Io Eclipse Data Roundup and Summary

**APO:** UT180320, UT190812, UT200823, UT200908, UT201001, UT201017

For each date, make the waterfalls with commands as: 'UT201017'

**Io\_Eclipses\_optical\_V2**, Part=**0**, Date='UT201017'

**Io\_Eclipses\_optical\_V2**, Part=**1**, Date='UT201017'

This saves a structure with brightness, uncertainties, times, etc. in the reduction directory: Io\_Airglow\_params.sav

**Keck:** UT180807

**Io\_Eclipses\_optical\_V2**, Part=**100.**, Date='UT180807'

**Io\_Eclipses\_optical\_V2**, Part=**101.**, Date='UT180807'

**Io\_Eclipses\_optical\_V2**, Part=**102.**, Date='UT180807'

**Io\_Eclipses\_optical\_V2**, Part=**102.**, Date='UT180807'

This saves a structure with brightness, uncertainties, times, etc. in the reduction directory: Io\_Airglow\_params.sav, same format as APO

**LBT:** UT190424

**Io\_Eclipses\_optical\_V2**, Part=**10.**, Date='UT190424'

**.**6300 Waterfall

**Io\_Eclipses\_optical\_V2**, Part=**11.02**, Date='UT190424'

**Io\_Eclipses\_optical\_V2**, Part=**11.2**, Date='UT190424' Na

**Io\_Eclipses\_optical\_V2**, Part=**11.3**, Date='UT190424' K

**Io\_Eclipses\_optical\_V2**, Part=**11.9**, Date='UT190424' Na Sunlit

Included in these summaries are waterfall plots of Na D and O6300. Other species are open for analysis, but the waterfalls are not included in this document for the sake of brevity.

Each waterfall contains information on which frames, if any, were rejected.

Pointing confirmation usually will not include images of ecam as this usually provides little information in eclipse, but will include a reference ecam file number which corresponds to science frame.

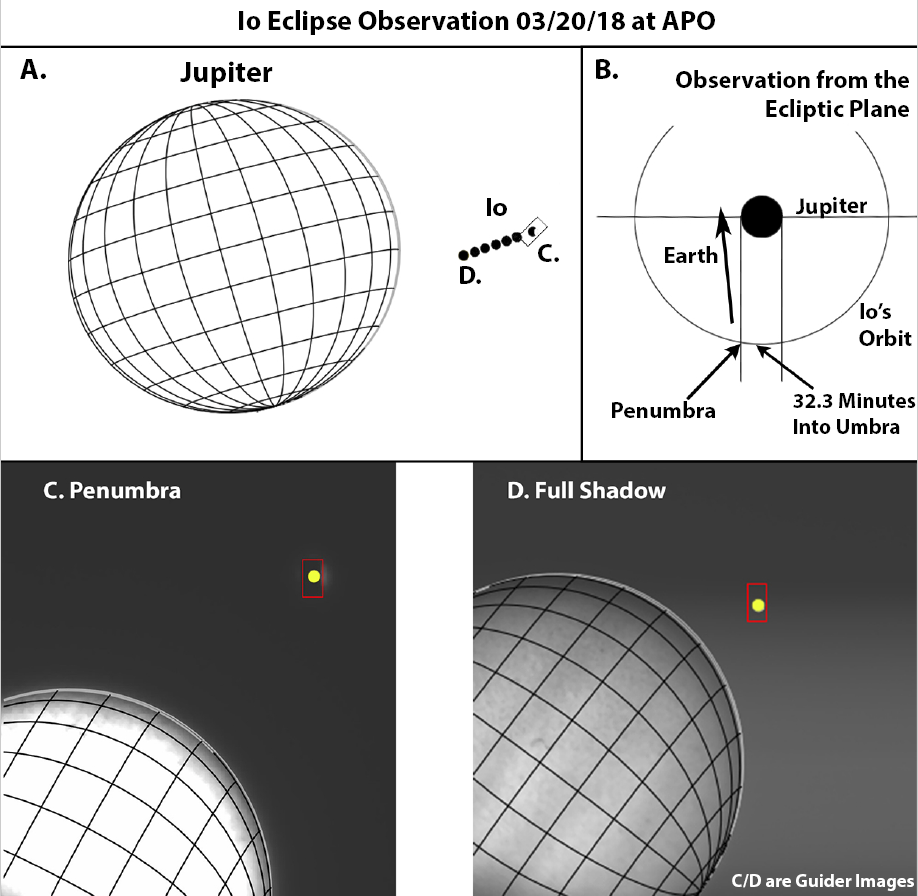
Additional helpful files are listed: in particular, for Na in sunlight analysis.

**APO**

**UT180320:**

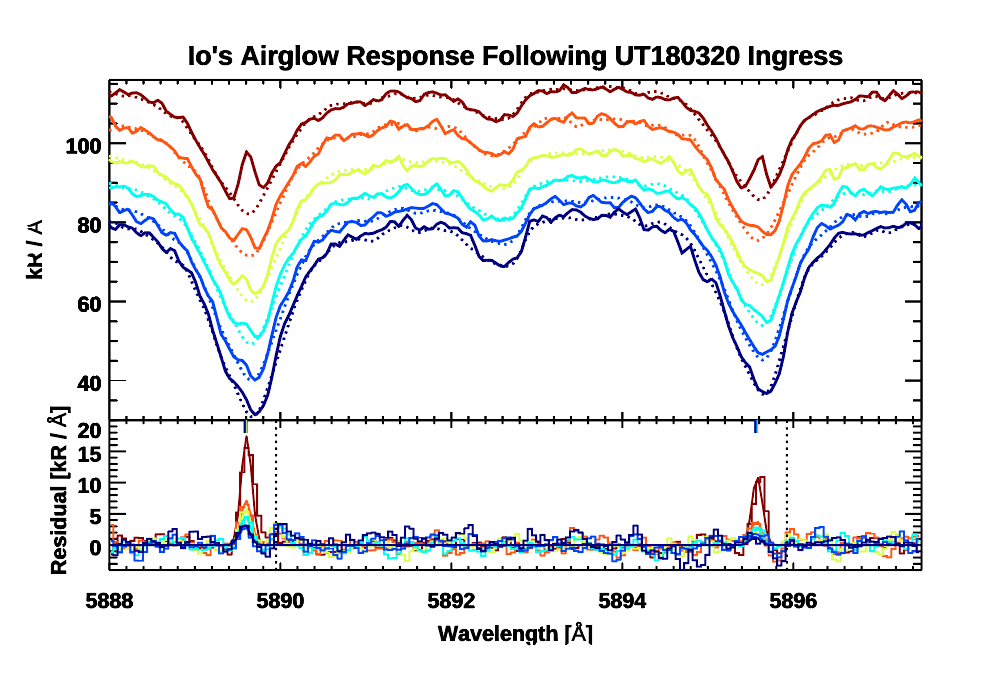
Pointing was confirmed to be good for all frames.

