

Thunderstorm activity as observed by the ARISE project

E. Blanc¹ and the ARISE team

1 CEA, DAM, DIF, F-91297 Arpajon, France

The objective of this paper is to evaluate the potential of the ARISE project for the study of thunderstorm activity, related processes and impacts.

ARISE is an infrastructure design study project that integrates different networks in order to provide “3D” images of atmospheric dynamics from the ground up to the mesosphere with unprecedented spatio-temporal resolution. The implied networks are:

- the International Monitoring System infrasound network, developed for verification of the Comprehensive nuclear Test Ban Treaty (CTBT). This system is unique in its spatial extent and sensitivity for recording infrasound and atmospheric waves.
 - the Network for the Detection of Atmospheric Composition Changes (NDACC), which uses Lidar to measure stratospheric dynamics,
 - the Network for the Detection of Mesopause Changes (NDMC), dedicated to airglow layer measurements in the mesosphere,
- and additional complementary stations and satellite data.

The infrastructure extends across Europe and outlying regions, including polar and equatorial regions. Atmospheric waves play a key role in atmospheric mixing and global circulation in the stratosphere and mesosphere. Large scale planetary waves can lead to sudden stratospheric warming, while gravity waves generate tropical wind oscillation. Parameterization of gravity waves is needed for accurate simulation of mean climate and variability, but their parameters are uncertain due to lack of long-term high-resolution observations. The expected benefits from ARISE include a better description of the atmosphere and an improved accuracy in short and medium range weather forecasts. ARISE measurements will be used to improve the parameterization of gravity waves in the stratosphere to better resolve climate models. Such description is crucial to estimate the forcing of stratospheric layers on the troposphere. The data collected within the ARISE project will be used for monitoring middle atmosphere climate, its changes in the occurrence of extreme events and long-term mean trend. The benefits also include civil applications related to monitoring of natural hazards