

TREx Spectrograph overview and the color of STEVE

CEDAR Workshop

June 20th, 2019

Santa Fe, NM

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Spectrograph purpose:

- to take high quality spectra of the auroral emission wavelengths across the visible light spectrum

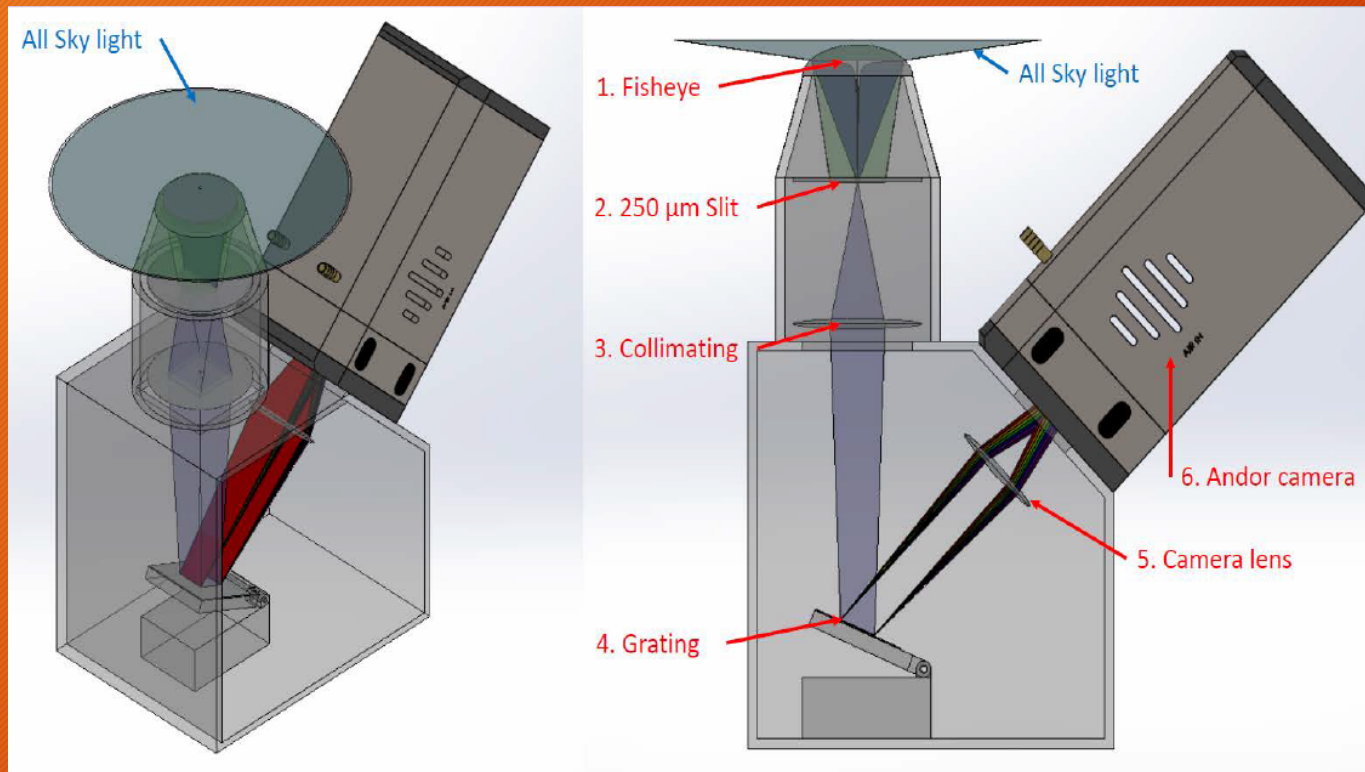
- ~400-750 nm range

- ~.71 nm/pixel resolution

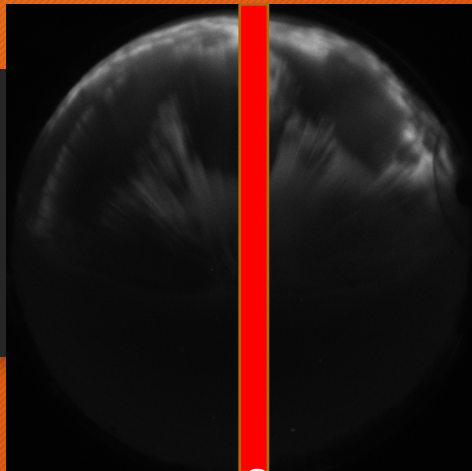
- ~15 second cadence (13 sec exposure)

- supplement to the *MSP* located at key core sites within the *TREx* region.

Designing and Building the spectrograph:



Deployed in Lucky Lake, SK February 2018.