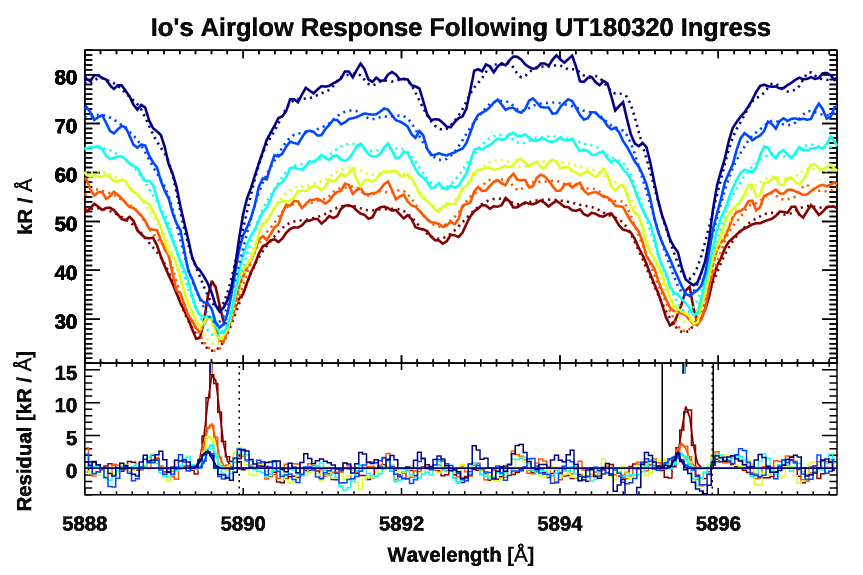
**Useful files: 6 Free and Clear + 1 penumbra + 6 eclipsed**



Na-D Waterfall:

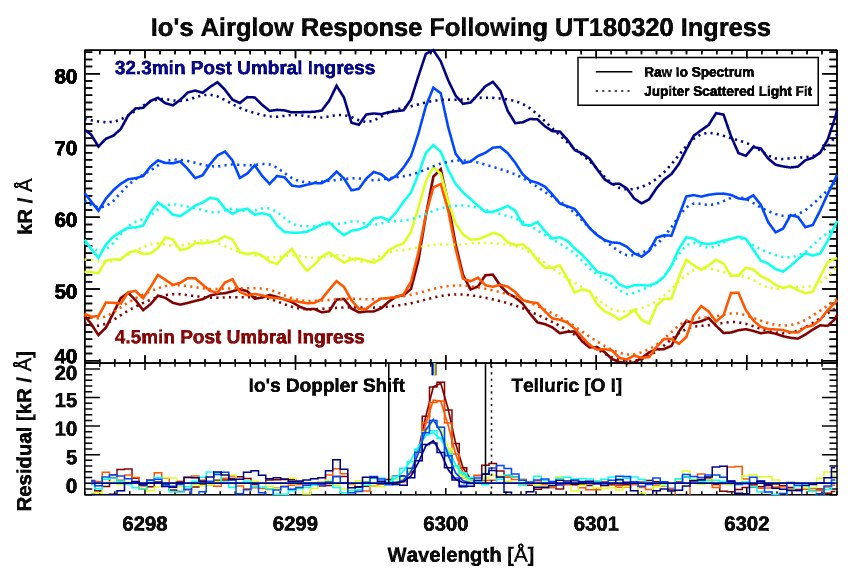
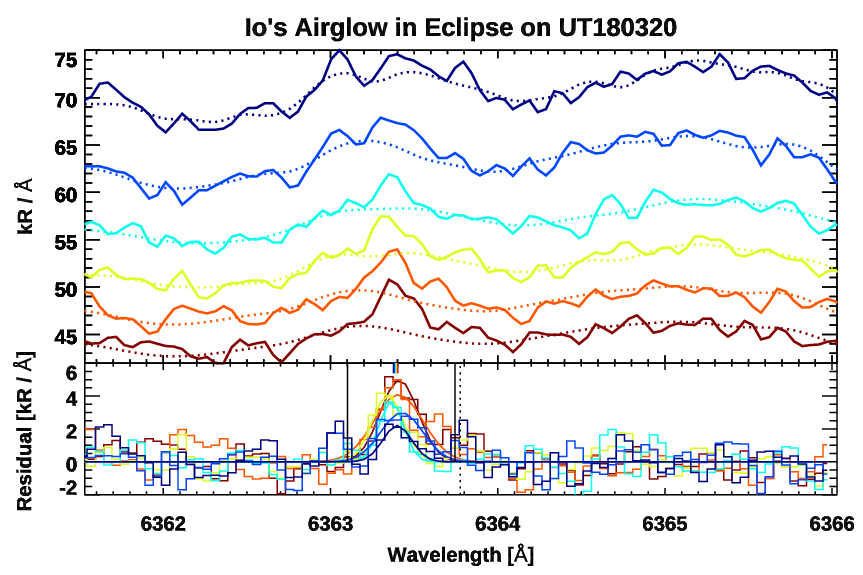
No frames are rejected. Spectrum fits well. Need to figure out the DC-offsetting business to get the plot ready for publication again. Here’s (old) with offsetting and (new) w/o.





