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ACE – FTS

Atmospheric Chemistry Experiment

File format description for ACE-Imager level 2 data version 2.2 ASCII format

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	Function	Name	Signature	Date
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1. Introduction and Format Description

The user is **strongly encouraged** to read the imager retrieval README file (produced by Chris Boone and reproduced in this document) before using these data.

General comments on the file formatting and data:
In all of these files, the start and end times given (either time stamp or date and time) correspond essentially to the start and end of the command sequence. They cannot and should not be used to derive the length of an occultation since they include warm up time and calibration measurements (deep space and exo-atmospheric). The location given for each occultation is obtained from the latitude, longitude and time of the 30 km tangent point (calculated geometrically).

The uncertainties provided for the extinction results are statistical errors from the fitting process (1-sigma), and do not include systematic contributions. A fill value of -999 is used when no data is available.

The ACE-imager measurements are recorded every 0.25 s. This corresponds to a measurement spacing of less than 1 km which decreases at lower altitudes due to refraction. The typical altitude spacing changes with the orbital beta angle. Because the altitude spacing is always less than 1 km, the retrieval is performed on a standard 1 km grid (every 1 km from ~5.5 to 74.5 km). Since the altitude range of this grid differs from that of the ACE-FTS 1 km grid, it is referred to as the "imager grid".

Use of ACE-FTS data:
Since we do not have absolute pointing information for the ACE instruments, the ACE-imager retrievals have to rely on data from ACE-FTS retrievals. The ACE-FTS tangent height information is used to provide altitude assignments and the ACE-FTS pressure and temperature retrievals are used for calculating refraction effects. Thus the imager level 2 data uses the same version number as the ACE-FTS level 2 data it is based on (in this case version 2.2).

Prepared by Kaley Walker, September 14, 2005 (kwalker@uwaterloo.ca).

Table 1: ACE-Imager File format – Version 2.2

Filename: sxXXXXimager.asc or sxXXXXXimager.asc			
Field name	**Description**	**Acceptable values / units**	**Type**
Header section			
name	Occultation identifier using mission name (ace), orbit number (XXXX) and type of occultation (sx)	ace.sxXXXX	String
start_timetag	Time stamp for start of measurement sequence for the occultation	Mission elapsed seconds	Float
end_timetag	Time stamp for end of measurement sequence for the occultation	Mission elapsed seconds	Float
start_time	Start date and time of occultation measurement sequence (UTC)	YYYY-MM-DD hh:mm:ss.ms+00	String
end_time	End date and time of occultation measurement sequence (UTC)	YYYY-MM-DD hh:mm:ss.ms+00	String
date	Date and time of occultation 30 km geometric tangent point (UTC)	YYYY-MM-DD hh:mm:ss.ms+00	String
latitude	Latitude of 30 km geometric tangent point for occultation	Degrees (±90, N = +, S = -)	Float
longitude	Longitude of 30 km geometric tangent point for occultation	Degrees (±180, E = +, W = -)	Float
beta_angle	Beta angle of occultation (at 30 km tangent point)	Degrees	Float
Data section			
z	Tangent altitude grid for retrieved parameters and species	km	Float
VIS_ext	Atmospheric extinction at 525 nm	km^{-1}	Float
VIS_ext_err	Statistical error for atmospheric extinction at 525 nm from fitting	km^{-1}	Float
NIR_ext	Atmospheric extinction at 1020 nm	km^{-1}	Float
NIR_ext_err	Statistical error for atmospheric extinction at 1020 nm from fitting	km^{-1}	Float

2. Readme File

ACE-Imager retrievals version 2.2
August 24, 2005

The preliminary approach employed for calculating transmittances for the imagers uses ACE-FTS tangent heights for altitude registration.

A rotation is applied to measured images such that the rows of the transformed image are parallel to the Earth's horizon. The transformation uses the assumed orientation of the satellite for aligning the MAESTRO input slit to the horizon (accurate to +/- 1 degree). The images are corrected for items such as dark counts and secondary images.

Transmittances are calculated only for the pixels deemed to be in the center of the ACE-FTS field of view (FOV), as determined from the pre-launch registration measurements, and post-launch checks of the registration. The results are averaged for three pixels to improve the signal-to-noise ratio. The three pixels are within the FTS FOV and are from the same row of the rotated image (and thus have the same tangent altitude).

Tangent heights are assigned to the transmittance data through the timestamps of the ACE-FTS and imager measurements. The imager data is on a finer altitude grid, and so cubic spline interpolation is used to cast the ACE-FTS tangent heights onto the imager measurement grid. An offset in timestamp is required for relating the two data sets. The timestamp for the ACE-FTS measurements corresponds to the beginning of the scan (rather than the more appropriate middle of the FTS scan), and there is the possibility of additional offsets in the timestamps. The value selected for the offset was chosen such that cloud features in the extinction profiles for the imagers matched observations from cloud spectral features in the FTS. This leads to an altitude registration (~ 1 km) problem with a small set of SAGE III measurements we had available for comparison, but internal consistency was more important, because the ACE-FTS tangent heights were used for altitude registration, and pressure and temperature from the ACE-FTS retrievals were used for calculating refraction effects.

From the transmittance data, a profile for atmospheric extinction was retrieved. The retrieval is performed on a standard 1-km grid, because the altitude spacing of imager measurements is always less than 1 km.

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