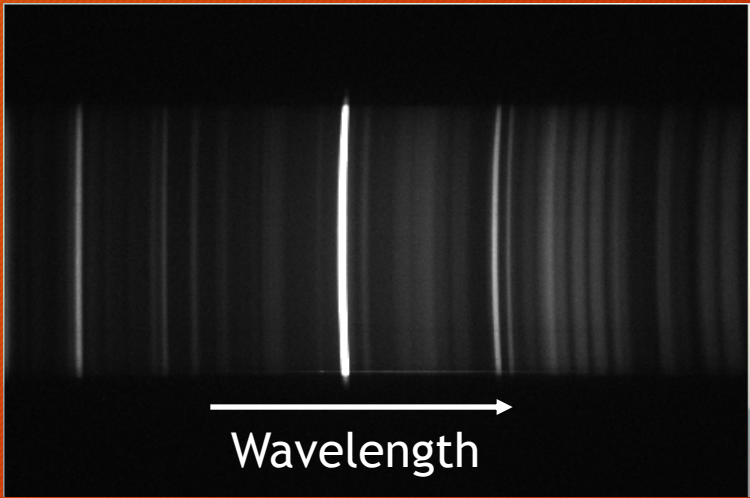


N

S

← Diffraction grating

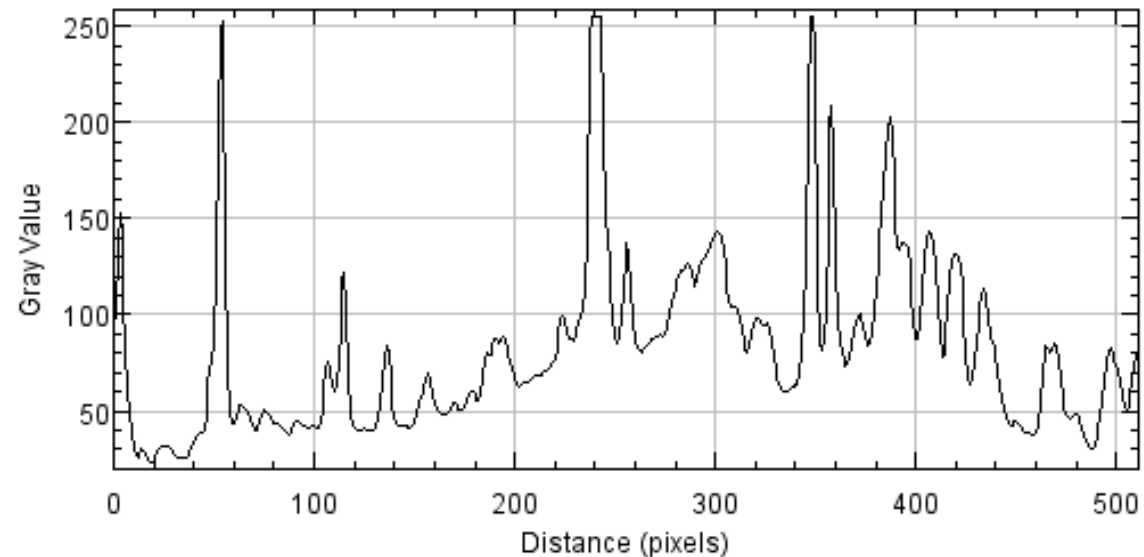
Spectrometer



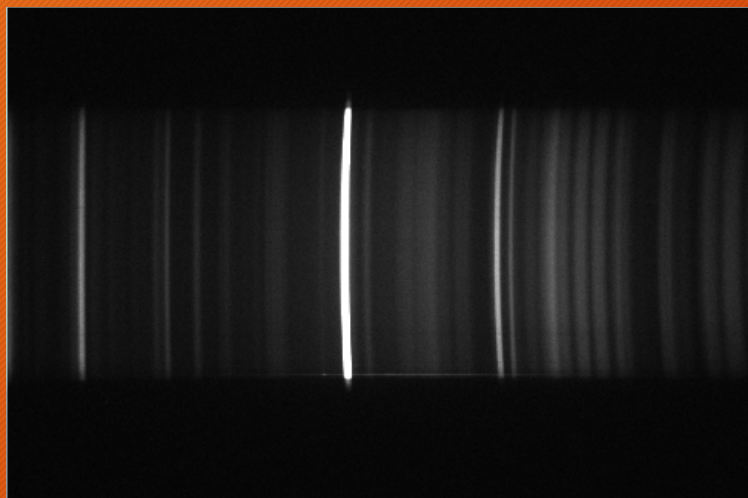
Elevation

Wavelength

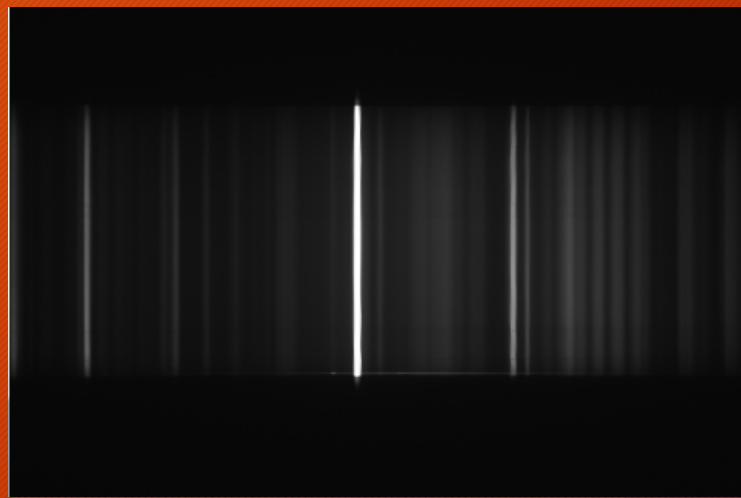
IDL post-processing



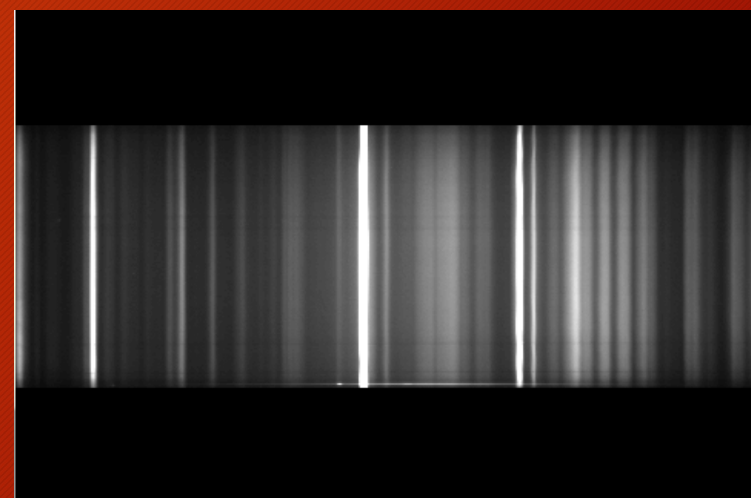
Unwarp



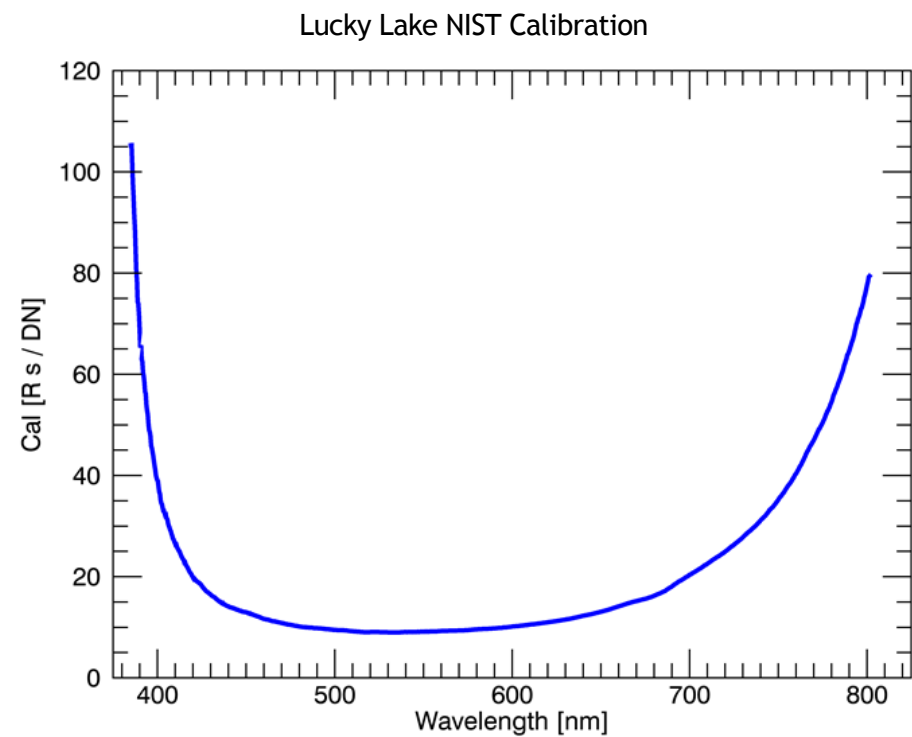
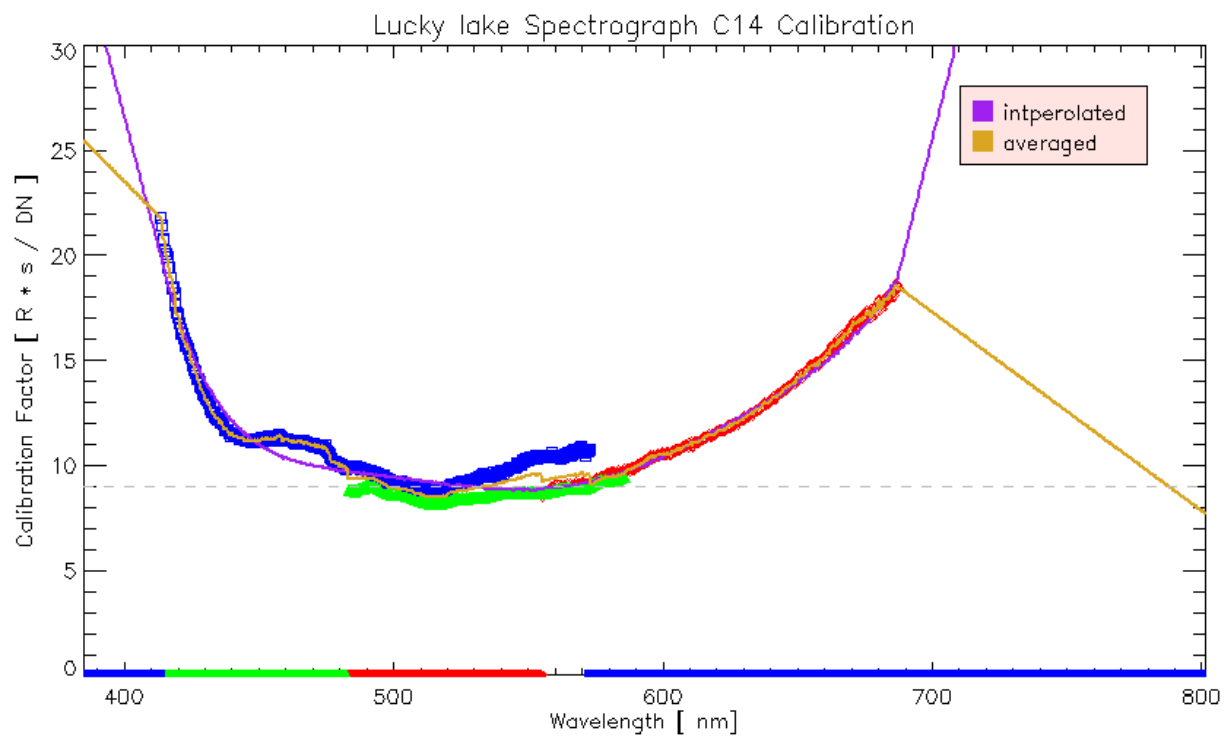
Edge, Spectral



