Analysis of the Solar Eclipses Observed by PREMOS/PICARD

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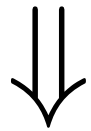
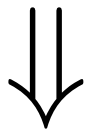
29 November 2011

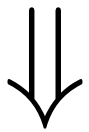
Observations of the light curves of solar eclipses



Retrieving the CLV of solar irradiance



Information about a broad range of heights in solar atmosphere



Tests and constraints of the existing 1D models of solar atmosphere

Shapiro et al. (2011) analyzed recent (January 15, 2010; July 11, 2010) eclipses (Herzberg channel [200-220 nm] of LYRA onboard space mission PROBA-2) and constrained

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Temperature structure of the photosphere

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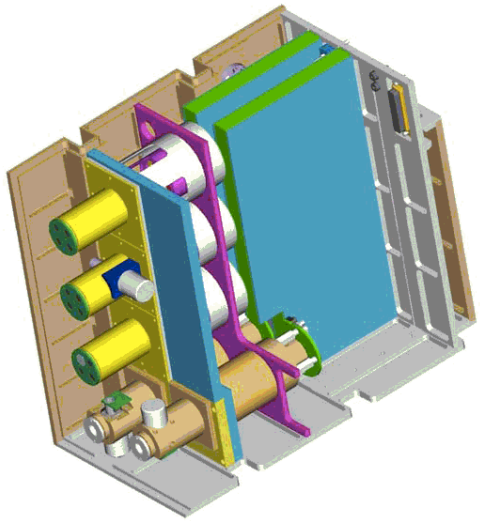
Treatment of pseudocontinuum opacities in the Herzberg continuum range

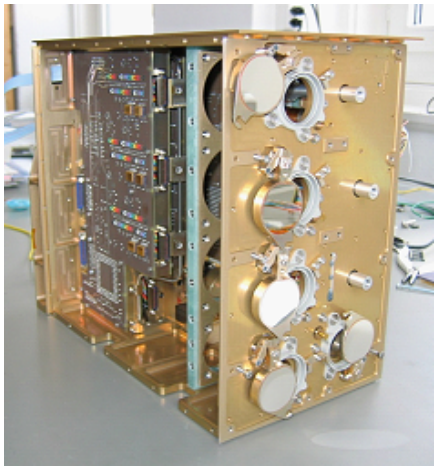
The objective of current investigation is

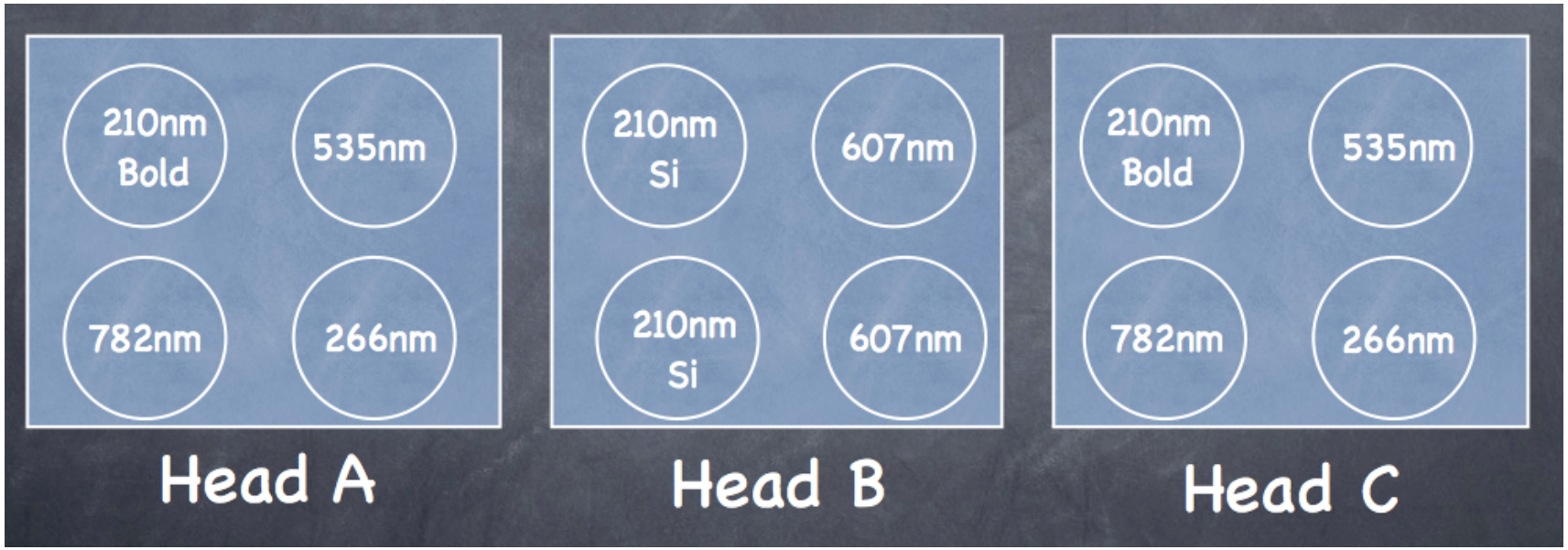
to significantly complement and extend this analysis, using the data of PREMOS package (in 6 spectral channels) onboard space mission PICARD

The PREMOS...

...package onboard space mission PICARD is observing solar irradiance in three UV (210 nm, 215 nm, 266 nm), one visible (535 nm) and two near IR (607 nm, 782 nm) spectral channels with filter radiometers