O6300:

No frames rejected. Fits accepted.

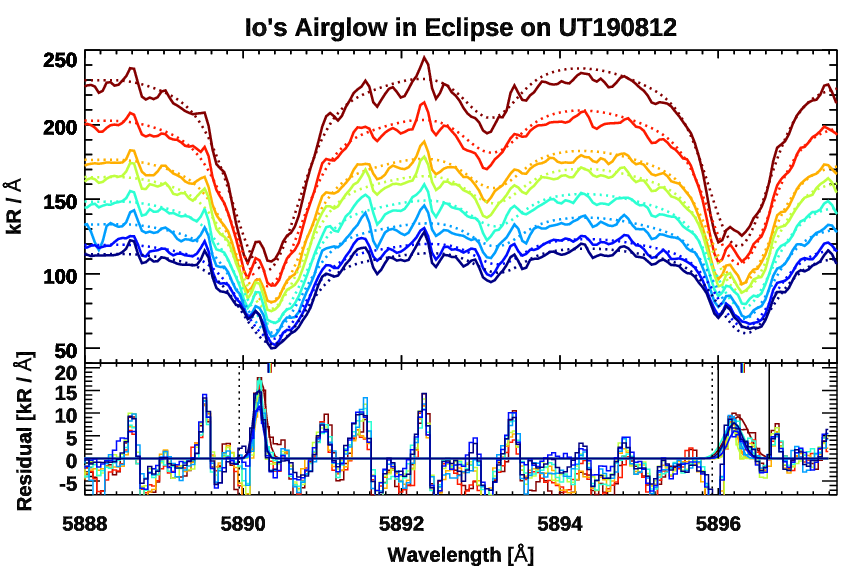
**UT190812:**

Pointing was confirmed to be good for all frames. Previously checked. Ecam no longer on images server. Update 5/21

Useful Files: Ganymede + 4 sunlit + 1 penumbra frame

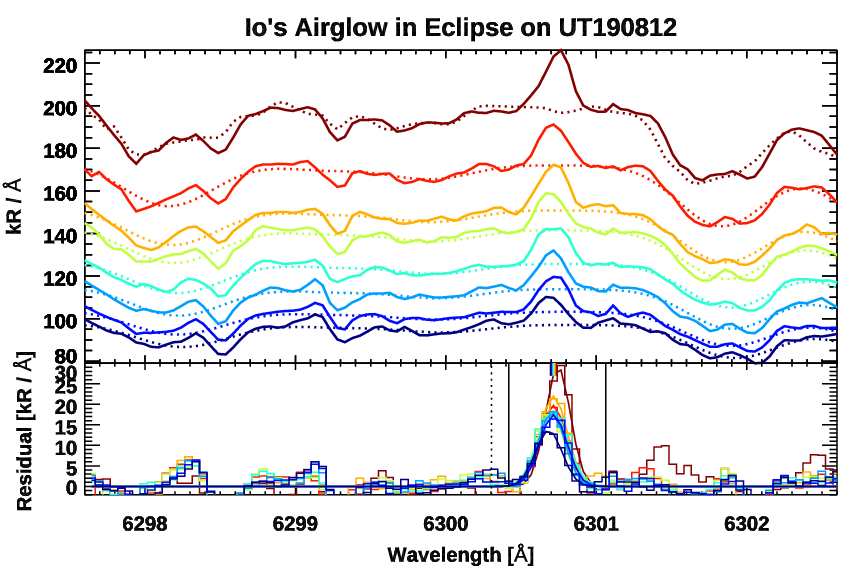
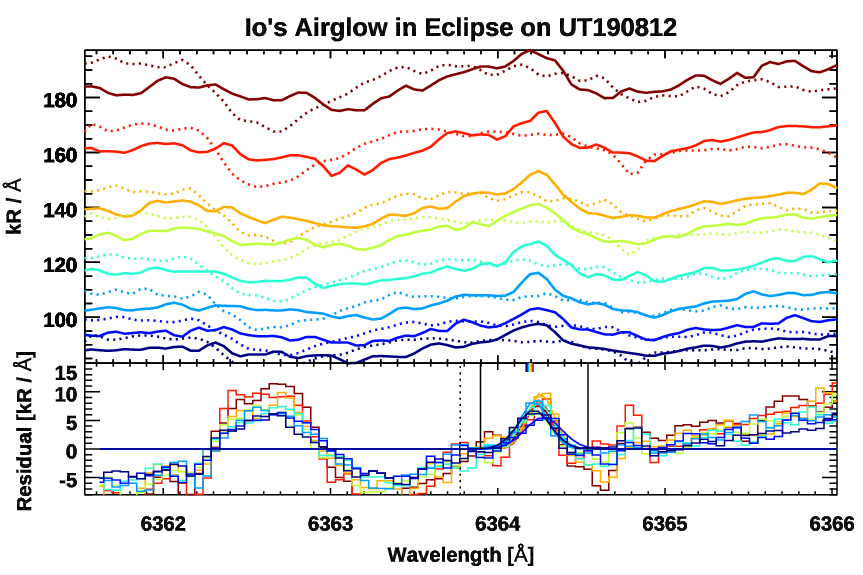
Na D waterfall:

**Dodgy Na fitting in high airmass ~2.4-3.2**. Below shows things with the telluric correction around Na Not terrible, but **could be improved by carefully dodging tellurics in the fit**



O6300 & 6364:

No frames rejected. All fitting acceptable. Overall pretty nice data, considering the airmass!

