FINNISH METEOROLOGICAL INSTITUTE

ESA MesosphEO

MesosphEO WP 4.2:
MIPAS-IMK/IAA Ice Volume Density Data ReadMe
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1. Introduction

This document explains the netCDF format used for MIPAS-IMK/IAA data of ice volume density calculated from the MIPAS MA, UA, and NLC observation modes in the ESA's MesosphEO project. For every observation mode there is one file which contains all ice volume density data available. The filenames are as follows:

MIPAS_<obs.-mode>_n_ice.nc

2. Data screening

The data given in the files cover an altitude range which usually is greater than the validity range of the data. Therefore data screening has to be performed:

Ice volume density data is very noisy with very large spread in the data and large positive and negative values. The use of single profiles is then not recommended. Also, when using average of data, e.g. as in zonal mean, the removal of outliers, something like 5 sigma of the mean value is recommended. Some spurious data might also be at altitudes below around 80 km, where NLC are not expected to occur and at latitudes below around 60 degrees.

All ice volume density data marked with the missing value (-999.0) have to be discarded.

3. Data gridding and units

The data are provided on a fixed altitude grid. There is one ice volume density profile per MIPAS measurement geolocation. Alongside there is a pressure and a temperature profile for every geolocation.

Temperature is provided in K, pressure in hPa. The unit of the ice volume density is 10^{-14} (m^3/m^3). A detailed description of all data fields is given in Sect. 5.

4. User guidance

The data have been derived from MIPAS spectra in emission and hence contain all sizes of ice particles. That is, it has been derived its volume density irrespective of the size of the ice particles. More details on the inversion and analysis of the data can be found in López-Puertas et al. (2009) and Garcia-Comas et al. (2016). The data can be used for analyse of the ice content in the NLCs. An advantage of the data is that they are sensitive to all ice particle sizes and that it cover the whole latitude range, i.e., all polar latitudes, begin that particular useful for studying the global latitudinal coverage. Another advantage is that they cover the NLC seasons in both hemispheres. On the other hand, the measurements are rather sparse in time and hence not useful for trends analyses or temporal variations analyses.

5. NetCDF format for MIPAS ice volume density data

The netCDF data files contain dimensional information, data variables, and some self-evident global attributes. In detail there are:

Dimensions:

No	Dimension name	Content
1	time	Number of measurements/geolocations
2	altitude	Number of result altitude grid points
3	stringlength	Maximum stringlength

Data:

No	Variable	Unit	Dimension	Description
1	time	days	time	Days since 1.1.1970, 00:00:00
3	geo_id	n/a	time x stringlength	geolocation identifier: 5 digits orbit number, 1 underscore, 16 digits UTC date/time in ISO format
4	latitude	degrees north	time	latitude, -90 to 90 deg
5	longitude	degrees east	time	longitude, -180 to 180 deg
6	sza	degree	time	solar zenith angle, 0 to 180 deg
14	altitude	km	altitude	altitudes of the retrieval grid, result data is given for this altitudes
16	pressure	hPa	altitude x time	pressure at altitude from MIPAS L2 data
17	temperature	K	altitude x time	temperature at altitude from MIPAS L2 data
18	n_ice	10^{-14} m^3/m^3	altitude x time	ice volume density at altitude

6. References

ESA MesosphEO project plan, version 1.5, 2016

Garcia-Comas, M., López-Puertas, M., Funke, B., Jurado-Navarro, A. A., Gardini, A., Stiller, G. P., Clarmann, von, T. and Höpfner, M.: Measurements of global distributions of polar mesospheric clouds during 2005–2012 by MIPAS/Envisat, Atmos. Chem. Phys., 16(11), 6701–6719, doi:10.5194/acp-16-6701-2016, 2016.

López-Puertas, M., García-Comas, M., Funke, B., Bermejo-Pantaleón, D., Höpfner, M., Grabowski, U., Stiller, G. P., Clarmann, von, T. and Savigny, von, C.: Measurements of polar mesospheric clouds in infrared emission by MIPAS/ENVISAT, Journal of Geophysical Research, 114, D00I07, doi:10.1029/2009JD012548, 2009.