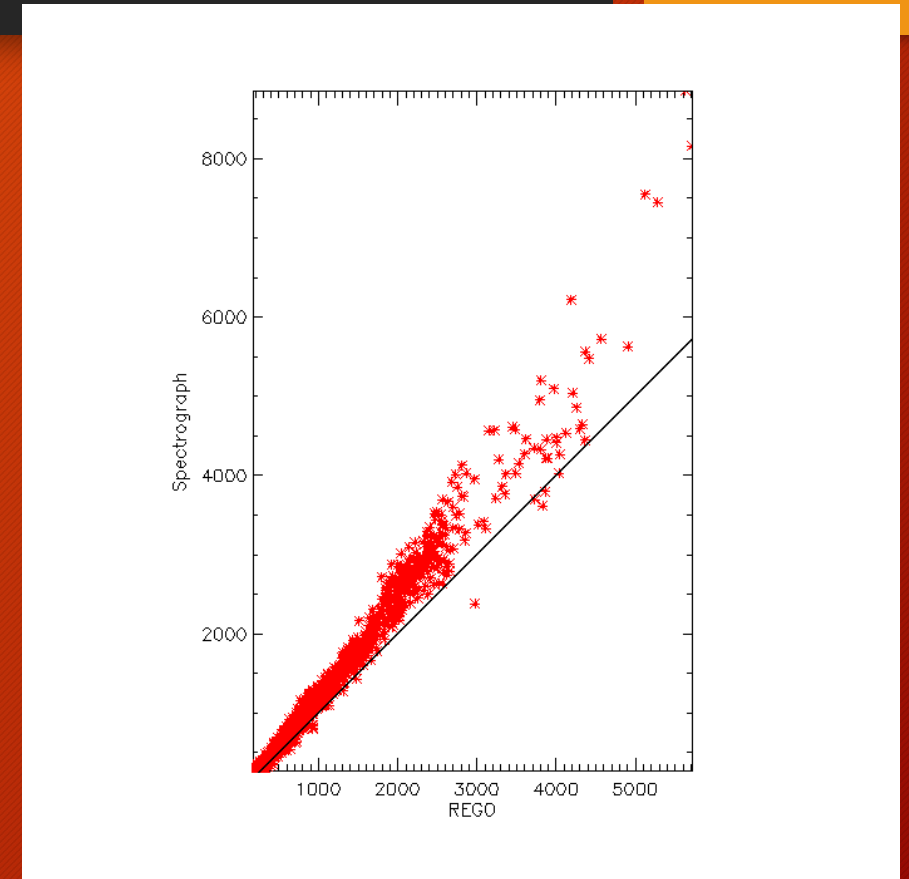
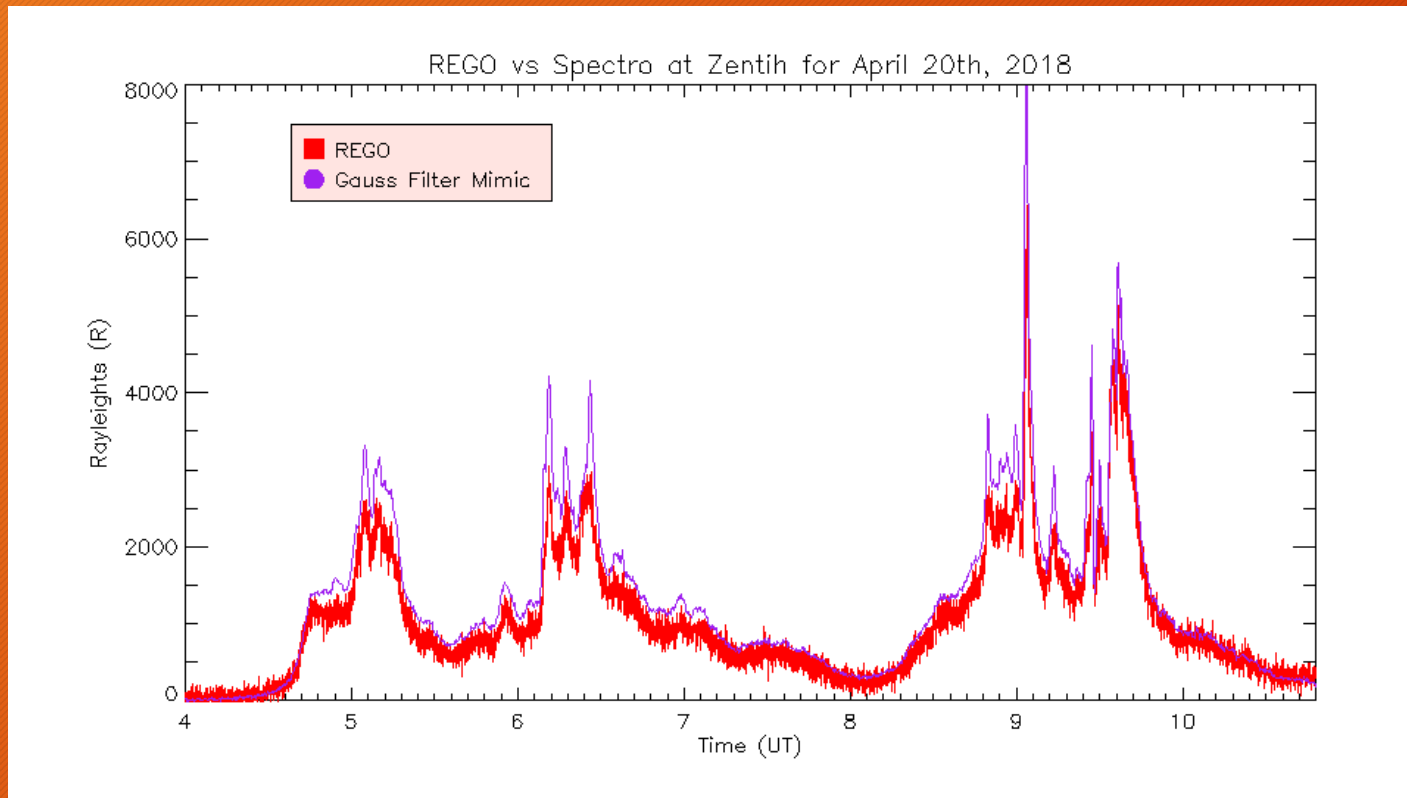
Flat field +
Absolute Intensity



