

refraction_corrector_plus

This program applies the correction of the differential atmospheric refraction effect in data cubes, using the equations that describe the variation of the coordinates x and y of the centroids of the data cube's images as a function of the wavelength. In order to the program work correctly, it's necessary that all the data cubes to be corrected have headers with the parameters "CRVAL3", "CRPIX3" and "CDELTA3" (related to the wavelength calibration). If that is not the case, then, these parameters can be added to the data cubes' headers using the program "header_correct_plus". The data cubes generated by this program will also have headers with these three parameters. The input parameters for this program are:

infolder: directory containing ALL files that will be used during the execution of the program.

outfolder: directory where ALL files generated by the program will be saved.

outputprefix: prefix to be added to the names of the data cubes with the differential atmospheric refraction effect corrected.

coefficients: name of the file containing the coefficients of the third degree equations that express the variation of the centroids' coordinates of the data cubes' images as a function of the wavelength (this file must be in the directory indicated by the parameter "infolder"). The third degree equations must have the form

$$\begin{aligned} X_{cent} &= Ax + Bx \cdot (\lambda) + Cx \cdot (\lambda)^2 + Dx \cdot (\lambda)^3 \\ Y_{cent} &= Ay + By \cdot (\lambda) + Cy \cdot (\lambda)^2 + Dy \cdot (\lambda)^3 \end{aligned}$$

where λ = wavelength

and this file must be configured in the following way:

Ax Bx Cx Dx
Ay By Cy Dy Cube 1

Ax Bx Cx Dx
Ay By Cy Dy Cube 2

Ax Bx Cx Dx
Ay By Cy Dy Cube 3

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. .
. .
. .

Ax Bx Cx Dx
Ay By Cy Dy Cube n

Obs: The parameters obtained for the third degree equations of all data cubes must be supplied here

cubenum: number of data cubes in which the program will be applied.

Xref and Yref: coordinates x and y, respectively, of the reference centroid, i.e., final coordinates of the centroid that all images of the data cubes will have after the differential atmospheric refraction correction. These coordinates will be the same to all data cubes in which the program will be applied.

Nmin and Nmax: values of the lowest and highest spectral pixel, respectively, to be considered in the process of differential atmospheric refraction correction. These values will be the same to all data cubes in which the program will be applied.

extension: value of the extension of the data cubes that will be used in the correction process. This value will also be the same to all data cubes in which the program will be applied and, if these data cubes have only one extension, then it must be taken the value 0 for this parameter.

logfile: name of the logfile to be created.

input_cubes_list: file containing the names of the data cubes (located in the directory indicated by the parameter “infolder”) in which the differential atmospheric refraction correction will be applied. This file must be configured in the following way:

cube1.fits
cube2.fits
.
.
.
.
cuben.fits

where cube1.fits, cube2.fits,... and cuben.fits are the names of the data cubes in which the differential atmospheric refraction correction will be applied