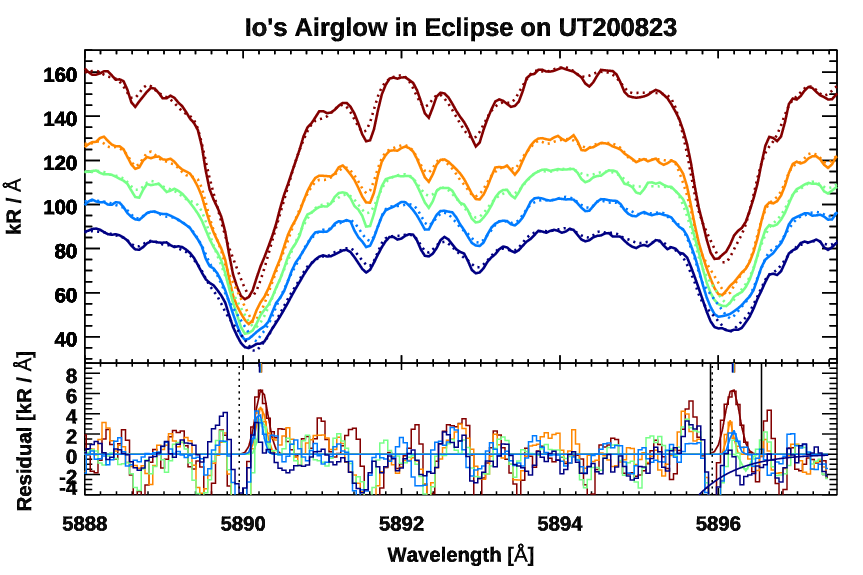
**UT200823:**

Frames present (1-8), pointing checked for 1(ecam0902), 2(ecam953), 4(ecam1129), 5(ecam1214), 7(ecam1352). All pointing good. None rejected.

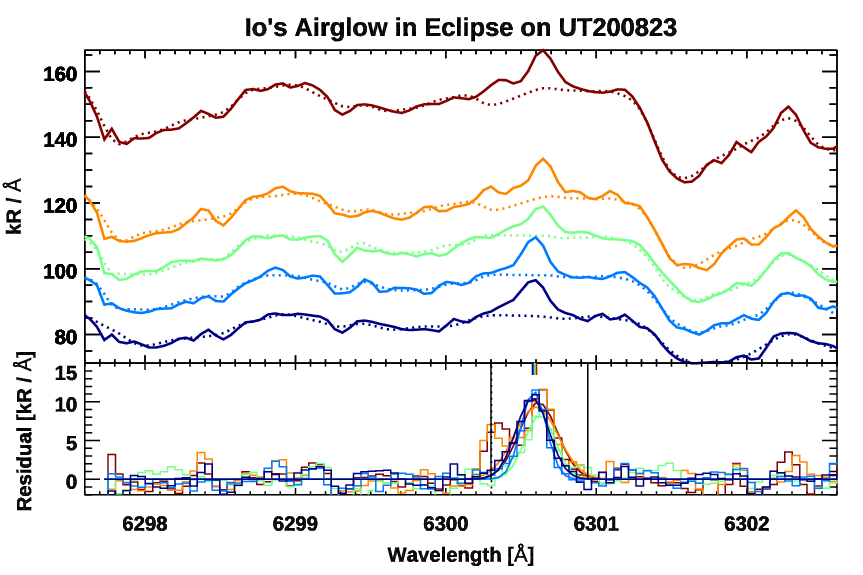
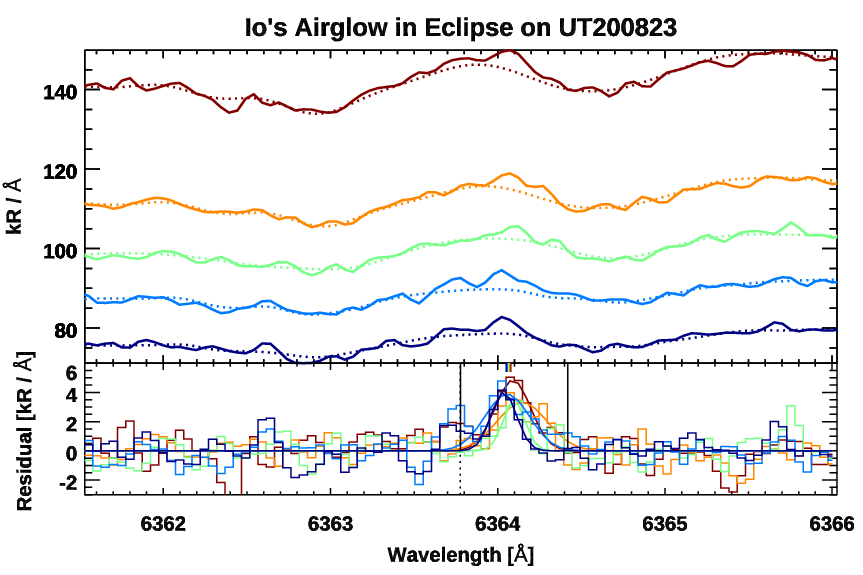
Useful Files: Ganymede + 4 sunlit

Na D waterfall:

**Poor Na fitting must be revised before use.** Surface level modifications to fitting algorithm did not fix issue. Telluric correction has issues because of the interstellar Na absorption. Few framess shows anything near the expected D2/D1 ratio



O6300 waterfall: Looking good.

