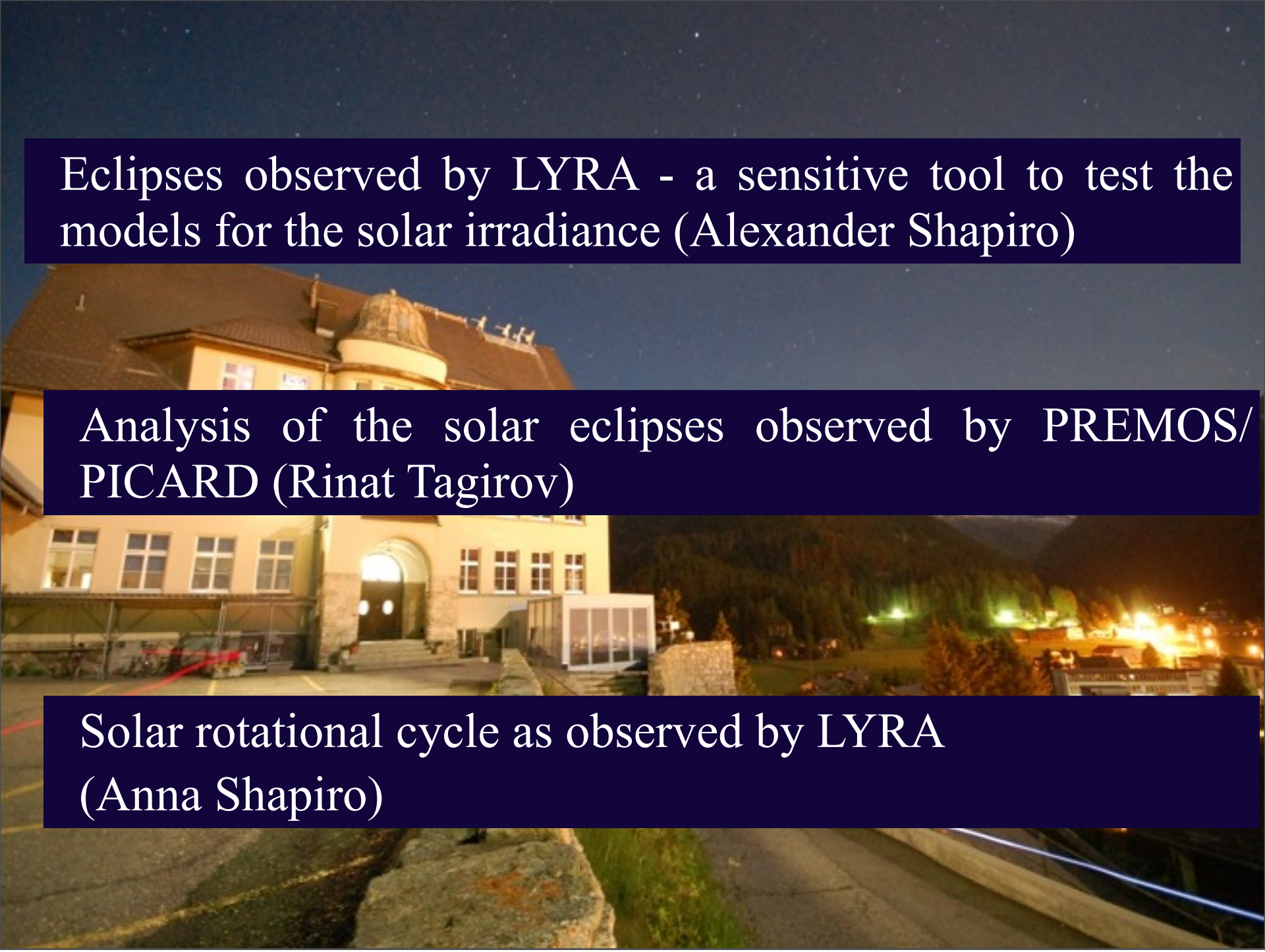
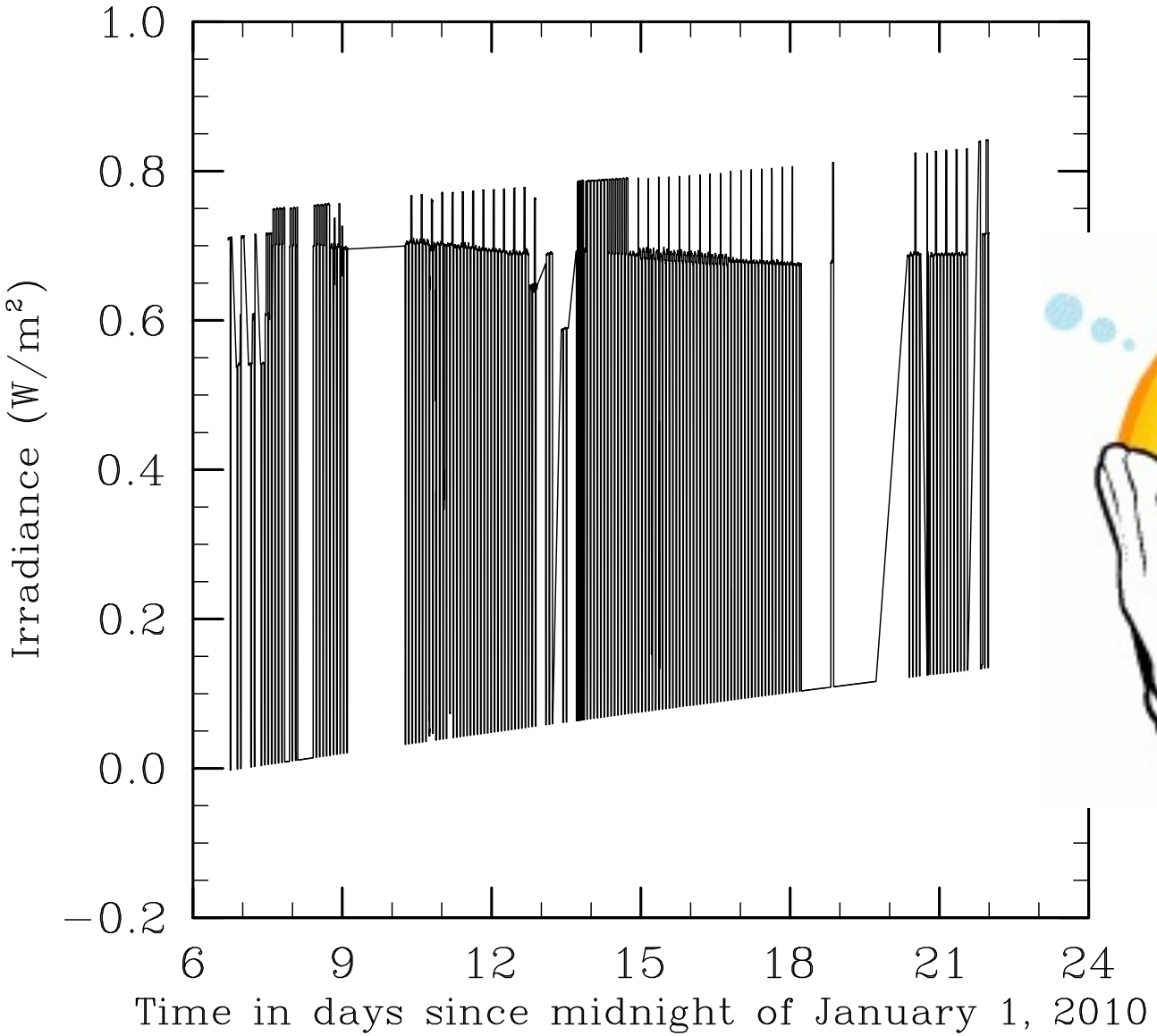
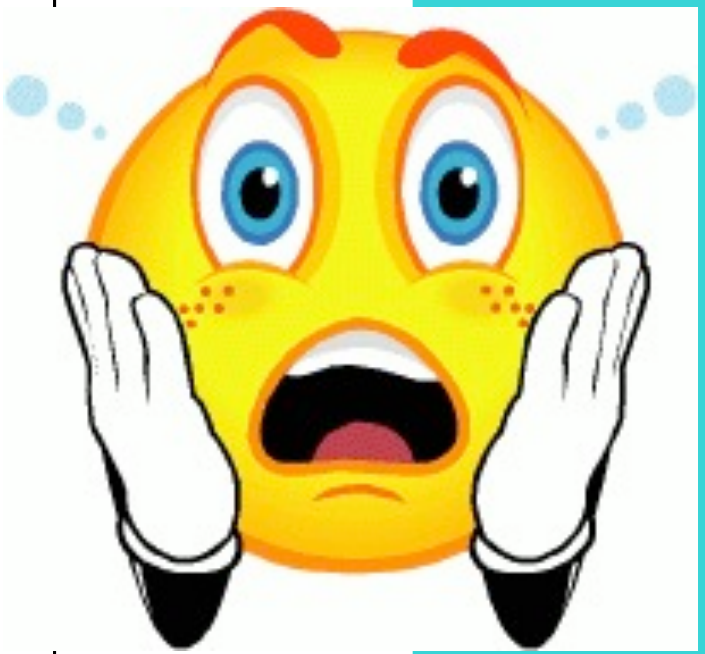