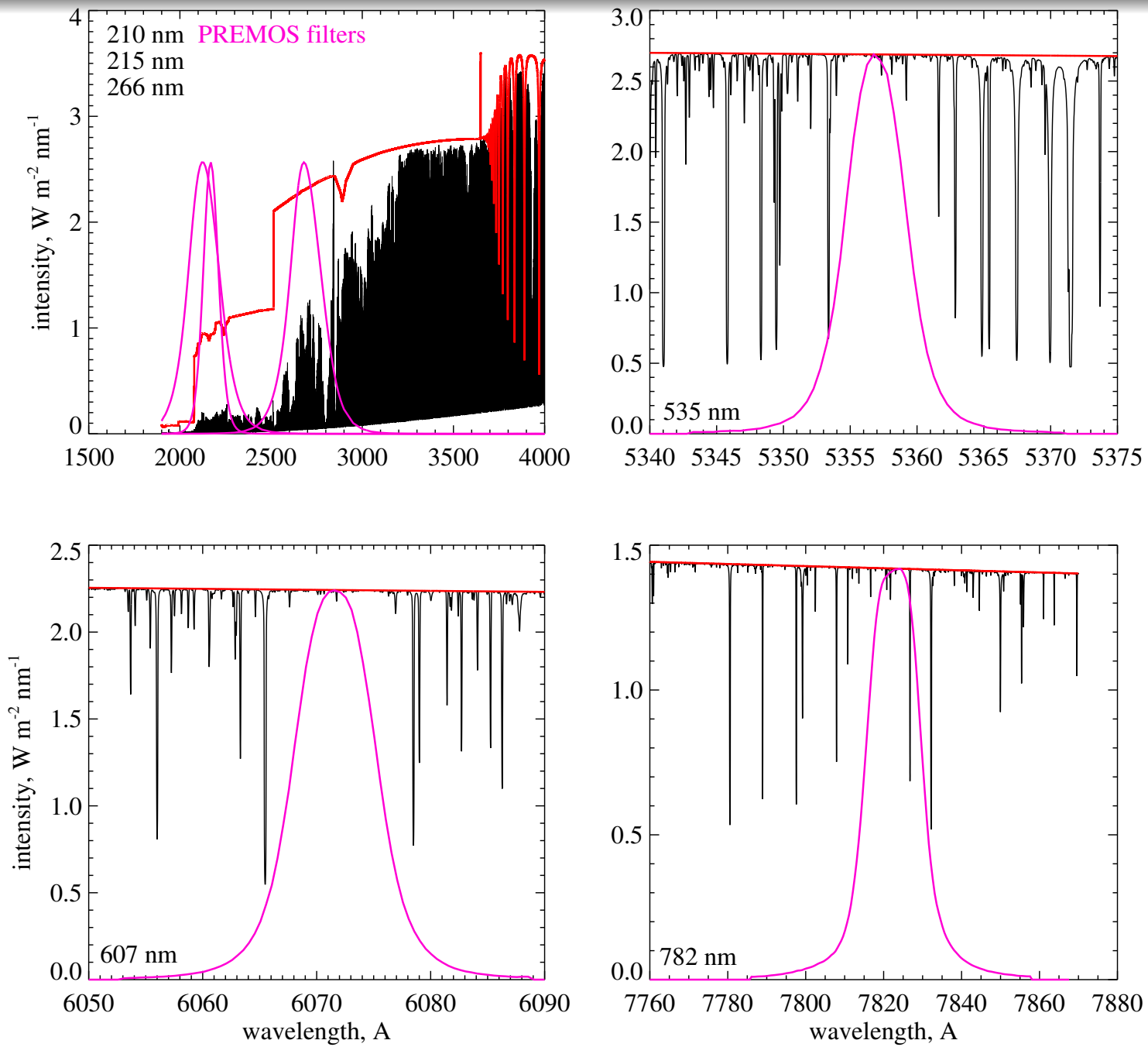




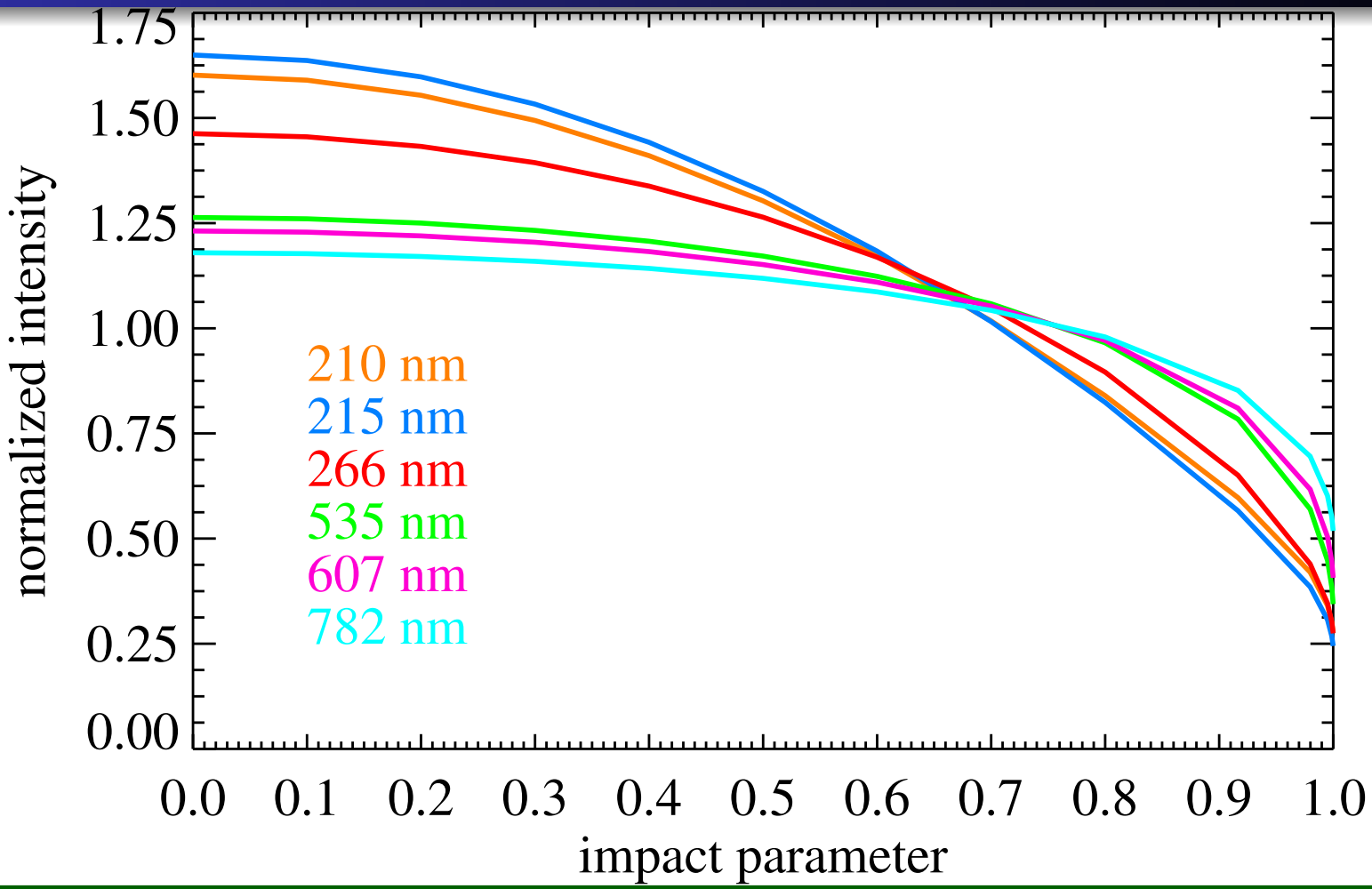


1. Retrieving the observational CLV from the light curves of solar eclipses observed by PREMOS
2. Modelling the theoretical CLV with COSI, comparing them with the observational ones, and testing 1D models of the solar atmosphere
3. Possible readjustments of the solar atmosphere models