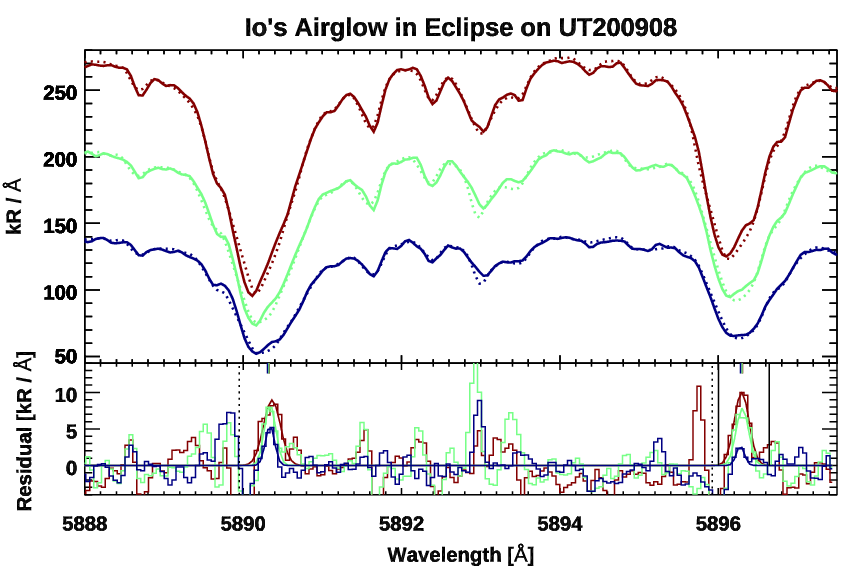
 

**UT200908:**

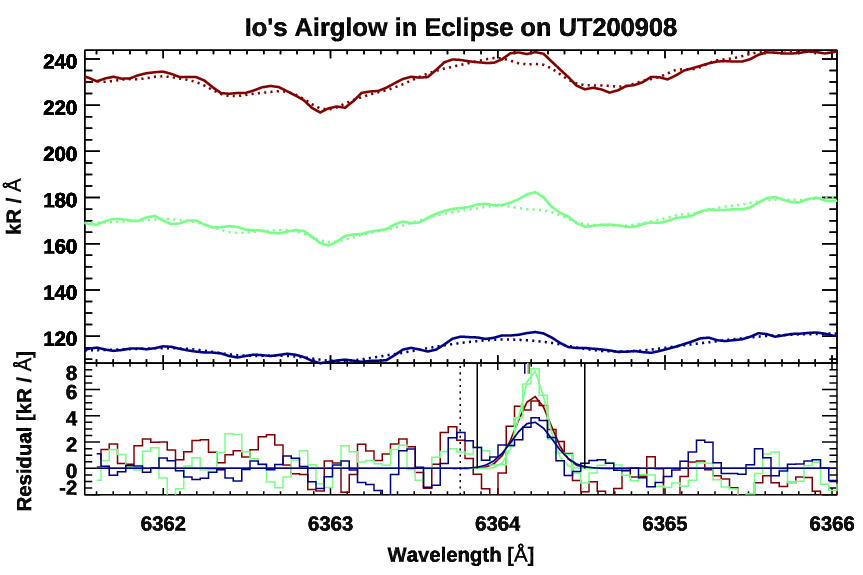
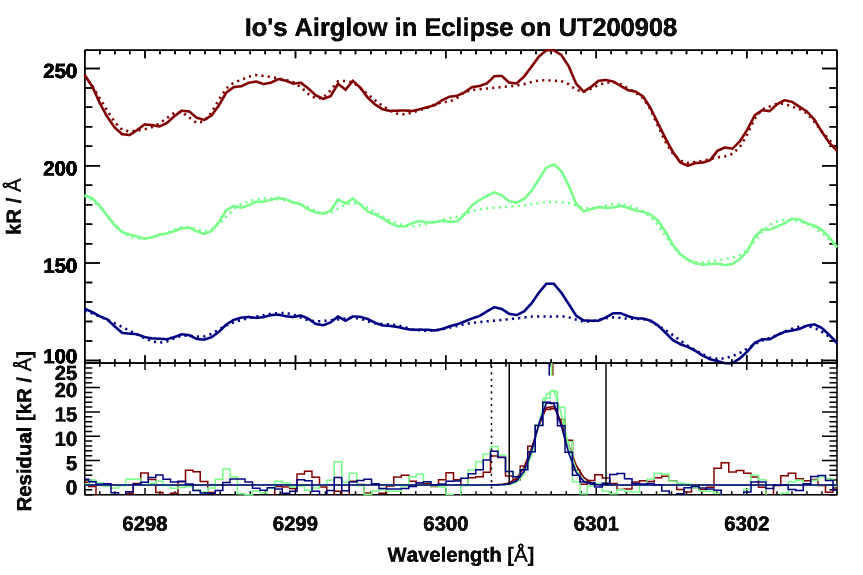
Frames present (19,20,23,25,26), pointing checked for 19(ecam0303), 23(ecam582), 25(ecam0742), 26(ecam0824). Pointing for 19, 23 is good therefore 19, 20, 23 are accepted. 25 26 rejected.

Useful Files: Ganymede + Europa + 6 sunlit + 1 penumbra

NaD Waterfall: **Poor Na fitting must be revised before use.** Only the faintest frame shows anything near the expected D2/D1 ratio



O6300:



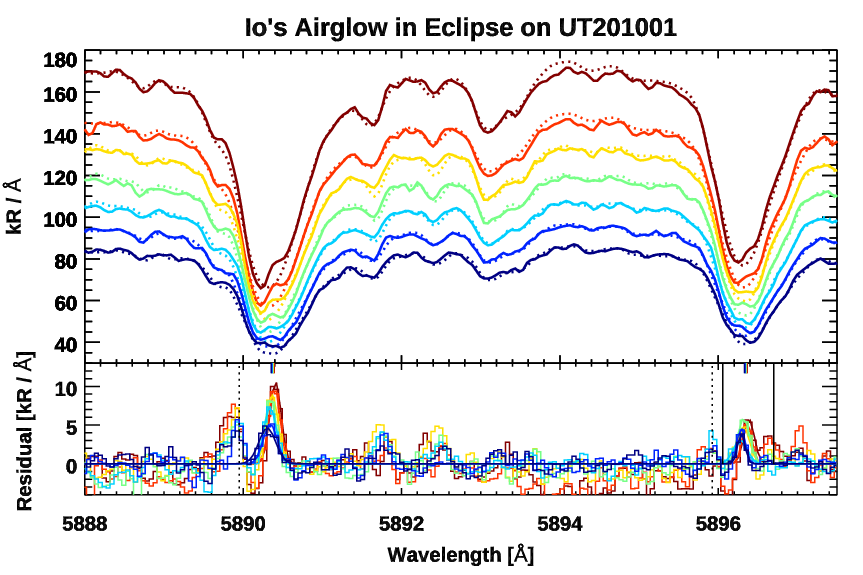
**UT201001:**

Pointing checked. Missing ecam numbers, will be re-found. All frames have good pointing, none rejected. Nice night of data!