Eclipses observed by LYRA - a sensitive tool to test the models for the solar irradiance (Alexander Shapiro)
Analysis of the solar eclipses observed by PREMOS/ PICARD (Rinat Tagirov)
Solar rotational cycle as observed by LYRA
(Anna Shapiro)

Solar Physics with LYRA

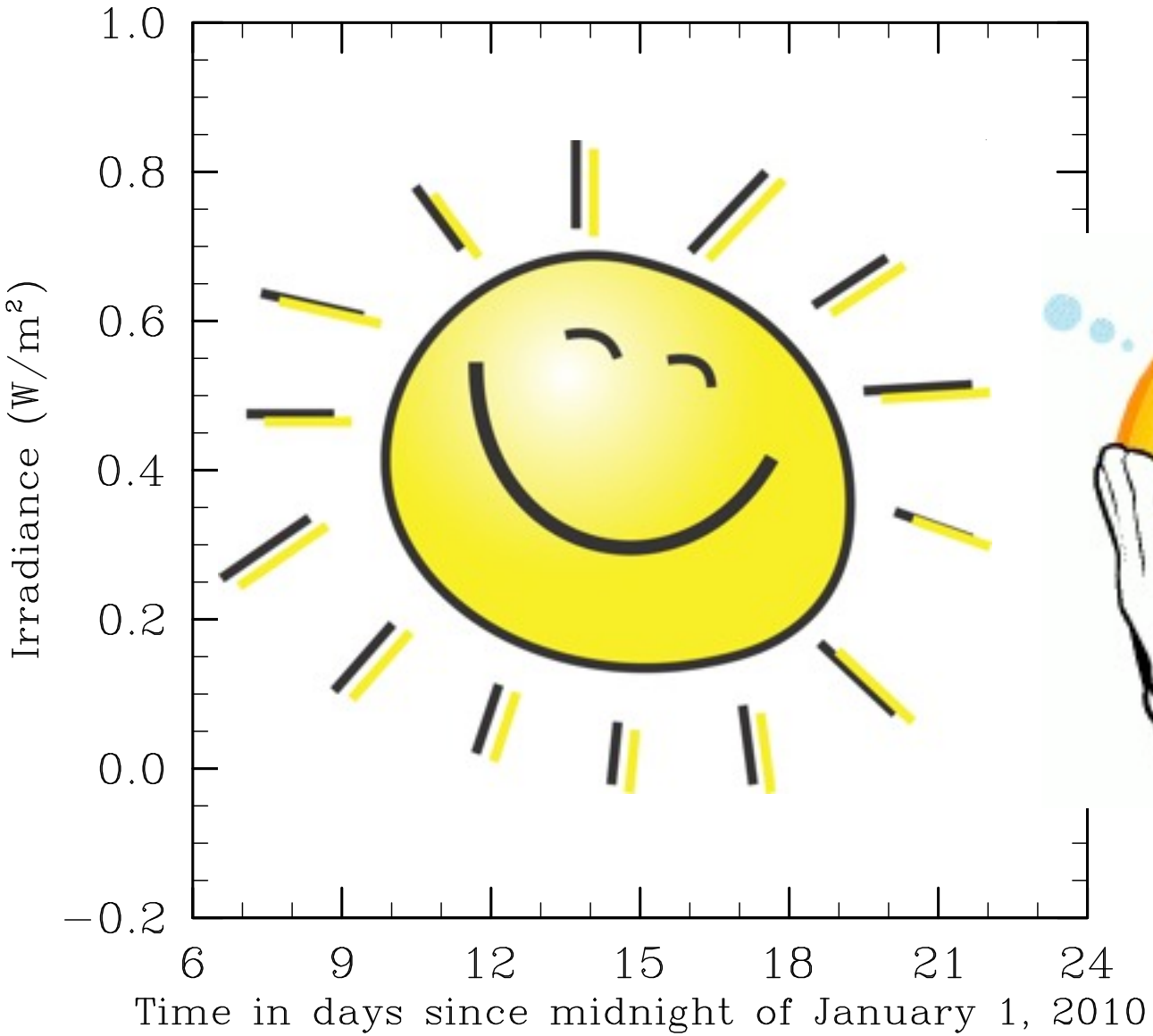