PREMOS spectral channels



Theoretical CLV in PREMOS filters

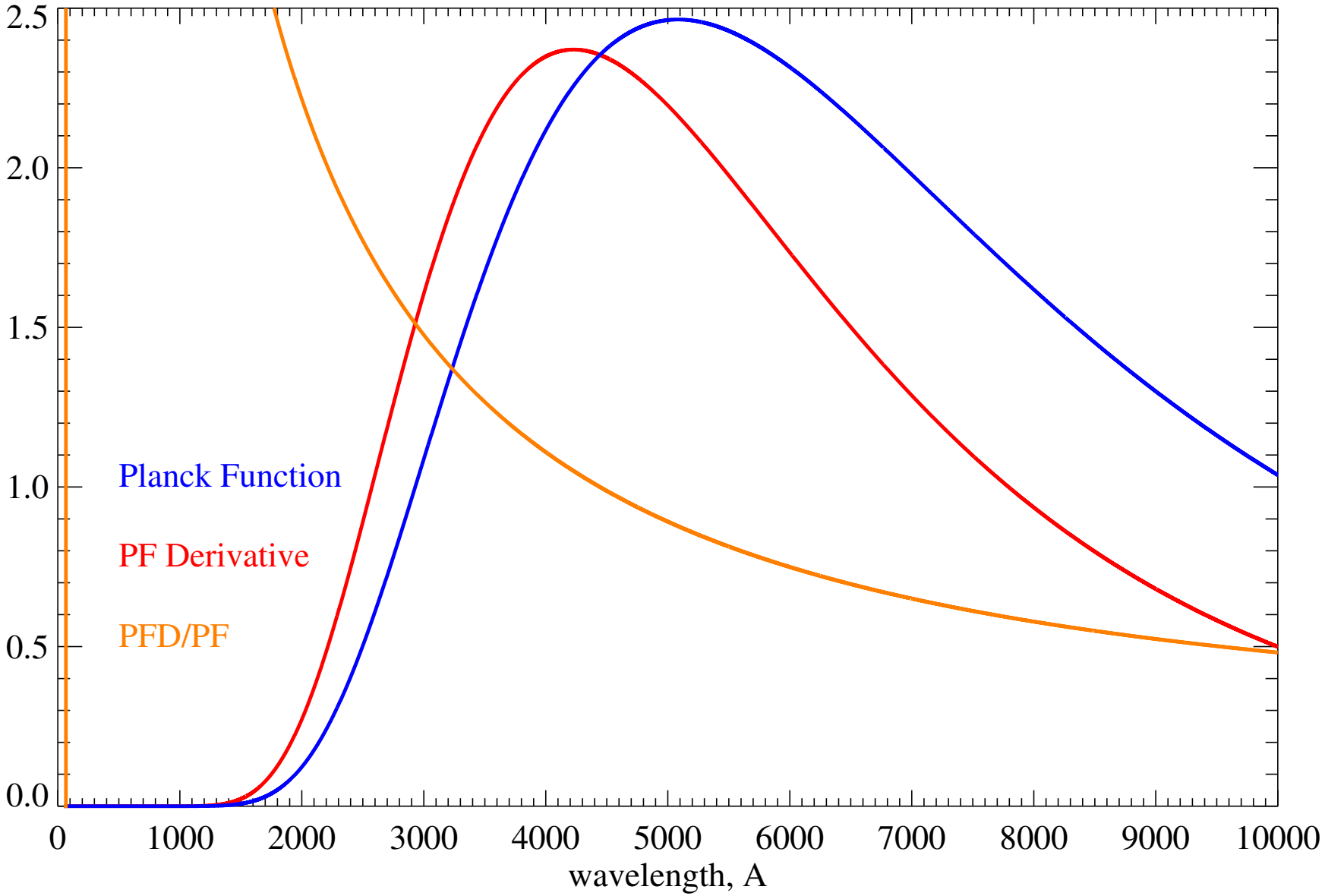


Normalization

$$I_{\mathrm{norm}}(p_j) = I(p_j) \Big/ \sum_{i=0}^{N-2} I_i^{\mathrm{mid}} \alpha_i, \quad I_i^{\mathrm{mid}} = [I(p_{i+1}) + I(p_i)]/2,$$

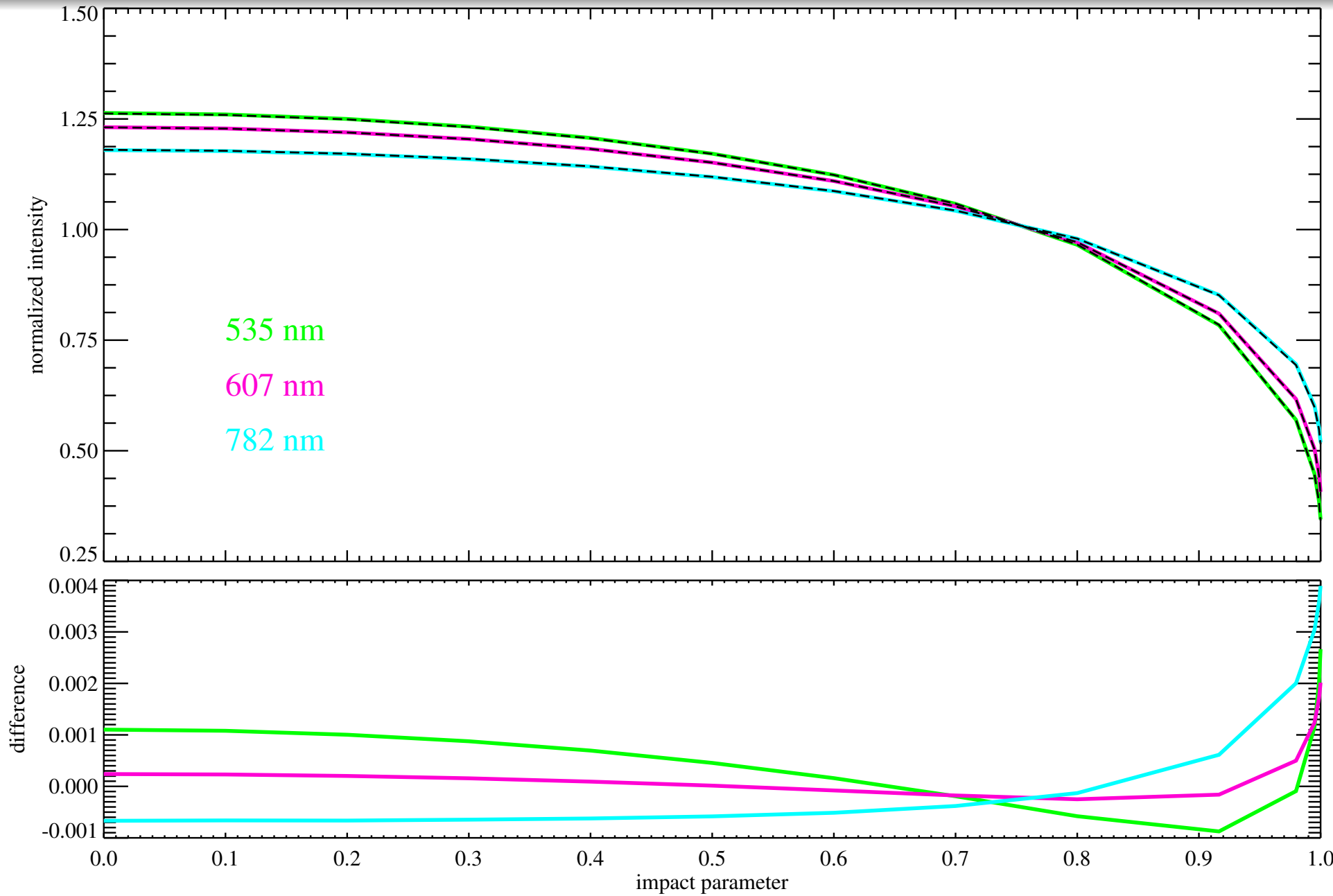
$$\alpha_i = S_i/\pi = p_{i+1}^2 - p_i^2, \quad i = 0, \ldots, N-2; \quad j = 0, \ldots, N-1; \quad N = 14$$

