Venus IRTF/SpeX Image Data Pipeline

Steps

0. Select 3-12 sharp continuum-k images from the beginning of the observation night. Then 3-12 sharps from the middle and end of the observation night. Put into folders:

Folders → 0cont-k sharps1  ... sgd.2017A072.170425.im.00019.a.fits, ...

0cont-k sharps2  ... sgd.2017A072.170425.im.02749.a.fits, ...

0cont-k sharps3  ... sgd.2017A072.170425.im.03082.a.fits, ...

1. Remove slit and detector crack using IDL *deslit.pro*. Send to folders:

Folders → 1cont-k deslit1  ... deslit_sgd.2017A072.170425.im.00019.a.fits,

1cont-k deslit2  ... deslit_sgd.2017A072.170425.im.02749.a.fits,

1cont-k deslit3  ... deslit_sgd.2017A072.170425.im.03082.a.fits,

2. Co-register and stack continuum-k images, remove bad and outlier pixels, using IDL *xccstackclean.pro*. This uses *correl_optimize.pro* with ¼ pixel registration and fractional pixel shifter *sshift2D.pro* to co-register the images. Each pixel in the superimage is replaced by the median of each set of stack pixels to remove bad and outlier pixels. Send to folders:

Folders → 2cont-k super1  clean_deslit_super_4-25-17_cont-k1.fits

2cont-k super2  clean_deslit_super_4-25-17_cont-k2.fits

2cont-k super3  clean_deslit_super_4-25-17_cont-k3.fits

3. Select 2-10 sharp Brackett-γ images from the beginning of the observation night. Then 2-10 sharps from the middle and end of the observation night. Put into folders:

Folders → 3br-g sharps1  … sgd.2017A072.170425.im.00135.a.fits, …

3br-g sharps2  … sgd.2017A072.170425.im.02810.a.fits, …

3br-g sharps3  … sgd.2017A072.170425.im.02824.a.fits, …

4. Remove slit and detector crack using IDL *deslit.pro*. Send to folders:

Folders → 4br-g deslit1  … deslit_sgd.2017A072.170425.im.00135.a.fits,

4br-g deslit2  … deslit_sgd.2017A072.170425.im.02810.a.fits,

4br-g deslit3  … deslit_sgd.2017A072.170425.im.02824.a.fits,

5. Co-register and stack Brackett-γ images, remove bad and outlier pixels, using IDL *xccstackclean.pro*. This uses *correl_optimize.pro* with ¼ pixel registration and fractional pixel shifter *sshift2D.pro* to co-register the images. Each pixel in the superimage is replaced by the median of each set of stack pixels.

Folders → 5br-g super1  clean_deslit_super_4-25-17_br-g1.fits

5br-g super2  clean_deslit_super_4-25-17_br-g2.fits

5br-g super3  clean_deslit_super_4-25-17_br-g2.fits

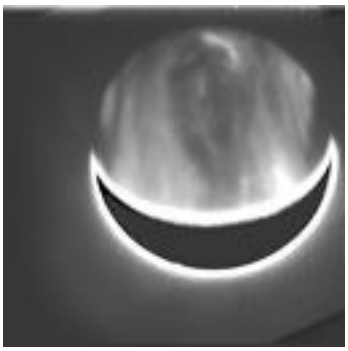
6. Subtract scattered sunlight from the continuum-k superimage by subtracting the Brackett-γ superimage. First, the background (sky) values of both superimages are sampled, then the Brackett-γ superimage background is adjusted to the continuum-k superimage background value. Then, co-register and subtract the background-normalized Brackett-γ superimage from

the continuum-k superimage using IDL *xccstackclean.pro*. This uses *correl_optimize.pro* with ¼ pixel registration and fractional pixel shifter *sshift2D.pro* to co-register the images.

Folders → 6sunlight subtract1

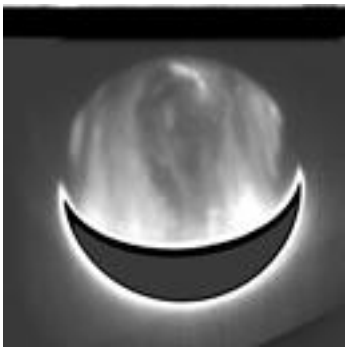
clean_deslit_sunsubtract_4-25-17_cont-k1.fits

6sunlight subtract 2



clean_deslit_sunsubtract_4-25-17_cont-k2.fits

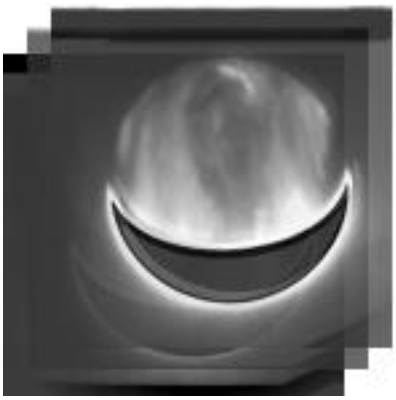
6sunlight subtract 3



clean_deslit_sunsubtract_4-25-17_cont-k3.fits

7. Co-register each superimage in order to make a 3-frame movie of cloud motion using IDL *xccstackclean.pro*. This uses *correl_optimize.pro* with ¼ pixel registration and fractional pixel shifter *sshift2D.pro* to co-register the images. ffmpeg.exe is used to make the movie.

Folder → 7coreg1-3



clean_deslit_sunsubtract_4-25-17.mov