



ESA Atmospheric Toolbox

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The ESA Atmospheric Toolbox (BEAT) is one of the ESA Sentinel Toolboxes.

It consists of a set of software components to read, analyze, and visualize a wide range of atmospheric data products. In addition to the upcoming Sentinel-5P mission it supports a wide range of other atmospheric data products, including those of previous ESA missions, ESA Third Party missions, Copernicus Atmosphere Monitoring Service (CAMS), ground based data, etc.

The toolbox consists of three main components that are called CODA, HARP and VISAN.

CODA provides interfaces for direct reading of data from earth observation data files. These interfaces consist of command line applications, libraries, direct interfaces to scientific applications (IDL and MATLAB), and direct interfaces to programming languages (C, Fortran, Python, and Java).

CODA provides a single interface to access data in a wide variety of data formats, including ASCII, binary, XML, netCDF, HDF4, HDF5, CDF, GRIB, RINEX, and SP3.

HARP is a toolkit for reading, processing and inter-comparing satellite remote sensing data, model data, in-situ data, and ground based remote sensing data.

The main goal of HARP is to assist in the inter-comparison of datasets. By appropriately chaining calls to HARP command line tools one can pre-process datasets such that two datasets that need to be compared end up having the same temporal/spatial grid, same data format/structure, and same physical unit.

The toolkit comes with its own data format conventions, the HARP format, which is based on netcdf/HDF. Ingestion routines (based on CODA) allow conversion from a wide variety of atmospheric data products to this common format. In addition, the toolbox provides a wide range of operations to perform conversions on the data such as unit conversions, quantity conversions (e.g. number density to volume mixing ratios), regridding, vertical smoothing using averaging kernels, collocation of two datasets, etc.

VISAN is a cross-platform visualization and analysis application for atmospheric data and can be used to visualize and analyze the data that you retrieve using the CODA and HARP interfaces. The application uses the Python language as the means through which you provide commands to the application. The Python interfaces for CODA and HARP are included so you can directly ingest product data from within VISAN. Powerful visualization functionality for 2D plots and geographical plots in VISAN will allow you to directly visualize the ingested data.

All components from the ESA Atmospheric Toolbox are Open Source and freely available. Software packages can be downloaded from the BEAT website: <http://stcorp.nl/beat/>