Solar Physics with LYRA

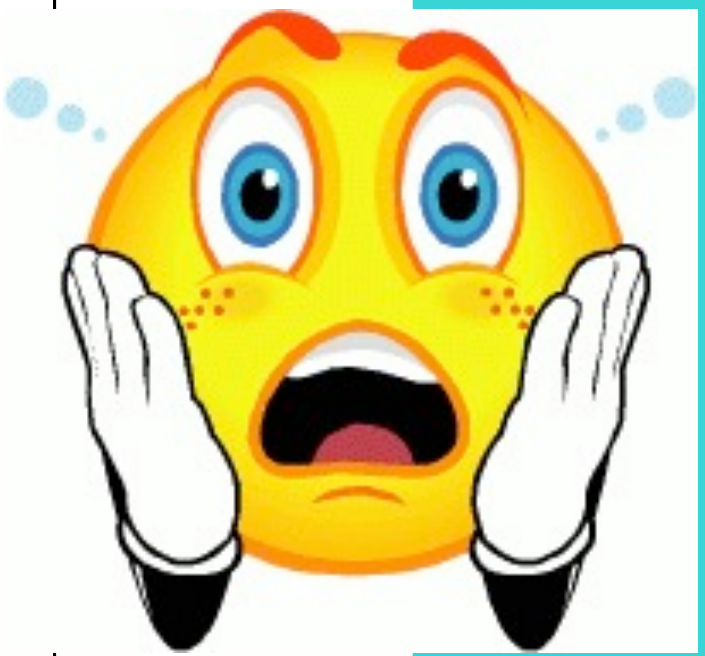
Solar Physics with LYRA





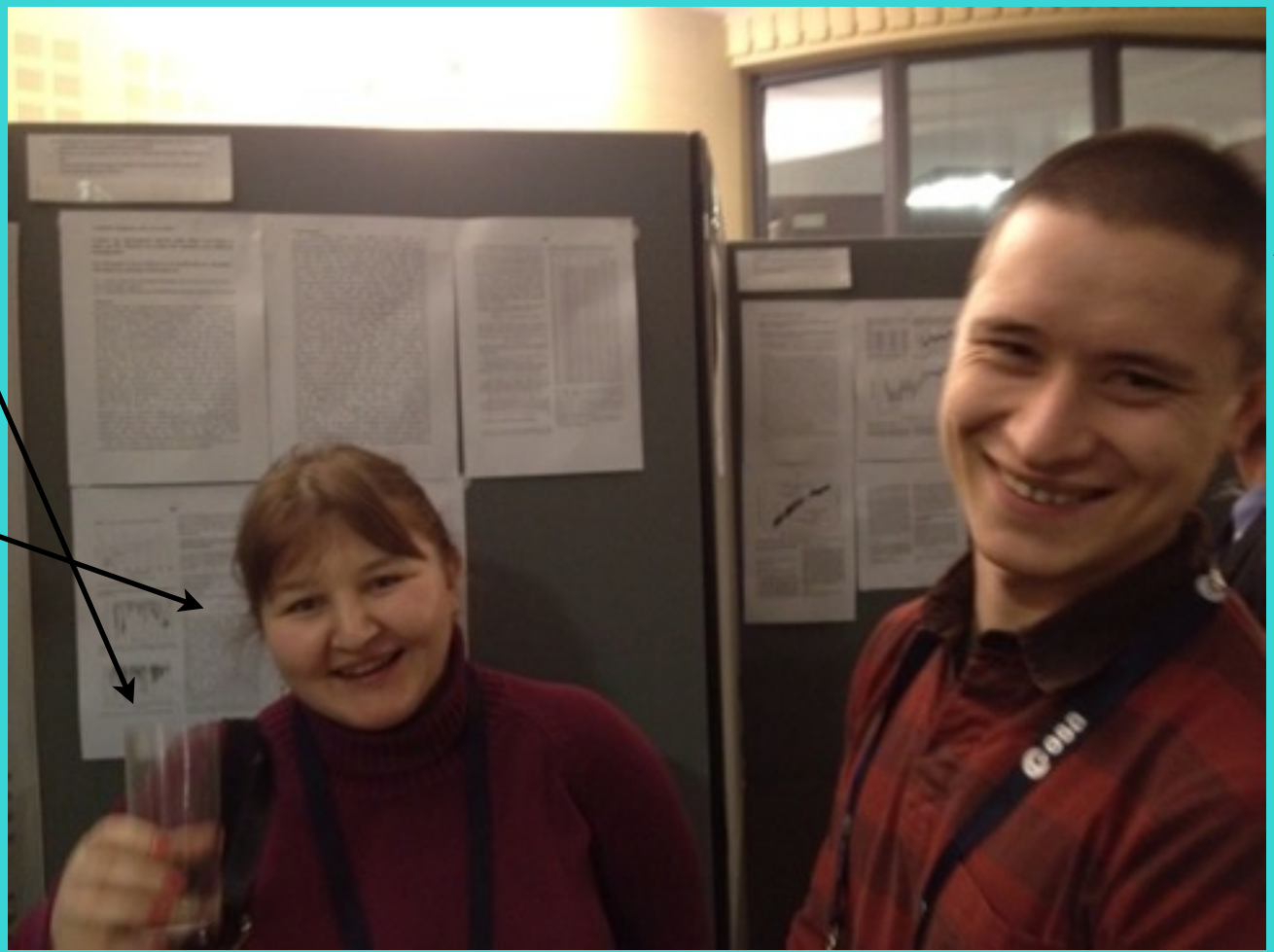