**Useful files: Ganymede + 8 free and clear (tracks into high airmass) + 1 penumbra**

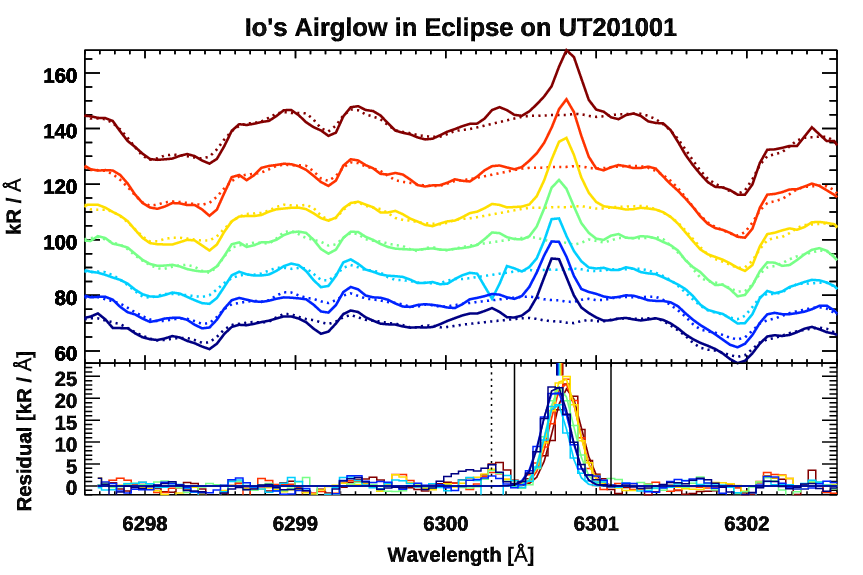
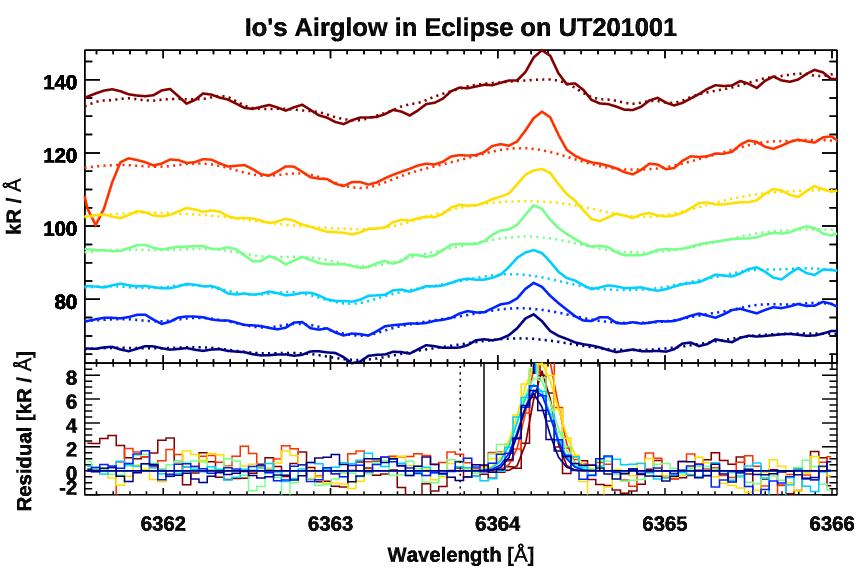
NaD Waterfall:

No rejections. All acceptable fits.



O6300:

No rejections. All acceptable fits.

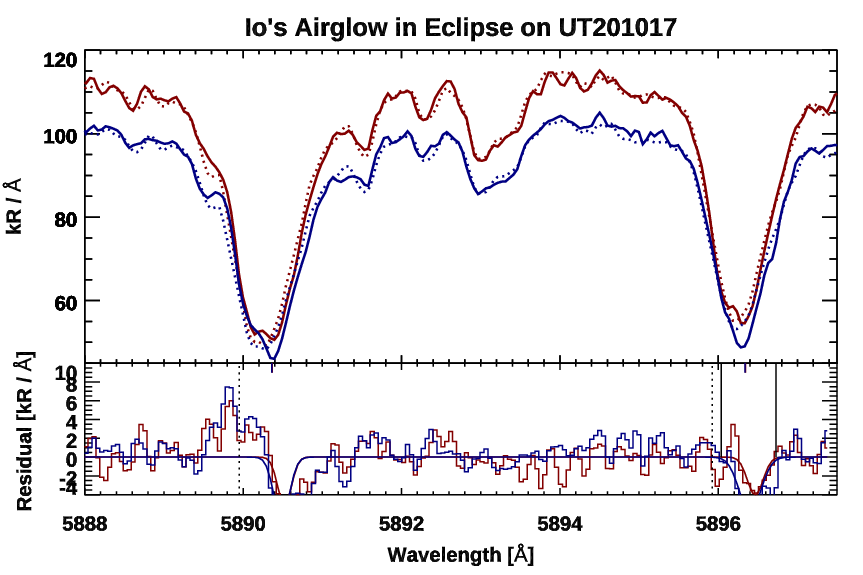
**UT201017:**

Frames present (16-20, 22,23,24), pointing checked for 20(ecam0345), 22(ecam495), 23(ecam0555), 24(ecam0615). Pointing for 22-24 is good therefore are accepted. **16-20 rejected.**