Explanation of the CLV wavelength dependence



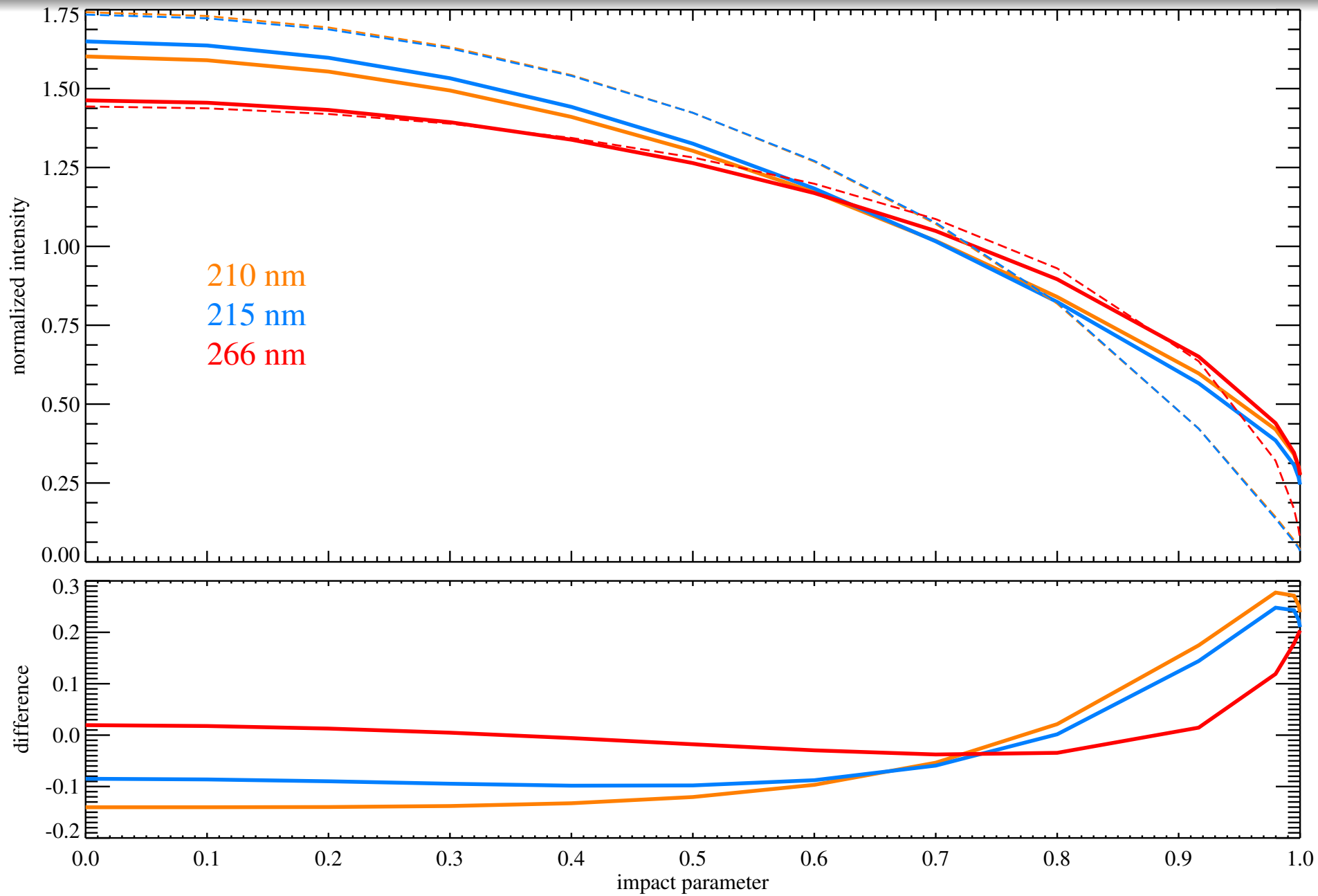
Figuring out the influence of lines on CLV

Influence of lines on CLV in IR and visible filters



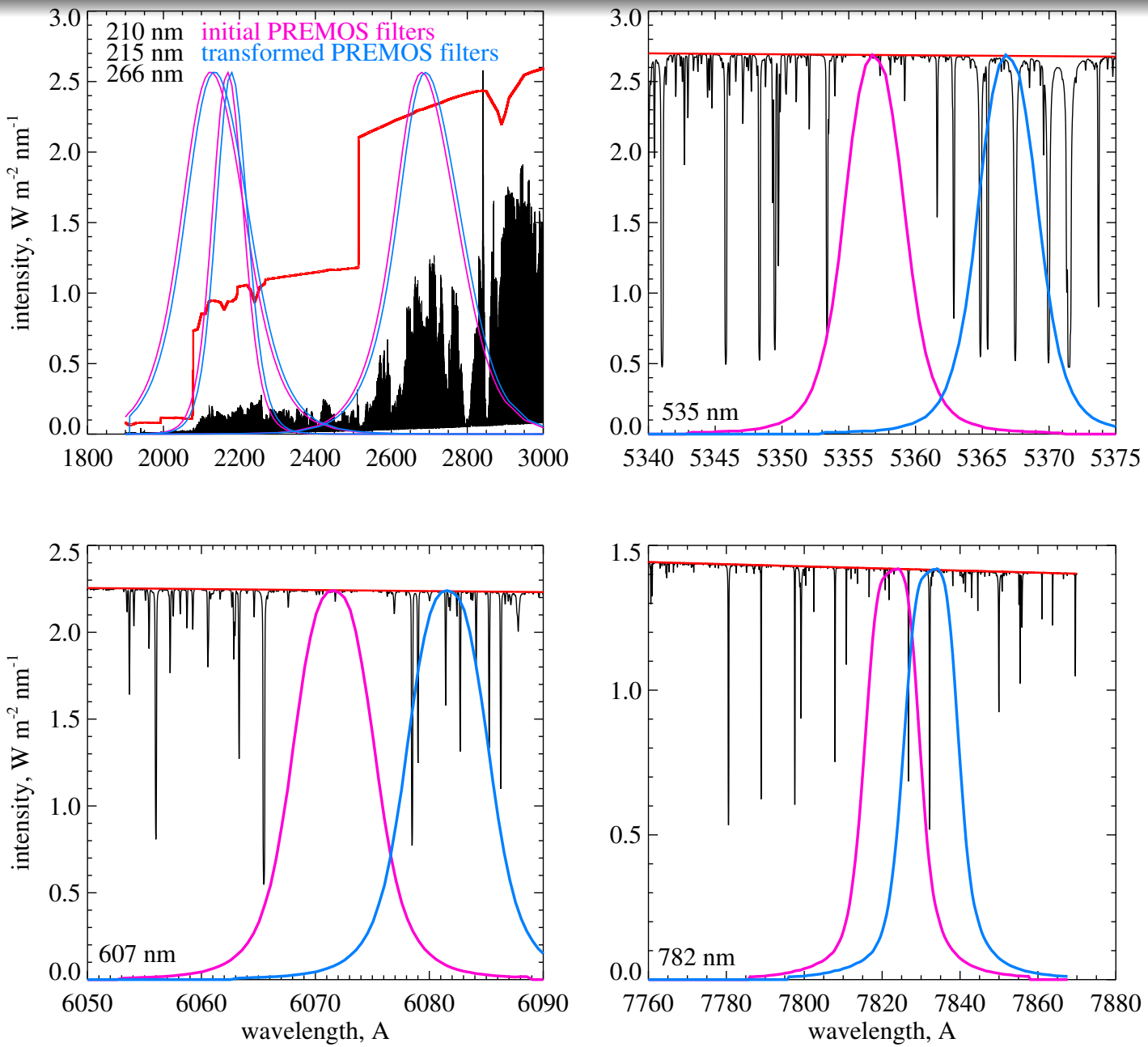
Figuring out the influence of lines on CLV