Solar Physics with LYRA





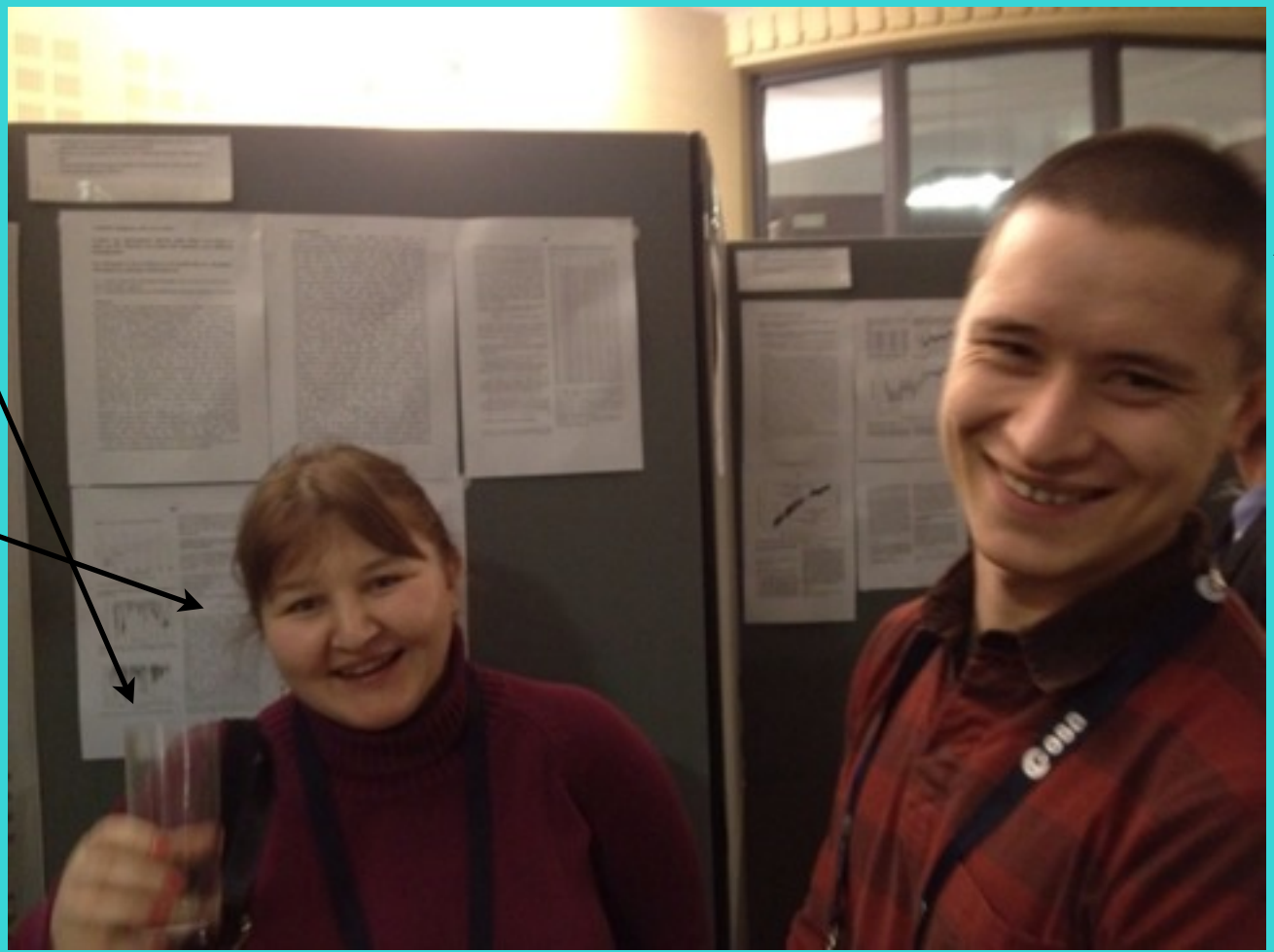
Analysis of the eclipses as observed by LYRA