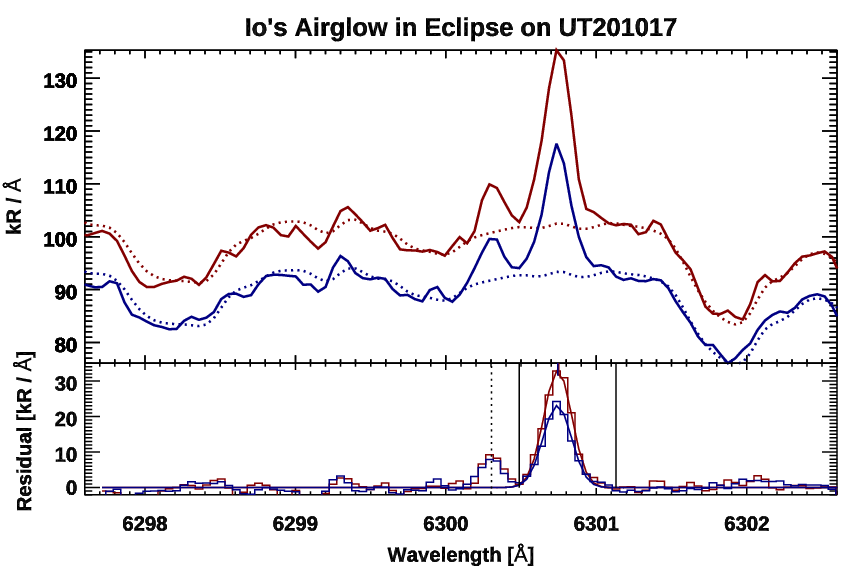
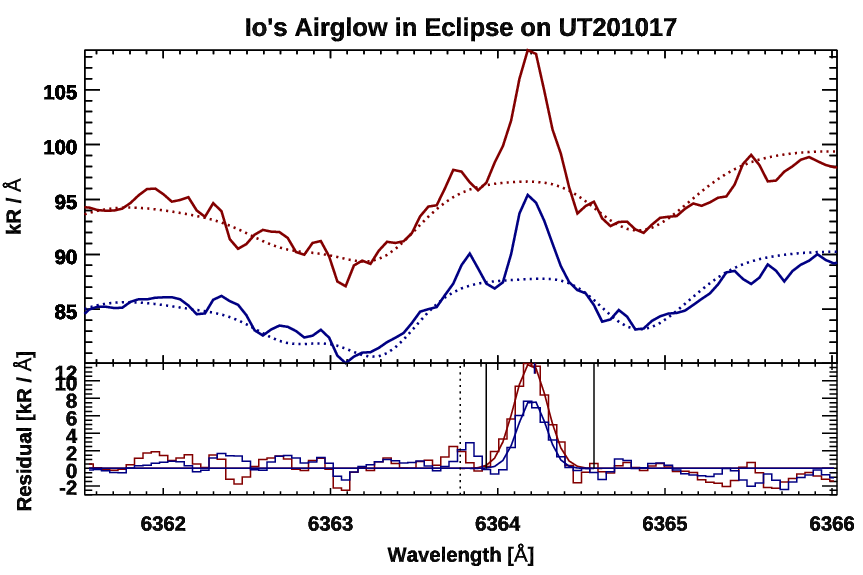
However, 24 is in penumbra, therefore we reject this value for the moment.

Useful files: Callisto + 4 free and clear + 1 penumbra + 2 eclipsed (22 & 23)

NaD: **Dodgy fitting! Do Not Use!**



O6300:

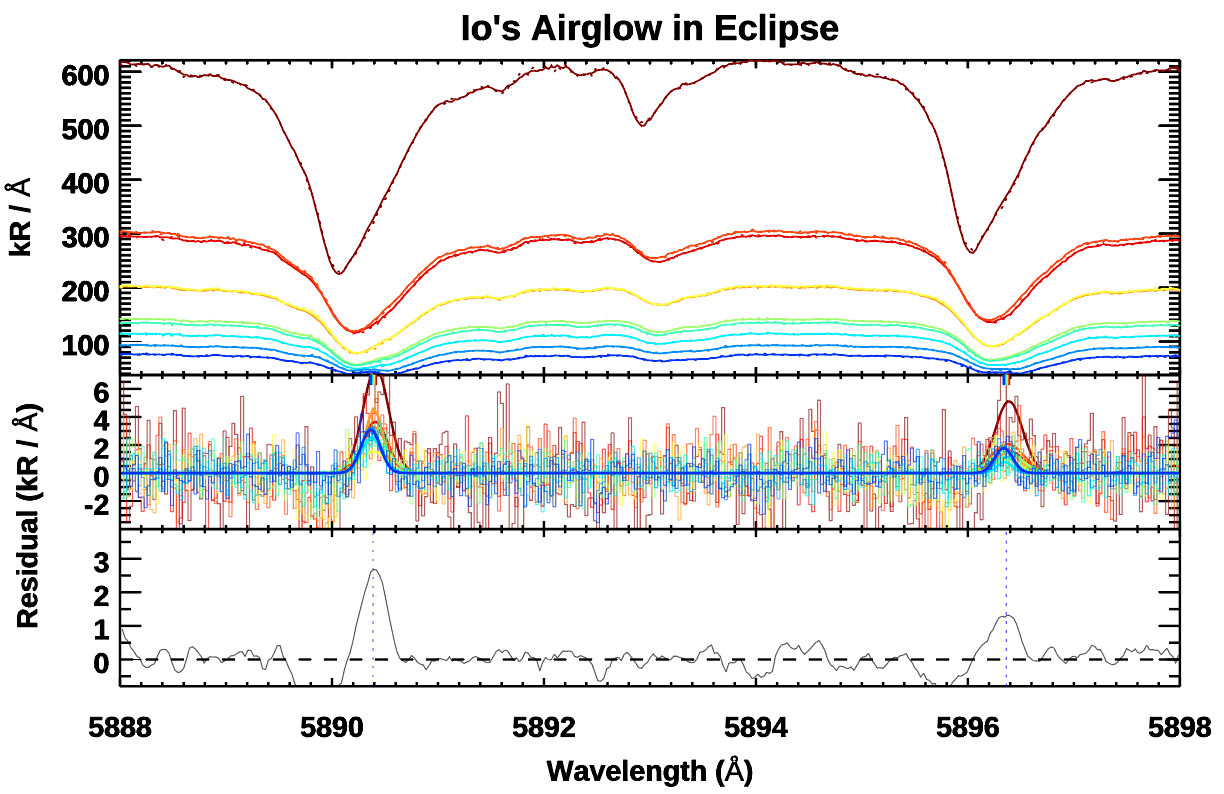
Should update for penumbra. Otherwise fit acceptable.

