IRIS Database Read me and List of Abbreviations

Last updated April 19th 2024

The IRIS Laboratory was setup to provide accurate high-quality spectral data of analogue spectra for remote sensing of Mercury by MERTIS onboard BepiColombo.

Two spectrometers BRUKER VERTEX 70v and BRUKER VERTEX 80v with different measurement units are used in the IRIS laboratory (see "Unit" below). Furthermore, the database contains some spectra measured in other laboratories with other devices.

In addition, the database includes Raman spectra, electron microscope data (EDS or WDS), electron microscope images, light microscopy images and photographs of the samples.

To use the database, you can use the search field. There you can search for a specific ID or a mineral or sample name. Before accessing the spectral information, the tab "Microprobe Analysis" MUST be used.

For another sample the tab ‘Reset’ MUST be pressed. Then start with another run.

If you have any question or problem, please send an email to: irisdb@wwu.de

We carefully checked all published data in this database. However, all information is without guarantee!

Please cite all information used from this database with the reference given in each spectral file along with the database itself.

Meteorites are named with their respective names as found in the “Meteoritical Bulletin Database”. For thin sections, taken from the meteorite collection of the Institut für Planetologie in Münster, the “PL-number” is given additionally.

See also the “Comment” within the spectral files for additional remarks of that specific sample.

The spectral file

The header of each spectral file that can be downloaded **[Measurementprotocol]** contains information about the sample, the measurement parameters and the background/standard measurement used to calculate that specific spectrum. The length (number of rows) of the header can vary between different files.

Each sample in the IRIS database has a unique identification number (ID) and a name[1], which is given in line 2 and 3 of the spectral file.

[Grainsize] The grain size is typically a range when a powder sample has been analyzed. 999-999 refers to thin sections or blocks of samples.

[Temperature] The approximate temperature of the sample is given here. This is rough the room temperature for measurements with the A513 (see Unit for details), but may vary if other units are used.

[Pressure] The pressure within the sample chamber is indicated here. This is not to be confused with the value 'Pressure Interfer'.

[Incident Angle] and **[Emergent Angle]** The available observation geometries depend on the used measurement device as follows:**[Unit]**

(1) 'A513' Variable angle unit: bidirectional to biconical measurements, the spot size on the sample depends on the observation geometry, angles between 13° and 90° for incident (i) and emergent (e) angles, indication e.g., i20;e30 for incident angle 20° and emergent angle 30°
(2) 'PM' Praying Mantis (Harrick), used always in combination with a heat stage, fixed biconical observation geometry indication i-;e-. The optical path is typically purged with zero air to reduce atmospherically bands. However, the sample compartment itself is usually evacuated to high vacuum (see [Pressure] entry).
(3) 'Hyperion' Infrared Microscope, observation geometry indication i0;e0. The spot size depends on the used detector (see [Detector]). The sample compartment can be purged with zero air to reduce atmospheric bands.
(4) 'Emission stage' collects the emitted radiation orthogonal to the samples surface.

[Date of Measurement] and **[Time of Measurement]** The exact measurement date and time for each single measurement is given here.

[Number of Scans] The number of scans is usually a value of 2^n with $n \in \mathbb{Z}$ and describes the number of full scans of the interferogram (forwards and backward). The normal routine in the IRIS laboratory includes double sided forward-backwards scans of the interferogram. Apodization is done via Blackman-Haries-3-term and Phase correction via the Mertz-function.

[Resolution] The spectral resolution is given here. It is 4 cm^{-1} in the IRIS laboratory. This value leads to a resolution that is comparable to the spectral resolution of the MERTIS instrument (dispersive spectrometer) which measures between 7 µm and 14 µm. The spectral data is typically zero-filled.

[Preamplifier Gain] and **[Signal Gain]** Preamplifier and signal gain are listed for internal check-ups.

[Source] The source is a glowing SiC-globar for MIR measurements.

[1] The name *should* describe the sample properties as well as possible. However, sometimes it is not as a 100% unambiguous. Always also read the list of aberrations below, the microprobe analysis, the comment and best of all the original publication to avoid misinterpretations.

[Beamsplitter] The beamsplitter depends on the measured wavelength range.

[Detector] The standard detector of measurements with the A513 unit is the liquid-nitrogen cooled mercury cadmium telluride (LN-MCT) detector. For UV measurements a gallium phosphide (GaP) diode detector and for VIS measurements a Si-detector is used. The Hyperion 3000 infrared microscope provides an FPA (Focal Plane Area) and an MCT detector: The FPA detector measures a 64 x 64 Pixel area with a resolution of around 3 µm. The microscopes MCT detector has a manual knife edge aperture which can be adjusted to a maximum size of around 150 x 150 µm².

[Apertur] The aperture field gives only valid information by usage of the A513 device. However, the spot size is larger than this value and has do be calculated separately if necessary!

[Pressure Interfer.] The pressure in the interferometer 'Pressure interfer'is the pressure within the instrument and not in the sample compartment!

[Experiment] The experiment lists the loaded measurement conditions in the interferometer software.

[Operator Name] The name of the person who is responsible for the measurement is listed here.

[Spectrometer] The spectrometer is typically one of the two instruments of the IRIS laboratory.

[Wavelength stop] and **[Wavelength start]** The range of the spectral measurement is listed here.

[Background Parameters] The background parameters are mostly for internal checking.

[ID Background] and **[Name Background]** For MIR measurements with the A513 and the Praying Mantis typically a commercial rough gold coated INFRAGOLD background or standard is used. For thin section measurements with the A513 and for measurements with the Hyperion 3000 infrared microscope usually a gold mirror is used. NIR measurements are performed with a Spectralon background. VIS and UV measurements are performed with $BaSO_4$. For emission measurements a cavity radiator is used.

[Comment] The comment field contains additional comments about the sample.

[Reference] The publication containing the measurements is available here.

[Measurement data] The measurement data contain three columns for the wavenumber, the wavelength, and the reflectance.

Abbreviation list:

Ab	Chemical composition $NaAlSi_3O_8$
An	Chemical composition $CaAl_2Si_2O_8$
BS	
CB	Calroris Basin – Crater on Mercury
CBC	
CMAS	
Di	Diopside
EAC	
En	Enstatite
FCMAS	
Fo	Forsterite
Fs	Ferrosilite
Fsp	Feldspar
G1 Char1	
GASP	

Gl	Glass
HaH	
Hal-	
HASP	
HMR	High Magnesium Region -a Terrain on Mercury
IC	
ICP-HCTa	
Ilm	Ilmenite
IT	
Mix	Mixture of different constitutes
MMX	
MORB	Mid ocean ridge basalt
NC	
NP	Northern Plains – Northern Plains of Mercury
NVPa	
NWA	Northwest Africa (Place of discovery of the meteorite)
Ol	Olivine
Or	Chemical composition $KAlSi_3O_8$
PD	
Pl, Plag	Plagioclase
PL-*number*	Refers to the meteorite collection of the Institut für Planetologie in Münster
Px, Pyx	Pyroxene
Qz	Quartz
RB	
SW	Space weathering
Syn	synthetic
UVW	
vdK	Refers to “vander Kaaden”
Wo	Wollastonite,chemical composition $Ca_3[Si_3O_9]$