Analysis of the eclipses as observed by LYRA



Analysis of the eclipses as observed by LYRA

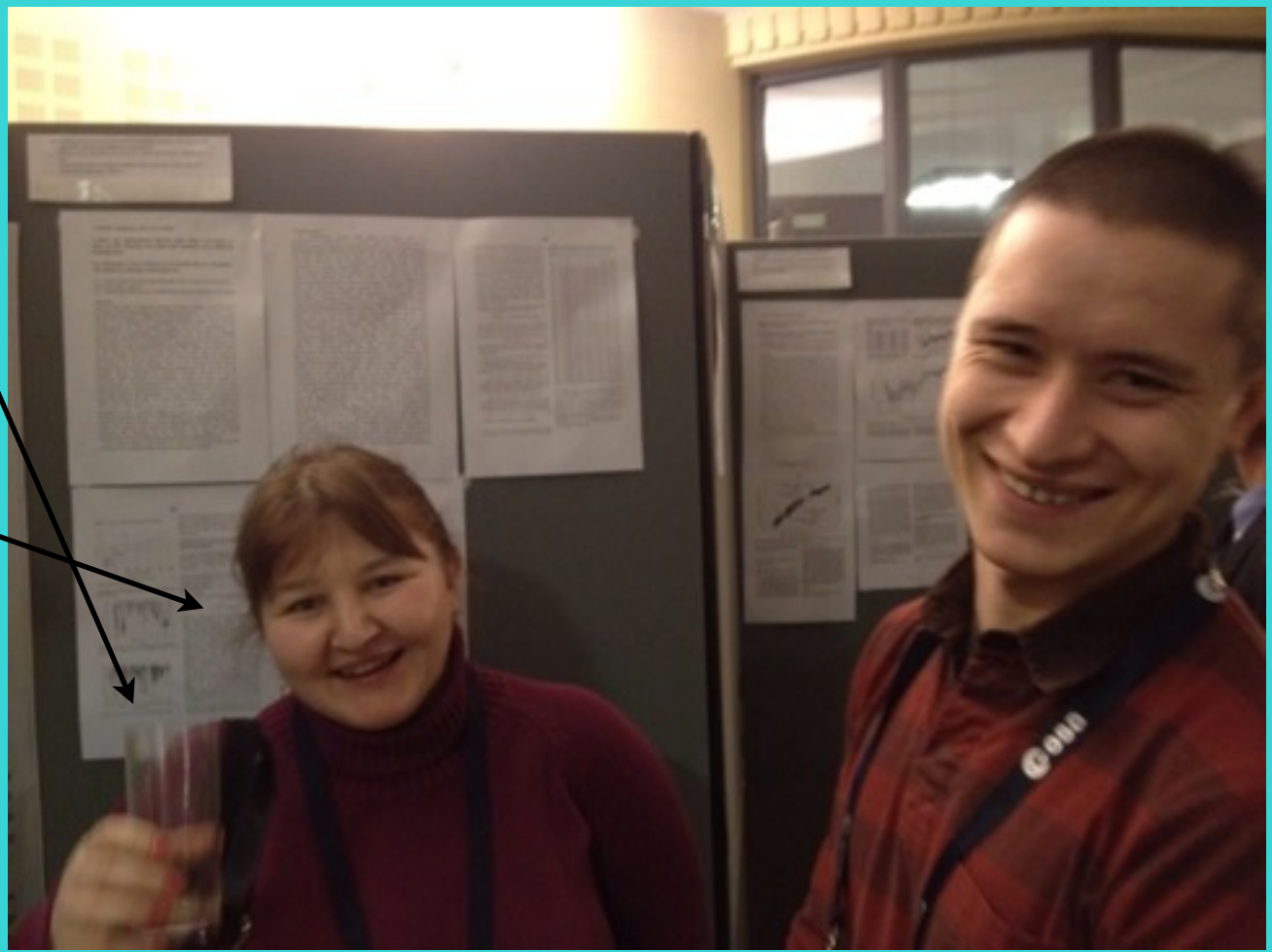
Analysis of the eclipses