Absolute Calibration

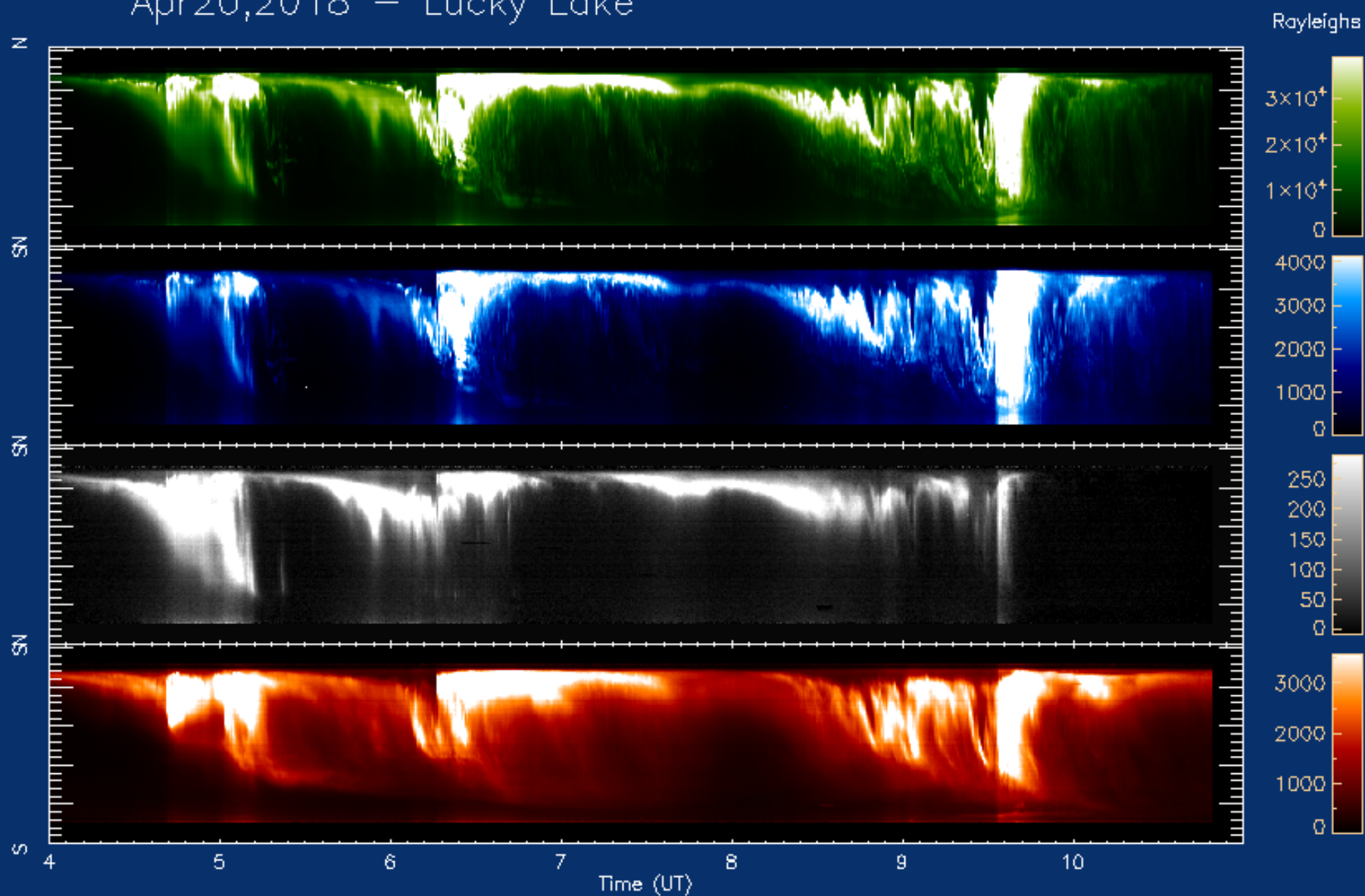


Intercalibration between REGO and Spectrograph

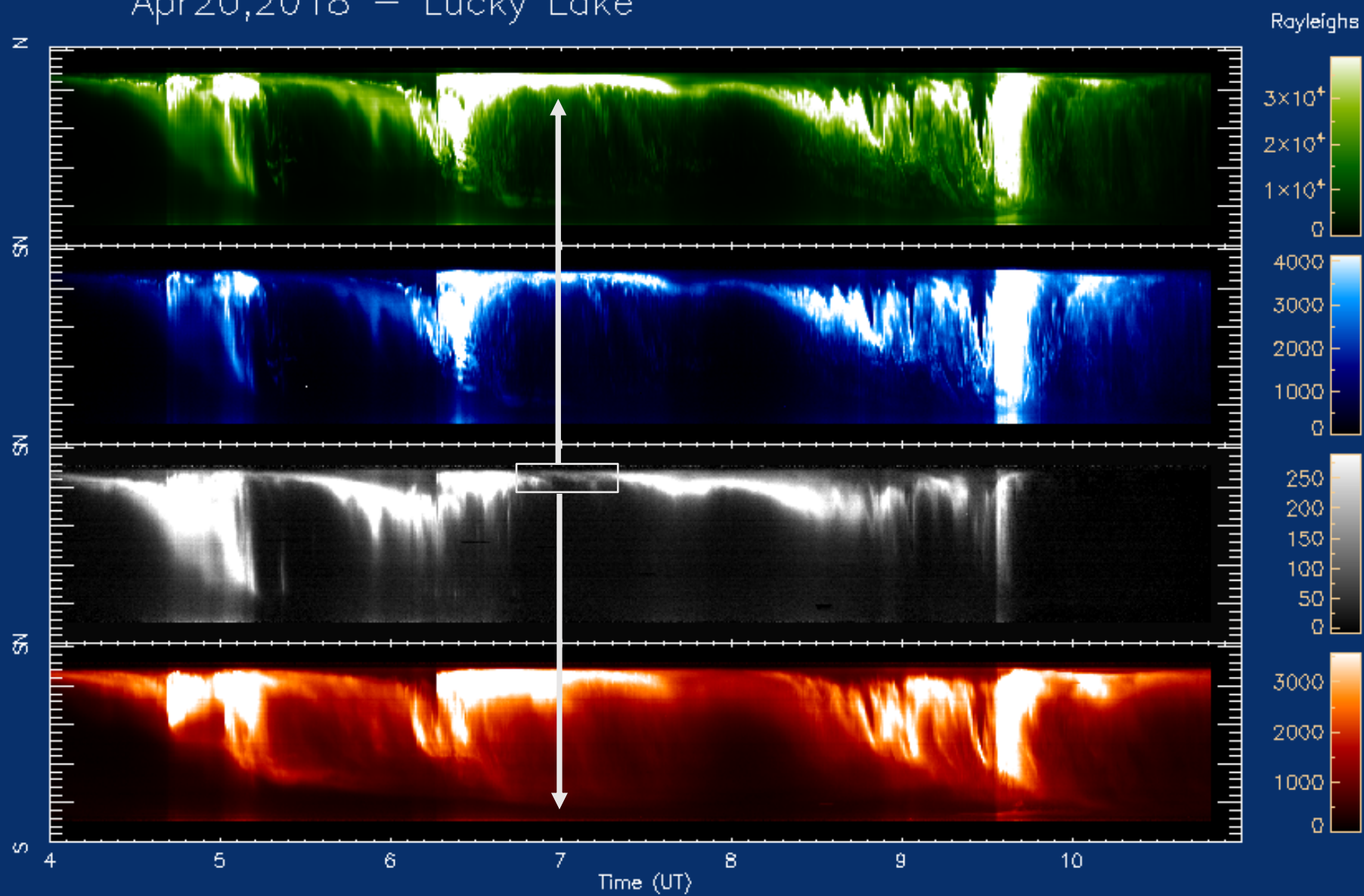


