/insu-04515464>

Submitted on 4 Jun 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License

EGU24-7854, updated on 04 Jun 2024

<https://doi.org/10.5194/egusphere-egu24-7854>

EGU General Assembly 2024

© Author(s) 2024. This work is distributed under the Creative Commons Attribution 4.0 License.



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

Samuel Kristoffersen¹, Constantino Listowski¹, Robin Wing², Gerd Baumgarten², Sergey Khaykin³, Alain Hauchecorne³, Julien Vergoz¹, and Alexis Le Pichon¹

¹French Atomic and Alternative Energy Commission, France

²Leibniz Institute of Atmospheric Physics

³Laboratoire atmosphères, milieux, observations spatiales

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.