Influence of lines on CLV in UV filters



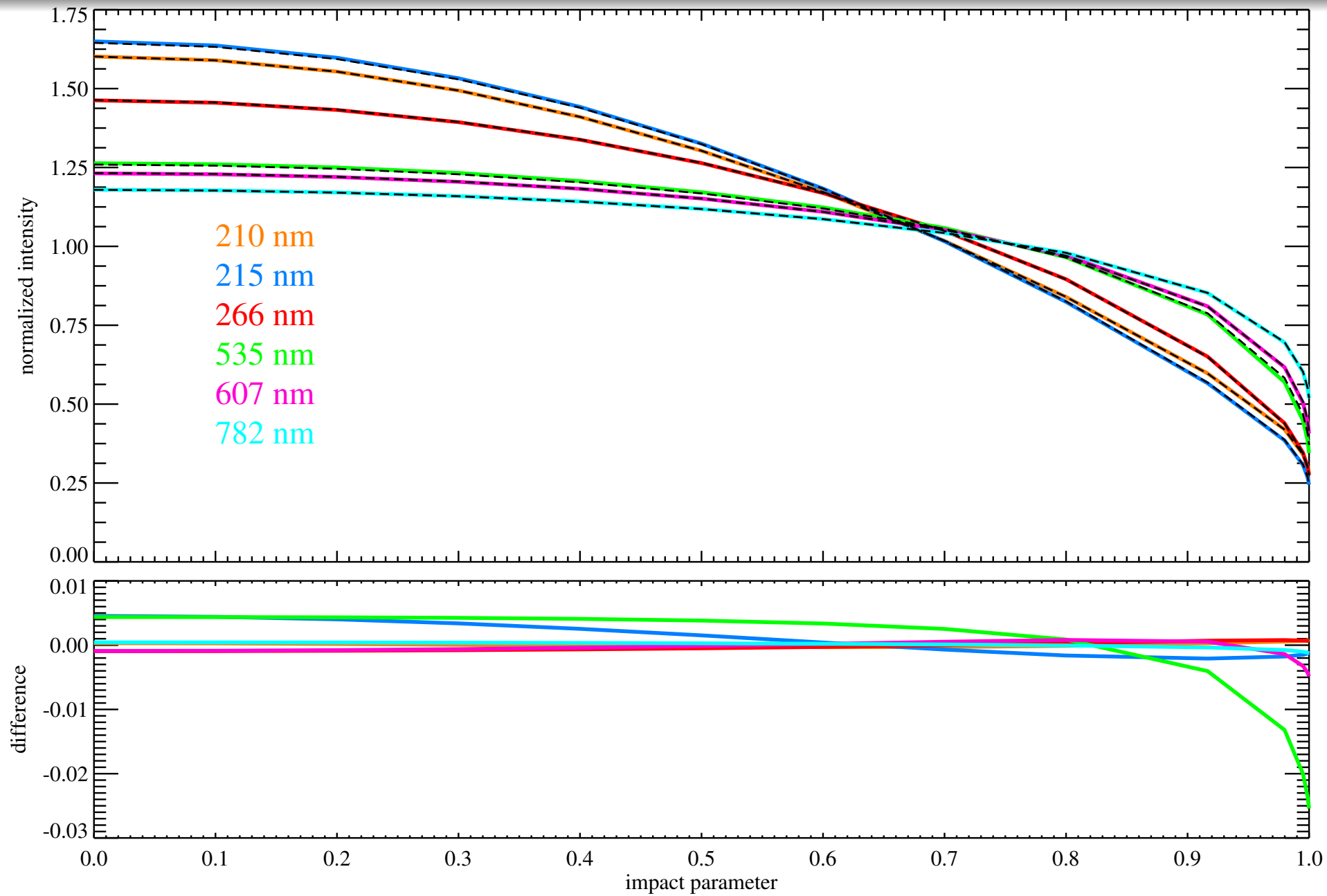
Transforming PREMOS filters

Filters shifted by 10 Å



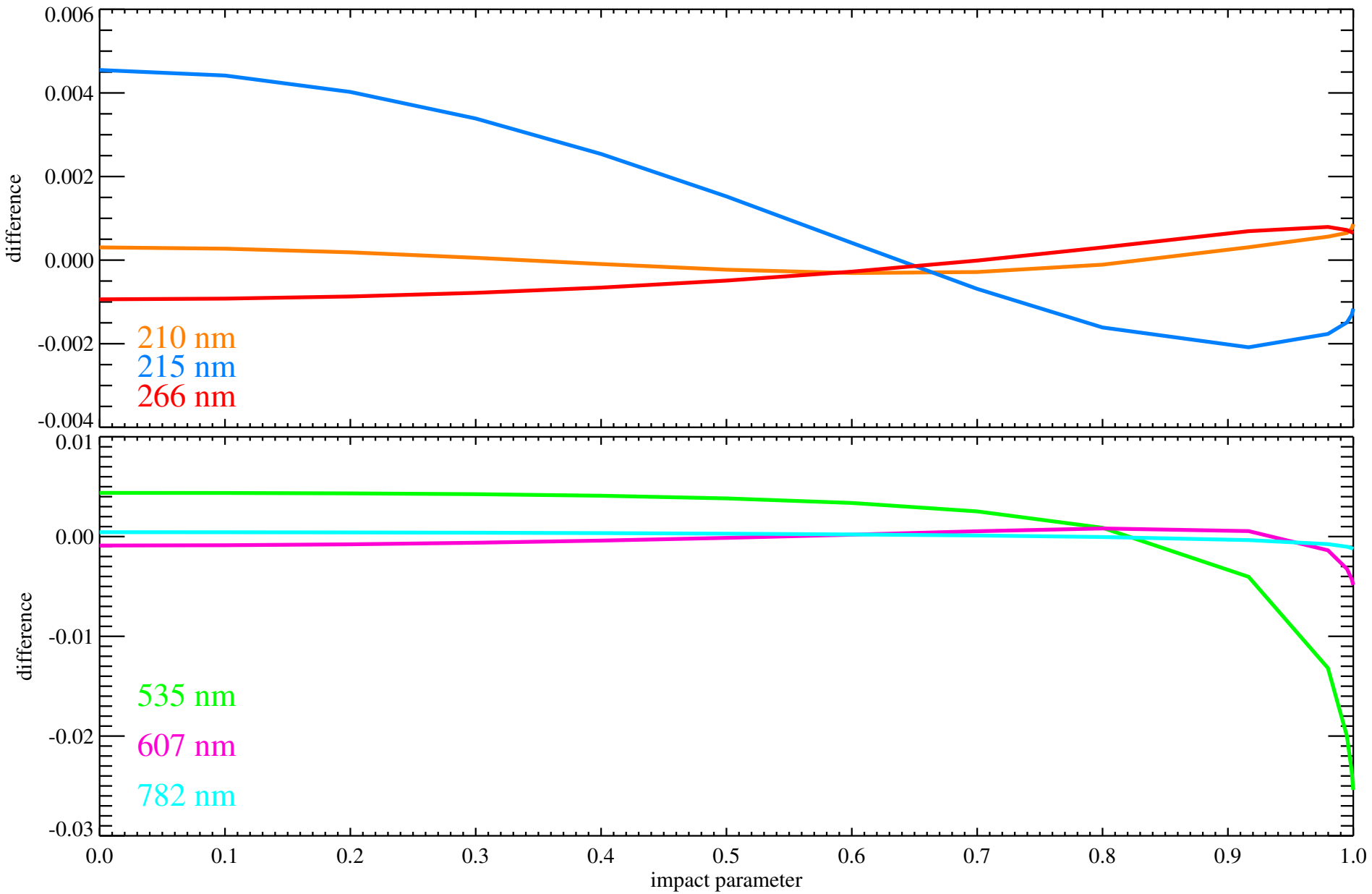
Transforming PREMOS filters

Influence of 10 Å filters shift on CLV