Currently working on intercalibration between FESO and Spectrograph

Calibrated Data
Apr20,2018 - Lucky Lake

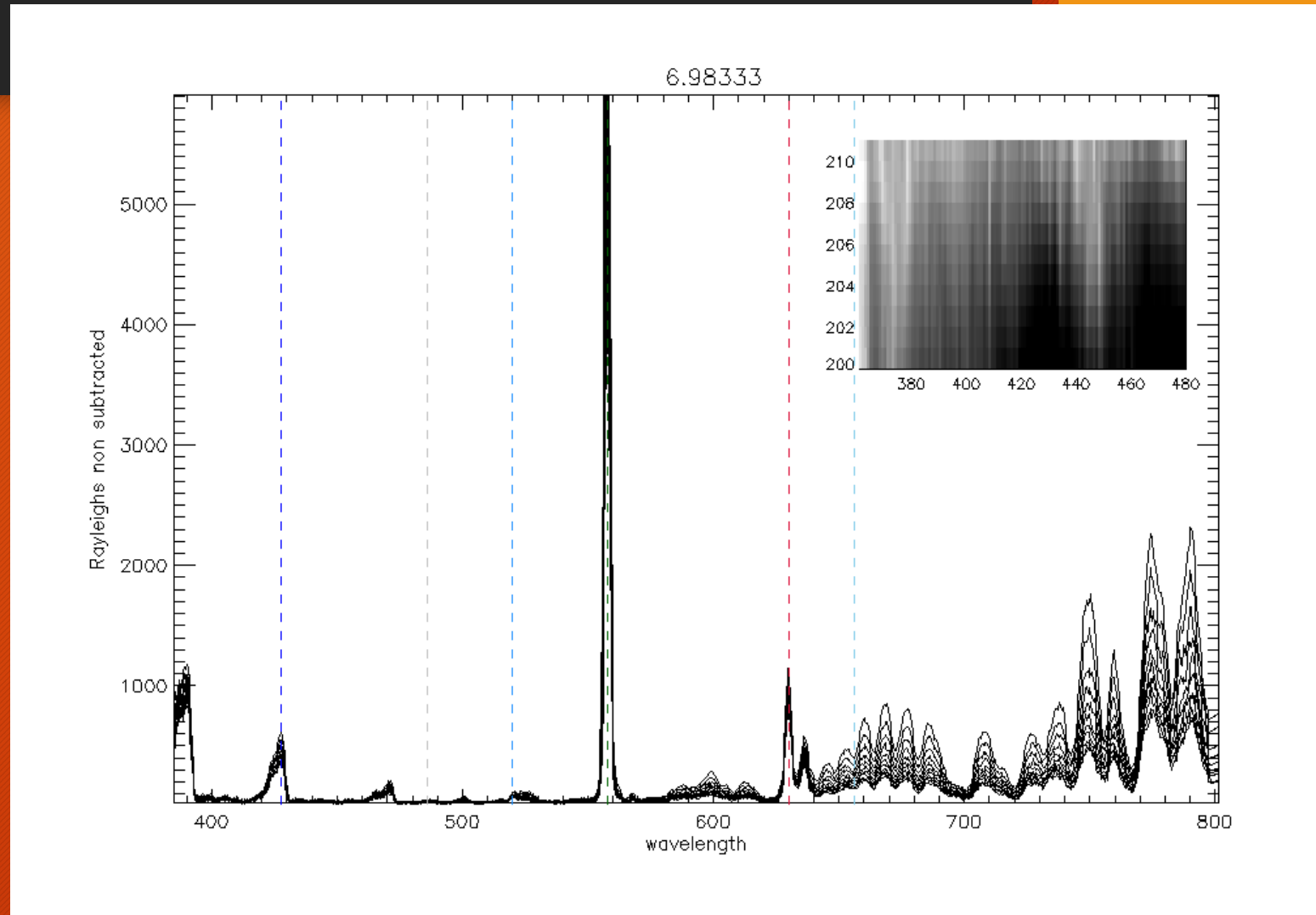
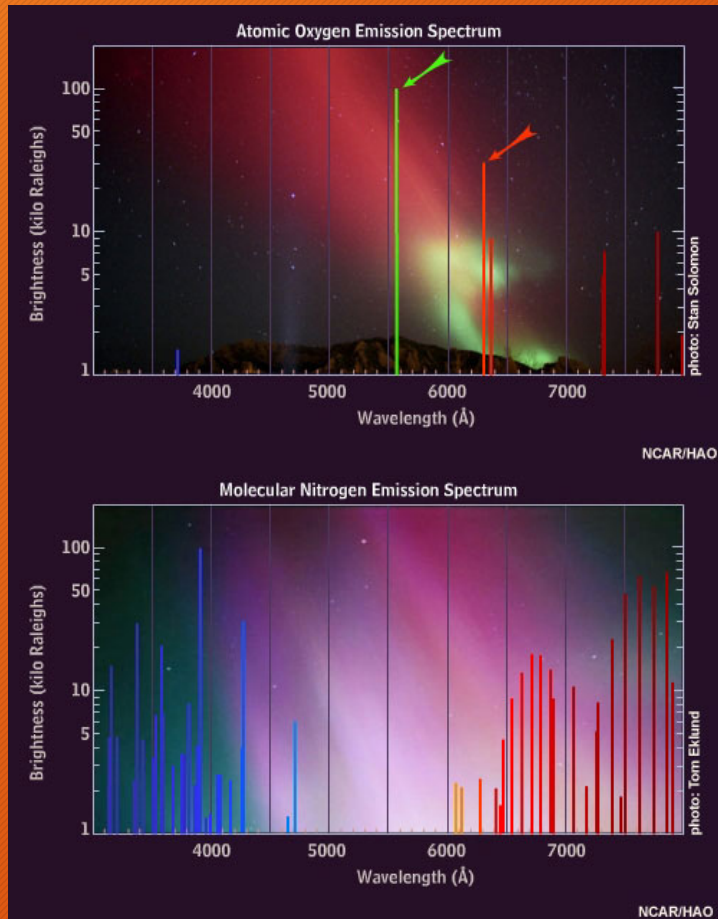