**Keck:**

**UT180807:**

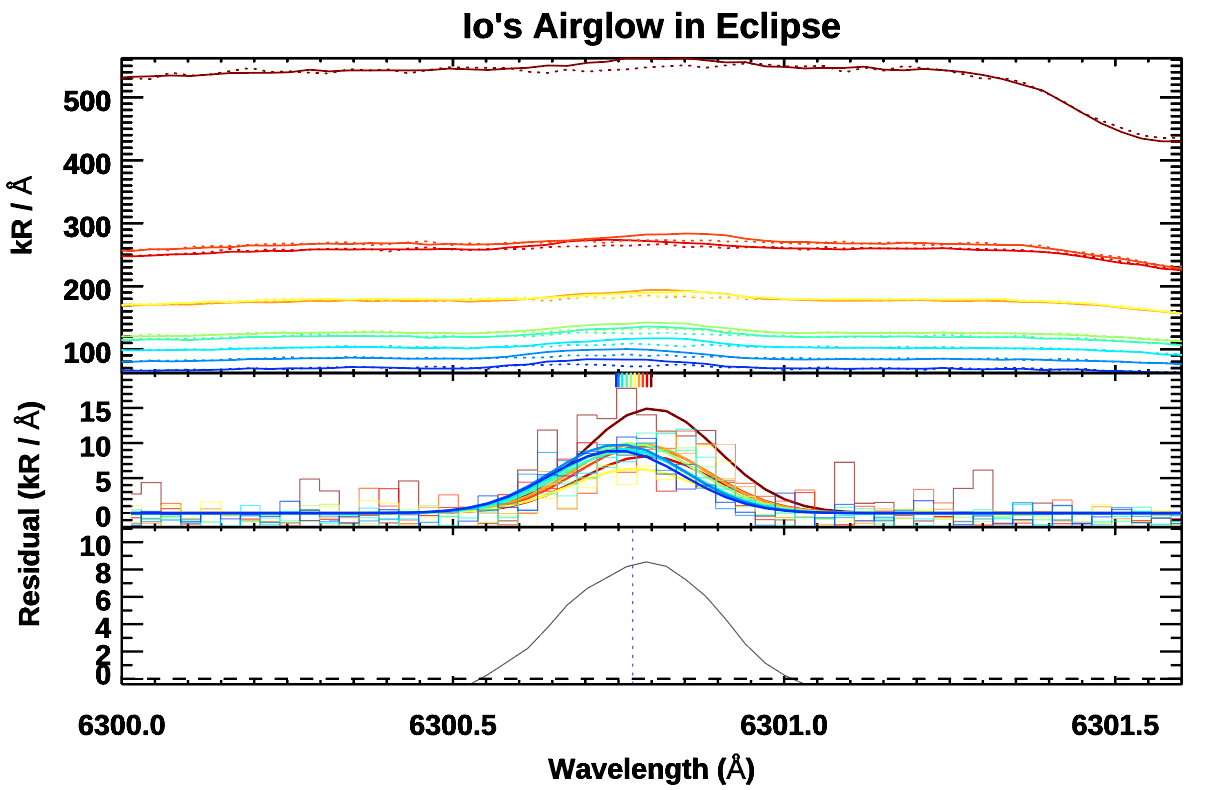
Keck needs to be fixed due to the fact that the object does not fill the slit. No ecam data therefore frames not checked.

Na D:



Fits look good, first brown frame is questionable in validity, but accepted.

O6300:



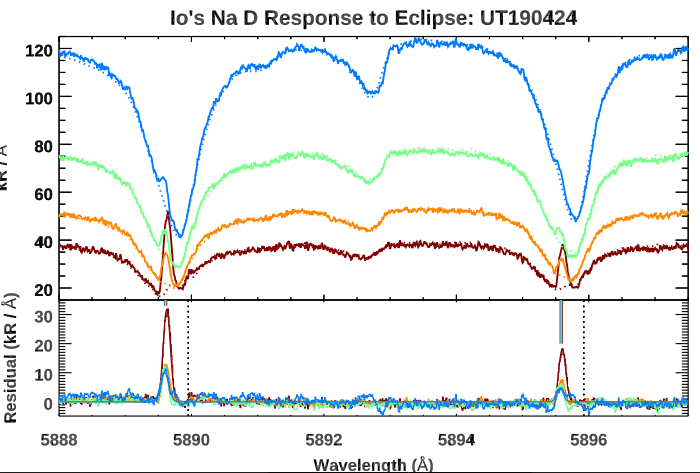
O6300 appears to be fine, all accepted.

**LBT:**

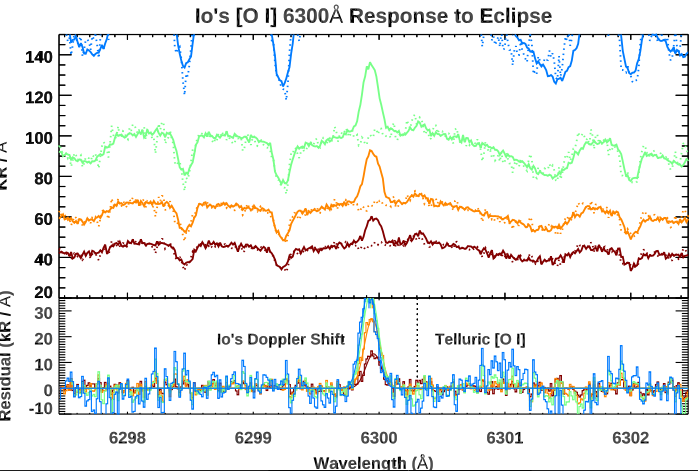
**UT190424:**

No ecam frames not checked. Good pointing assumed.

Na D:



O6300:



O6300 fit acceptable, all accepted.

**Part 12 of the program returns the following** Combined Plots (Torus, Egress, Ingress, etc.)**:**