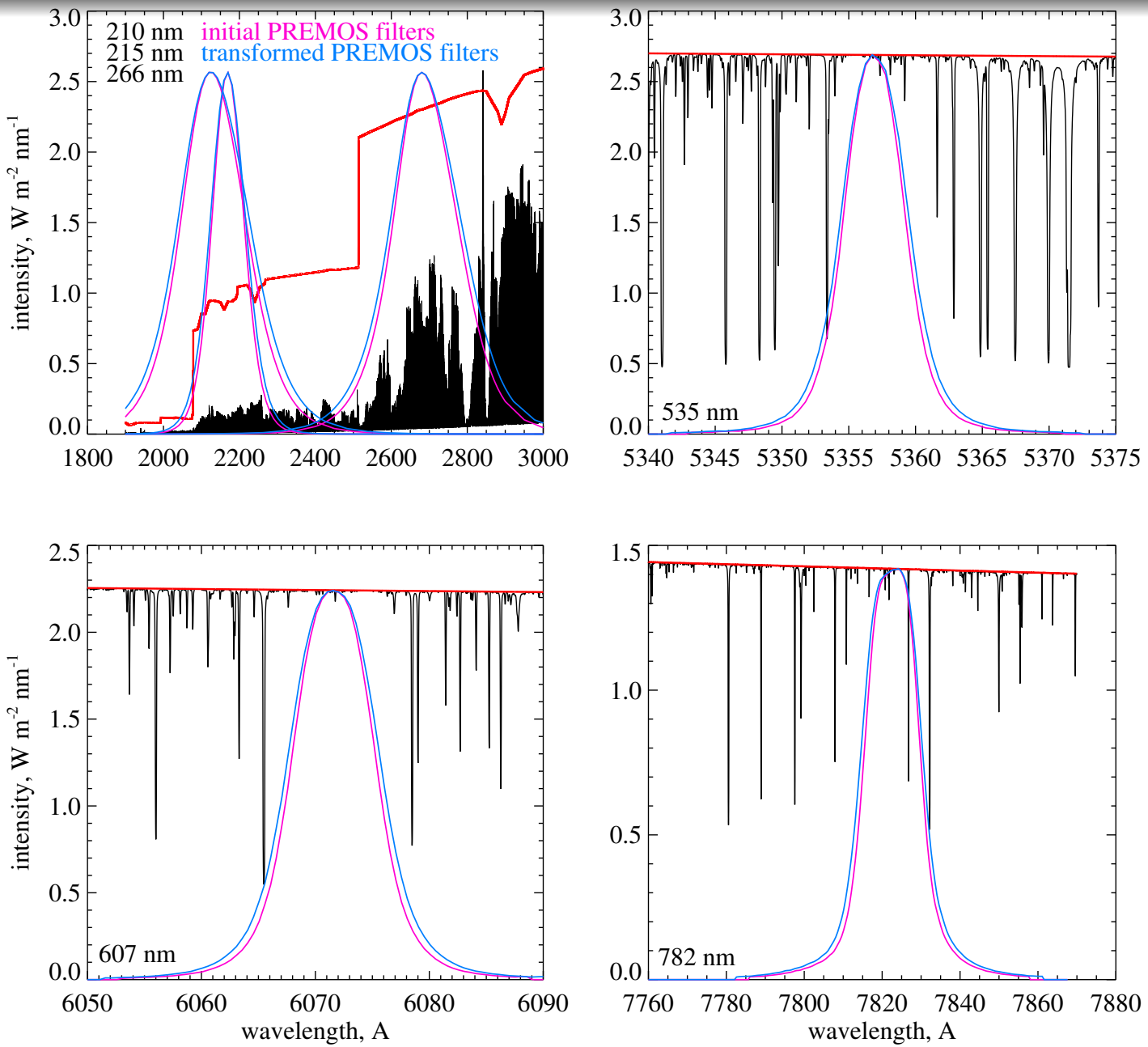
Transforming PREMOS filters

Influence of 10 Å filters shift on CLV



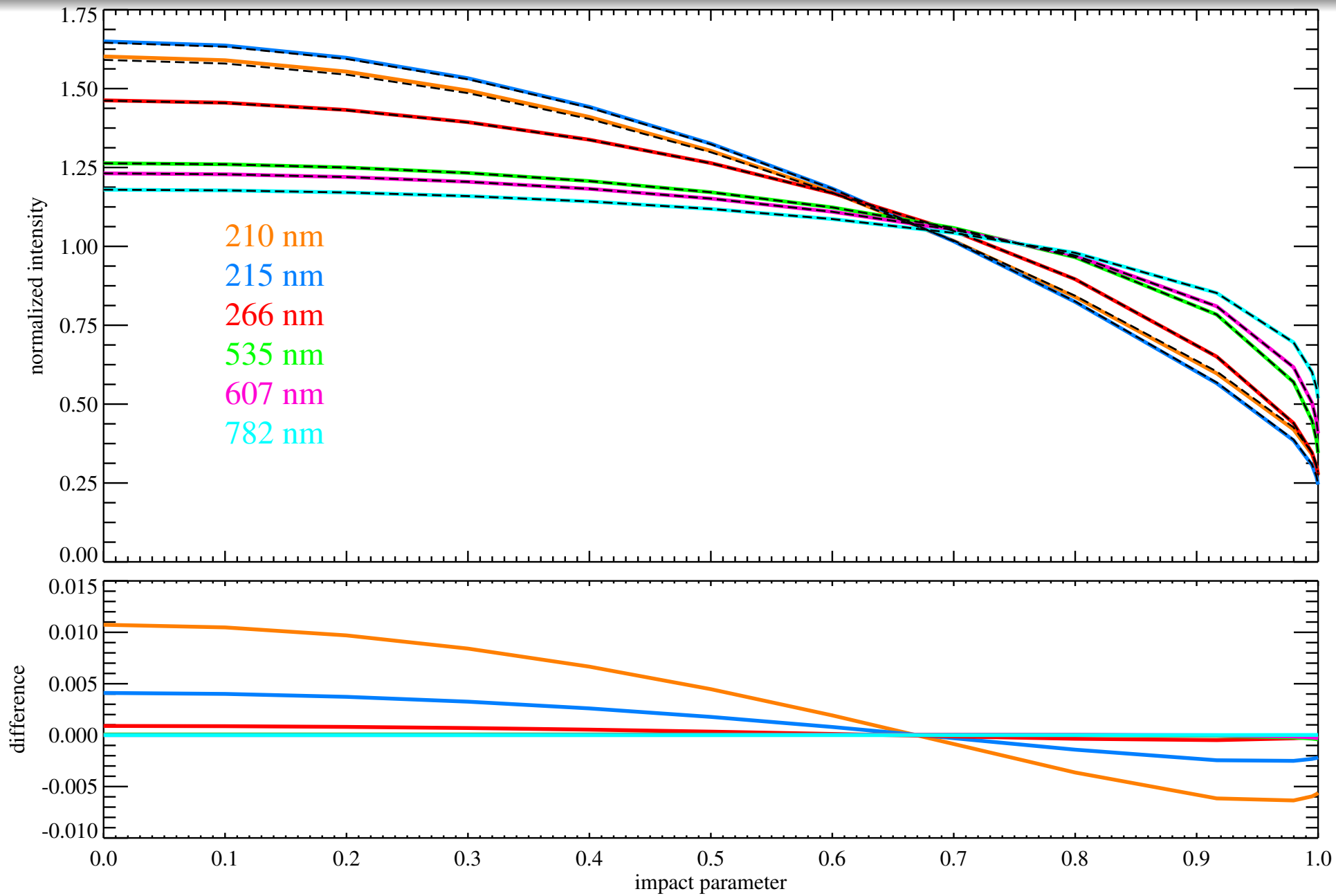
Transforming PREMOS filters

Filters broadened by 10%



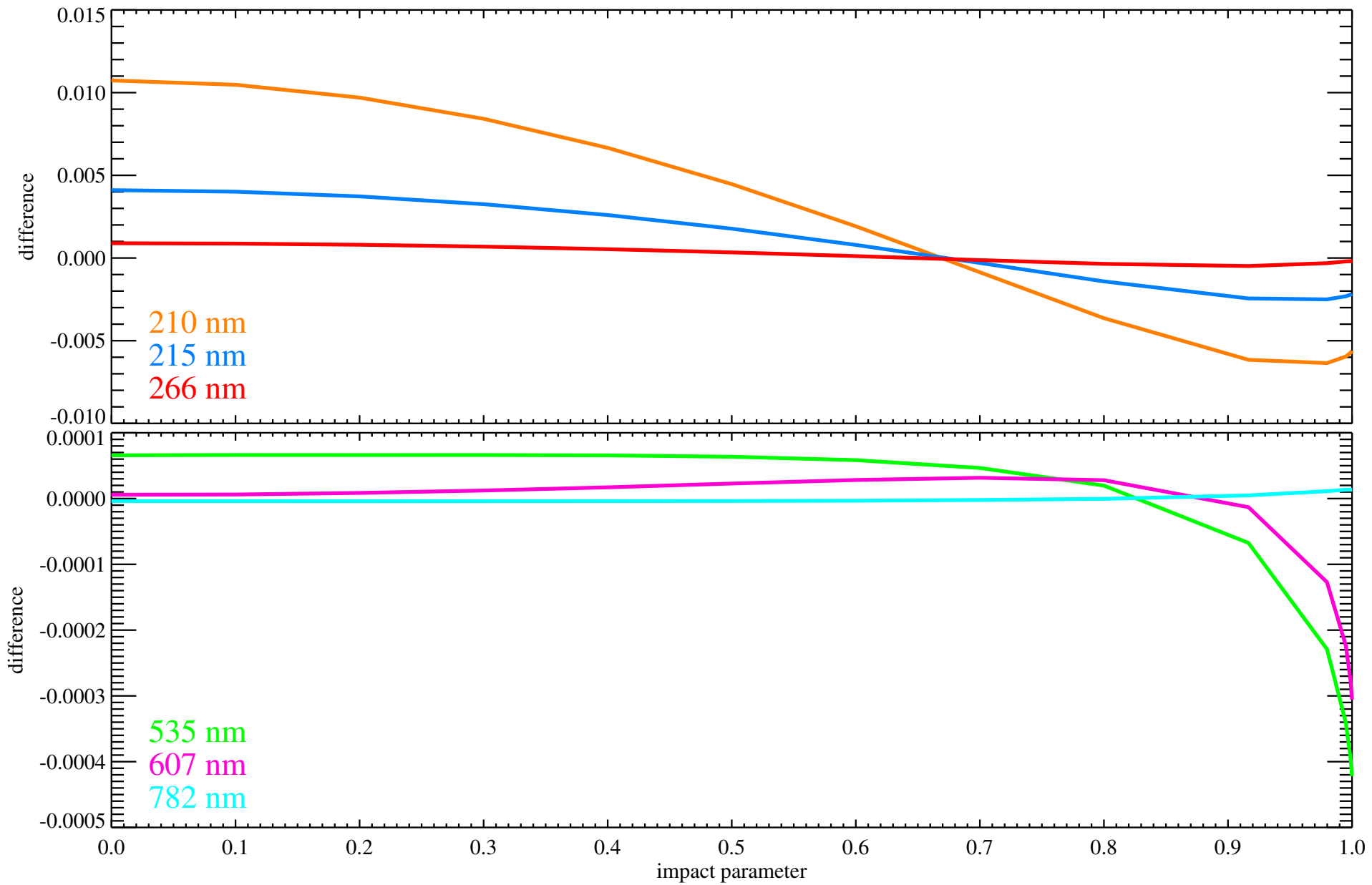