Calibrated Data
Apr20,2018 - Lucky Lake



Auroral Spectrum

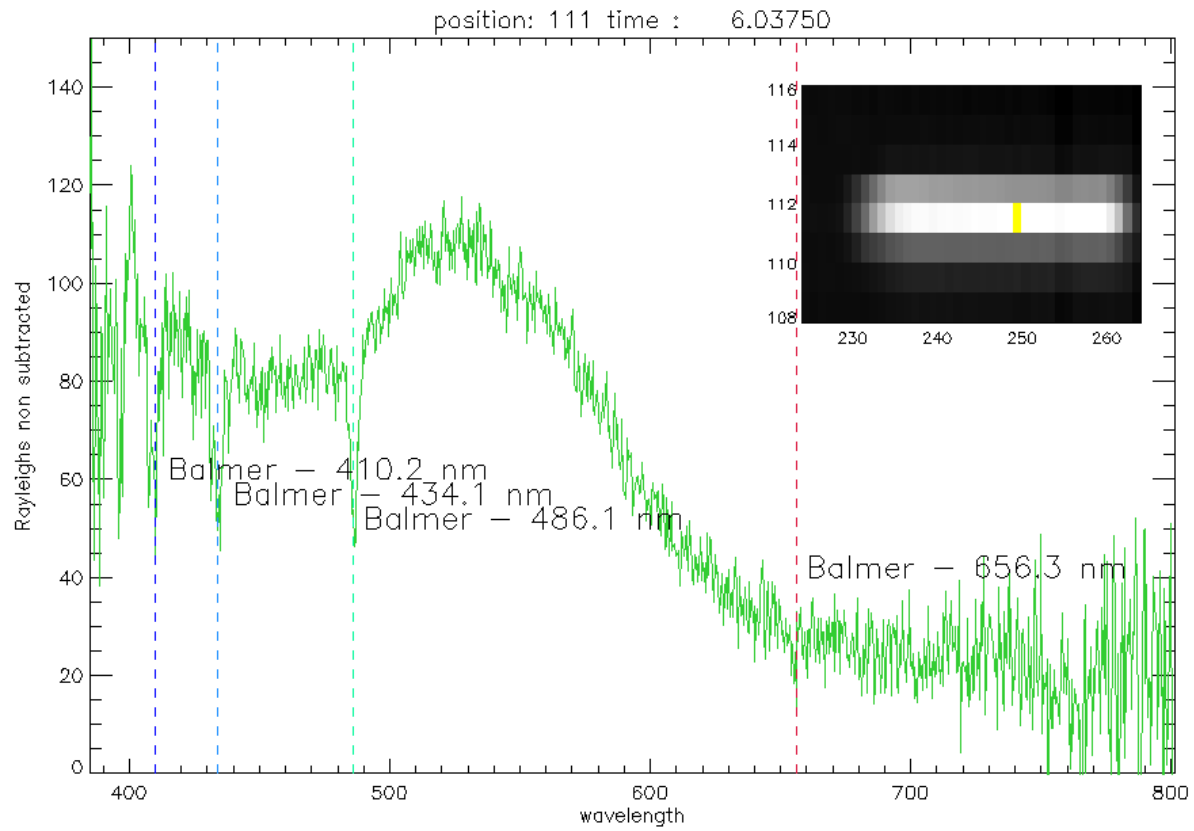
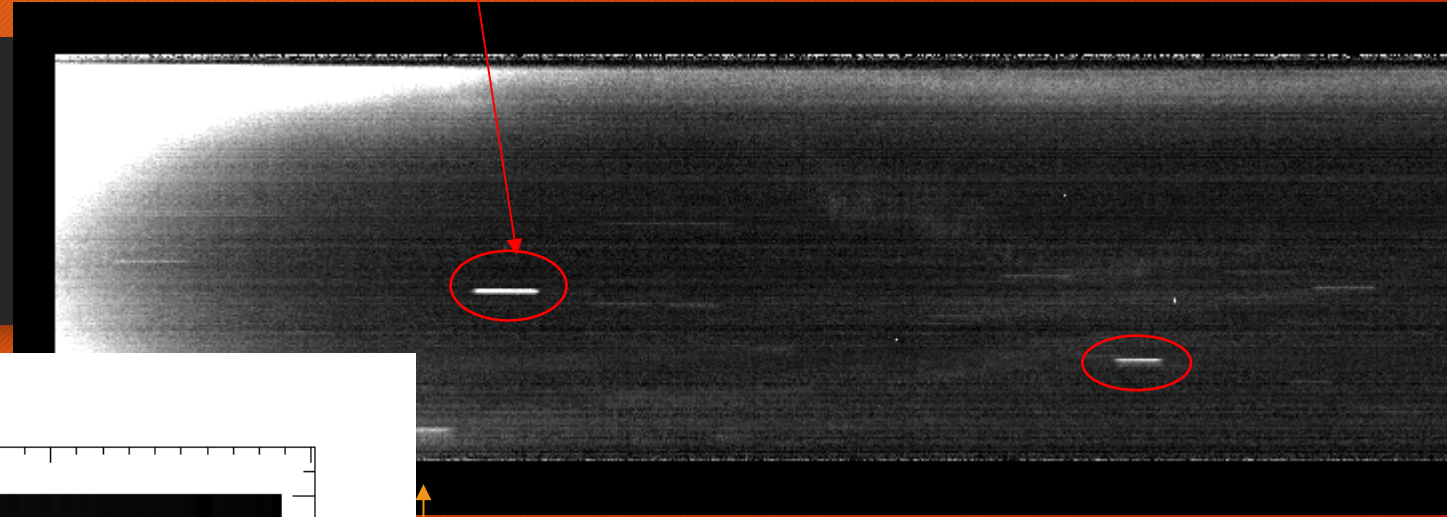
Aurora



Example 1

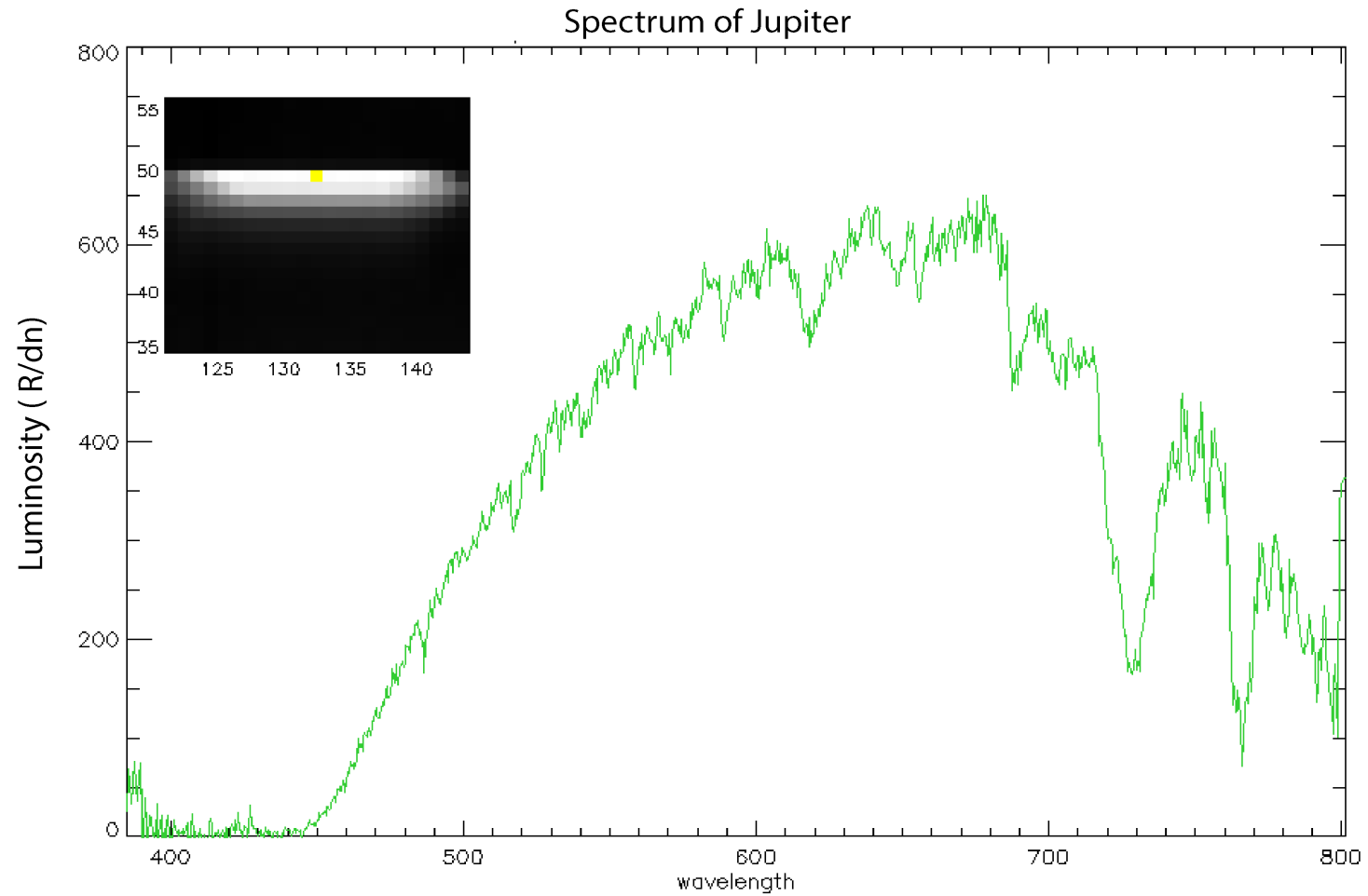
Stars

EXAMPLE 1



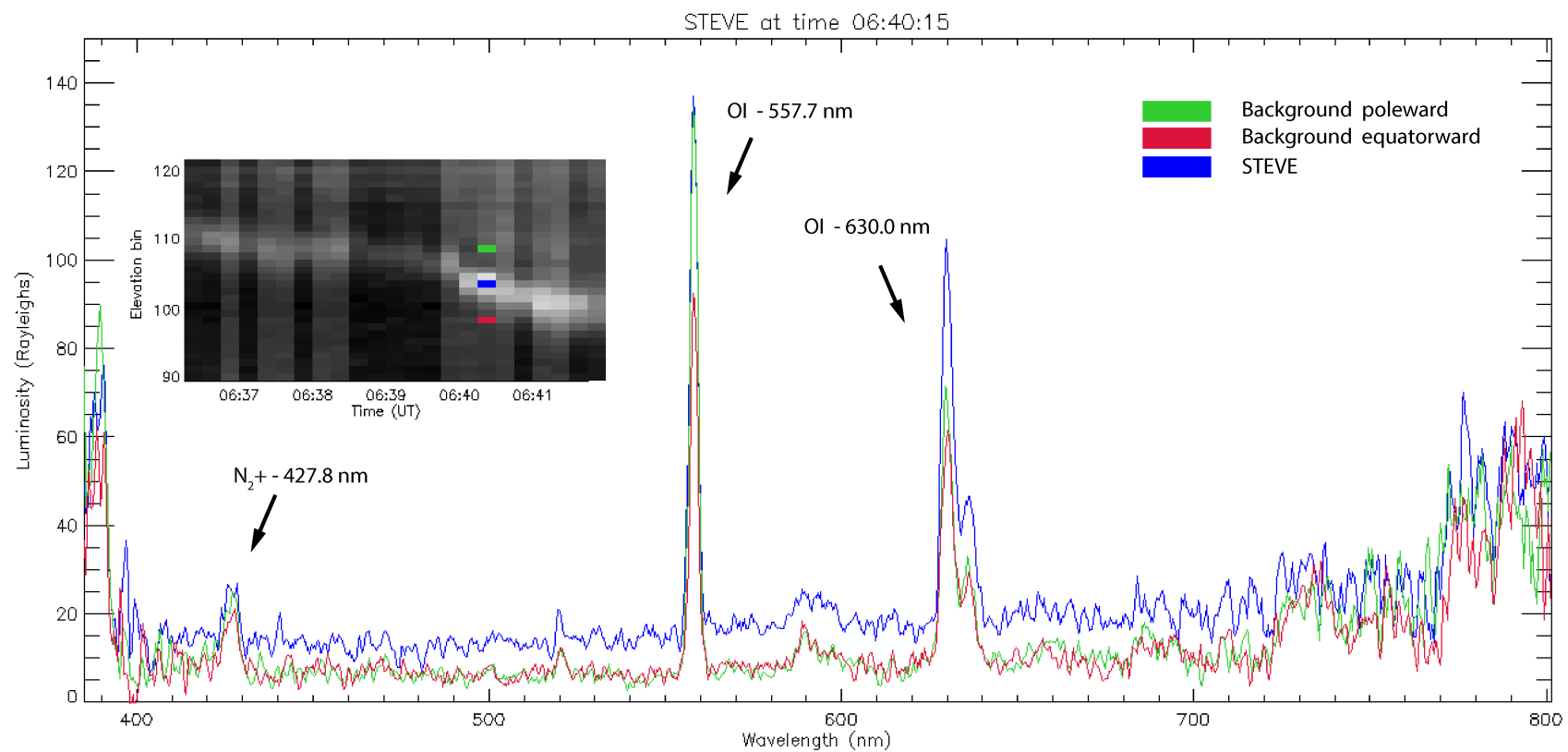
Planets

Jupiter



STEVE

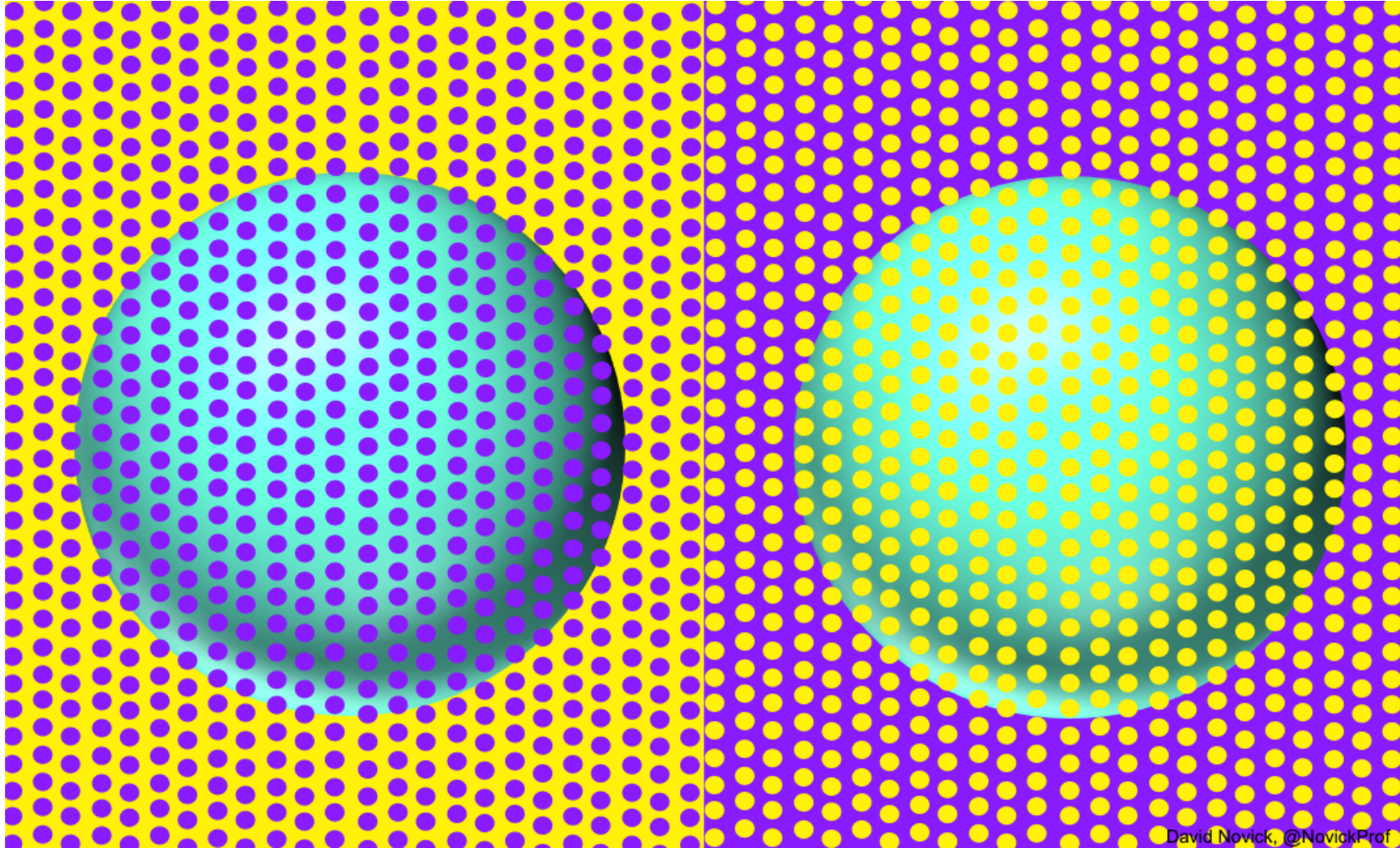
STEVE



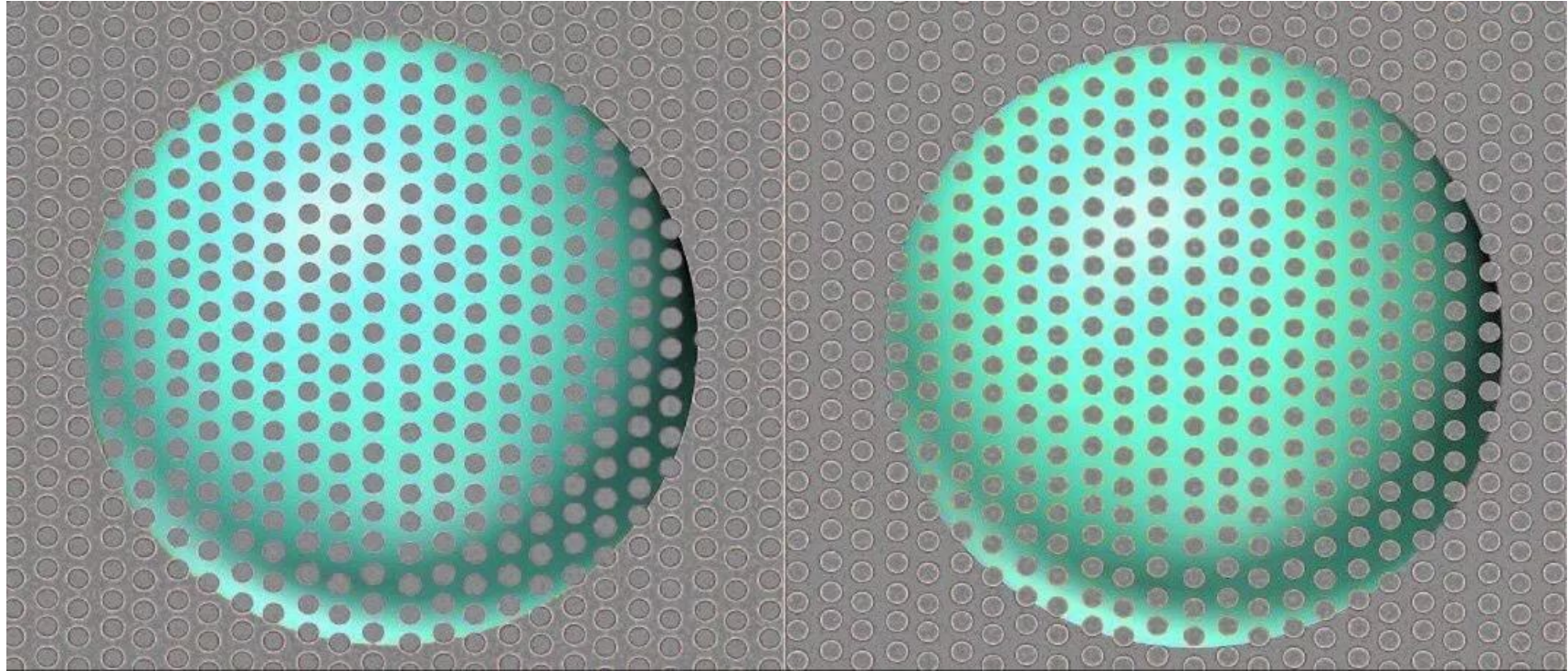


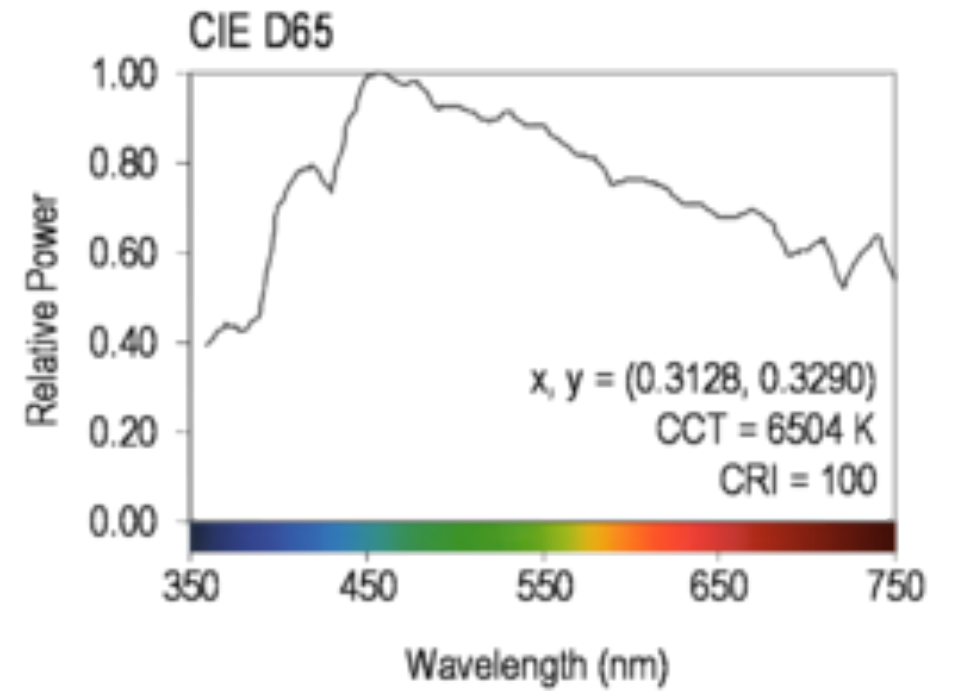
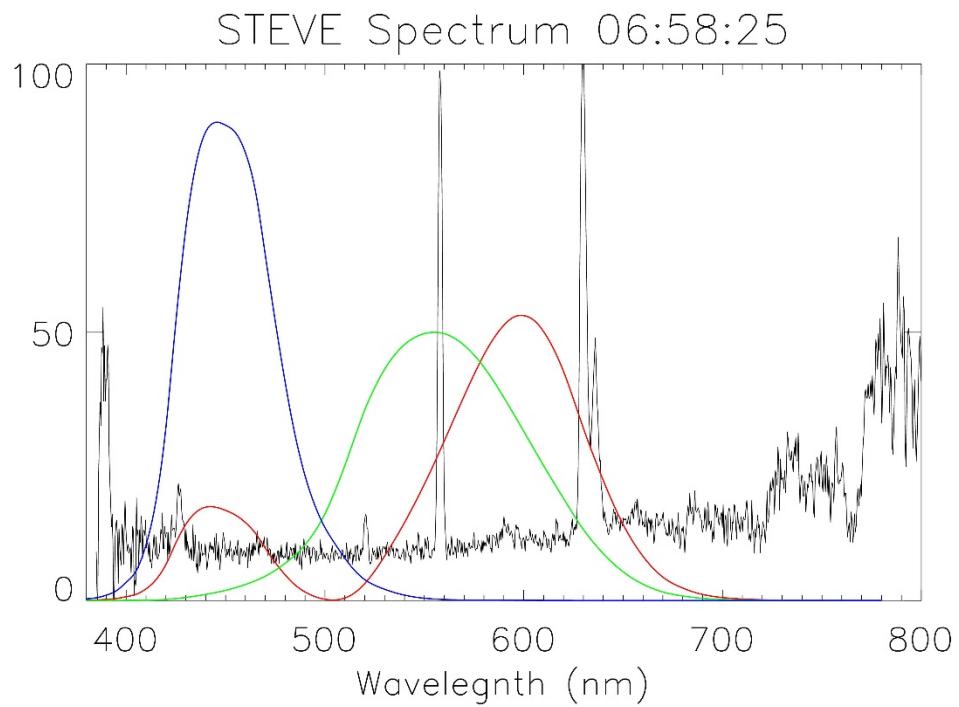
July 17 2019
12:08 am
Saskatoon, by
Colin Chatfield

However, the perception and comparison of colors can be tricky



From David Novick @NovickProf





Spectrum to XYZ using CIE 1931
color matching function

$$X = \int P(\lambda)\bar{x}(\lambda) d\lambda$$

$$Y = \int P(\lambda)\bar{y}(\lambda) d\lambda$$

$$Z = \int P(\lambda)\bar{z}(\lambda) d\lambda$$

XYZ to sRGB under
D65 illuminant

R=127, G=94, B=85

As shot, AdobeRGB



D65 adjusted, sRGB





Thx all !