Transforming PREMOS filters

Influence of 10% filters broadening on CLV



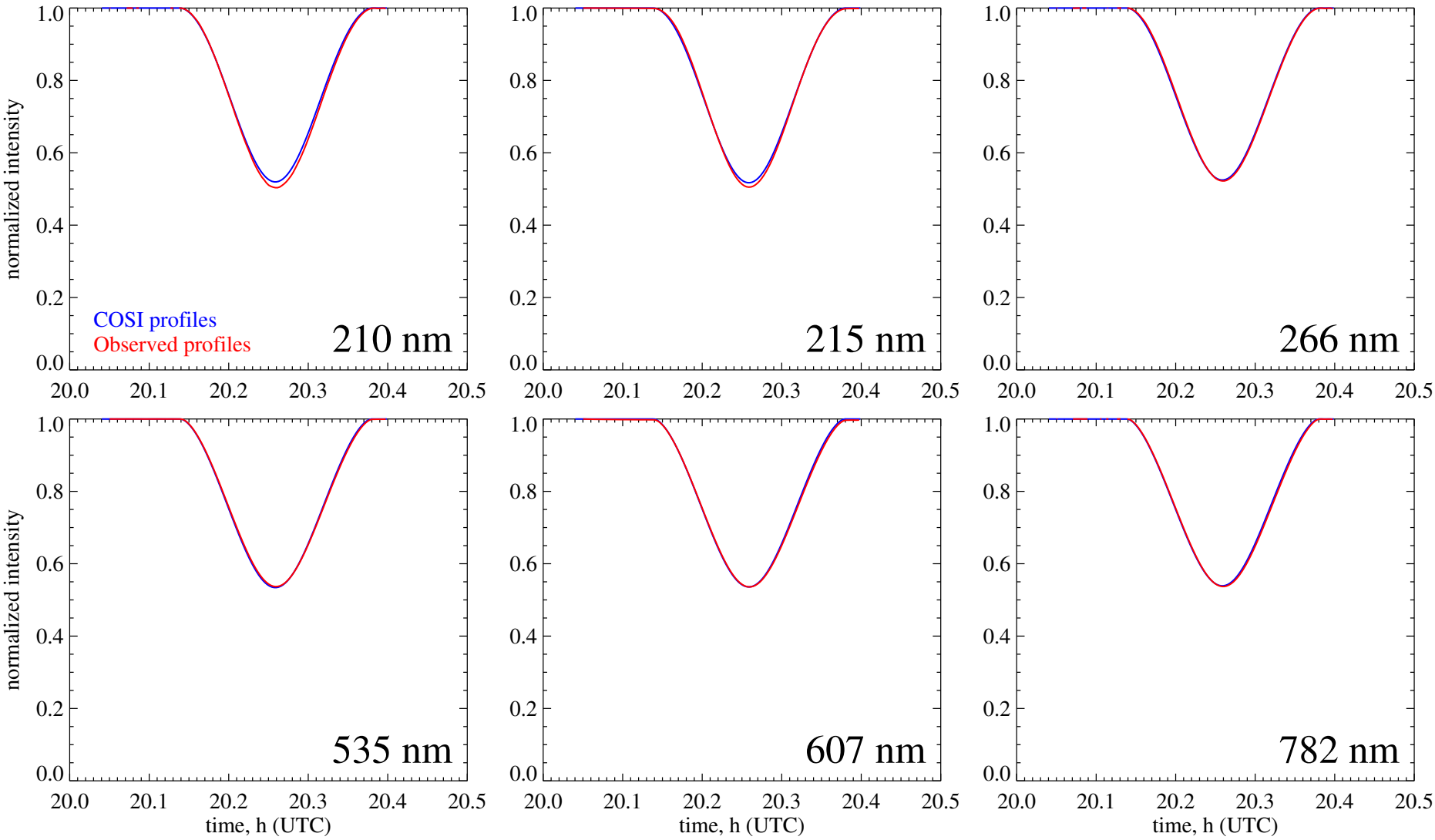
Transforming PREMOS filters

Influence of 10% filters broadening on CLV



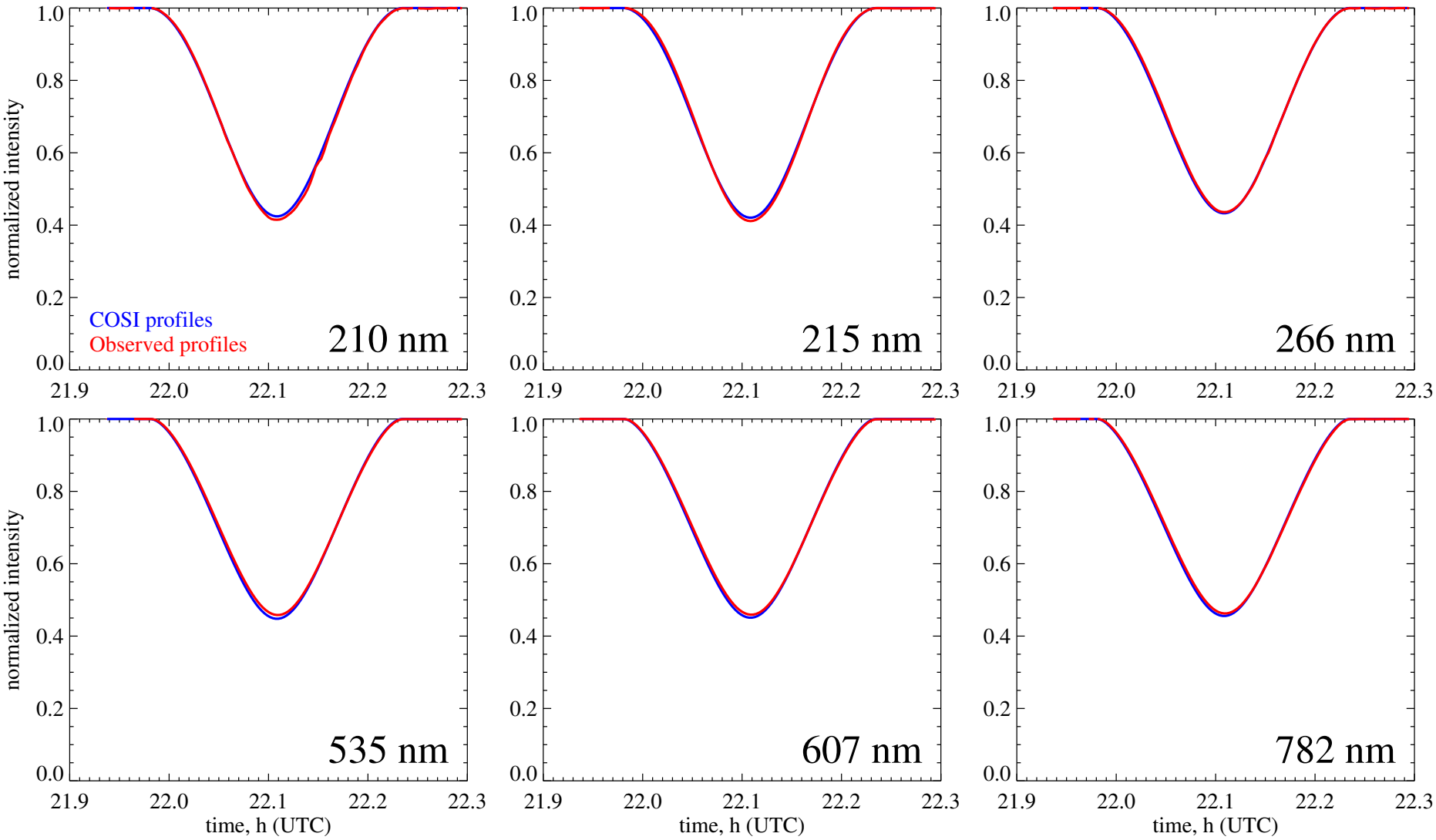
Eclipses observed by PREMOS

June 01, 2011 (first transit)



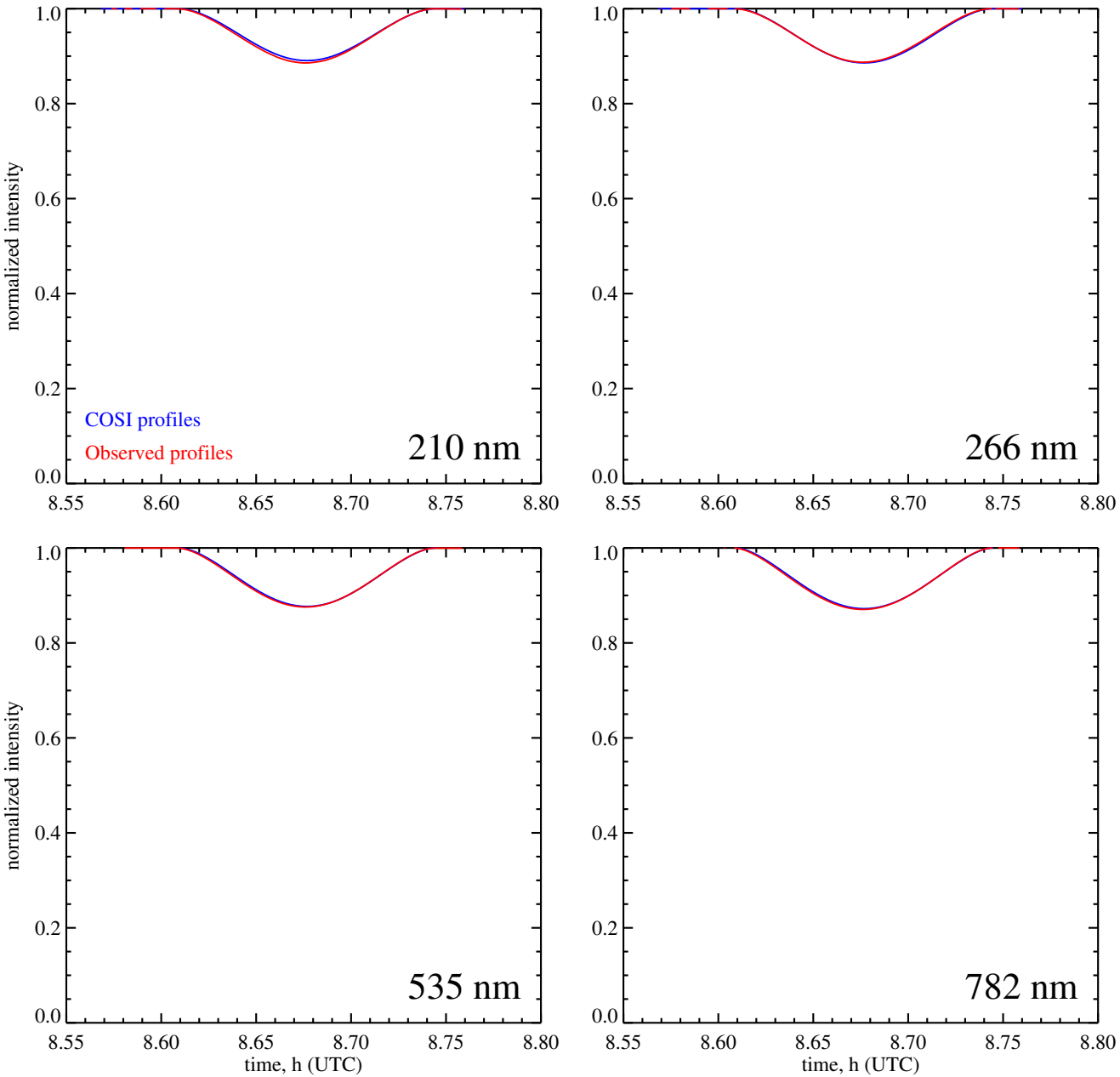
Eclipses observed by PREMOS

June 01, 2011 (second transit)



Eclipses observed by PREMOS

July 01, 2011



Thank You for Your Attention!