as observed by PREMOS/PICARD



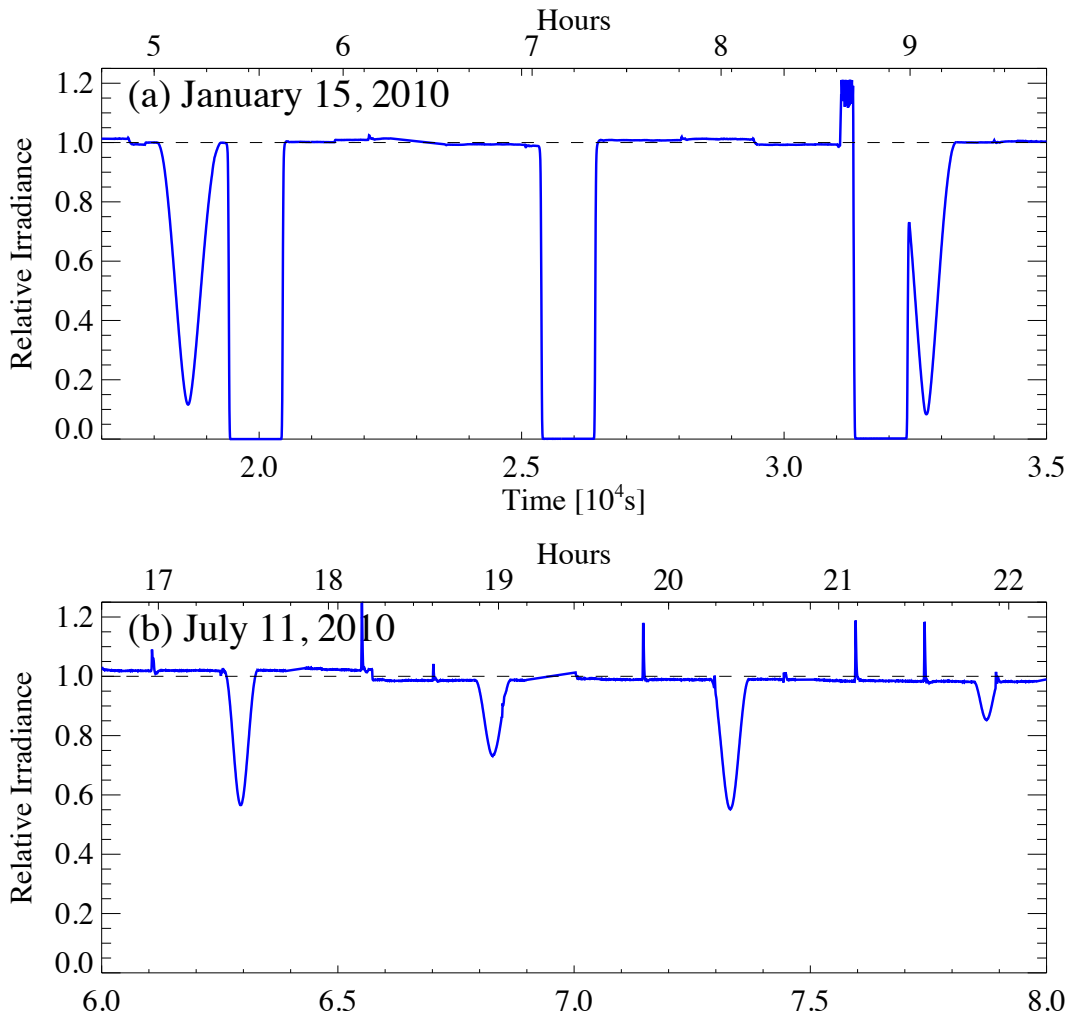
Analysis of the eclipses as observed by LYRA

Signatures of the solar rotational cycle in the LYRA data

Analysis of the eclipses as observed by PREMOS/PICARD



Eclipses and Occultations observed by LYRA

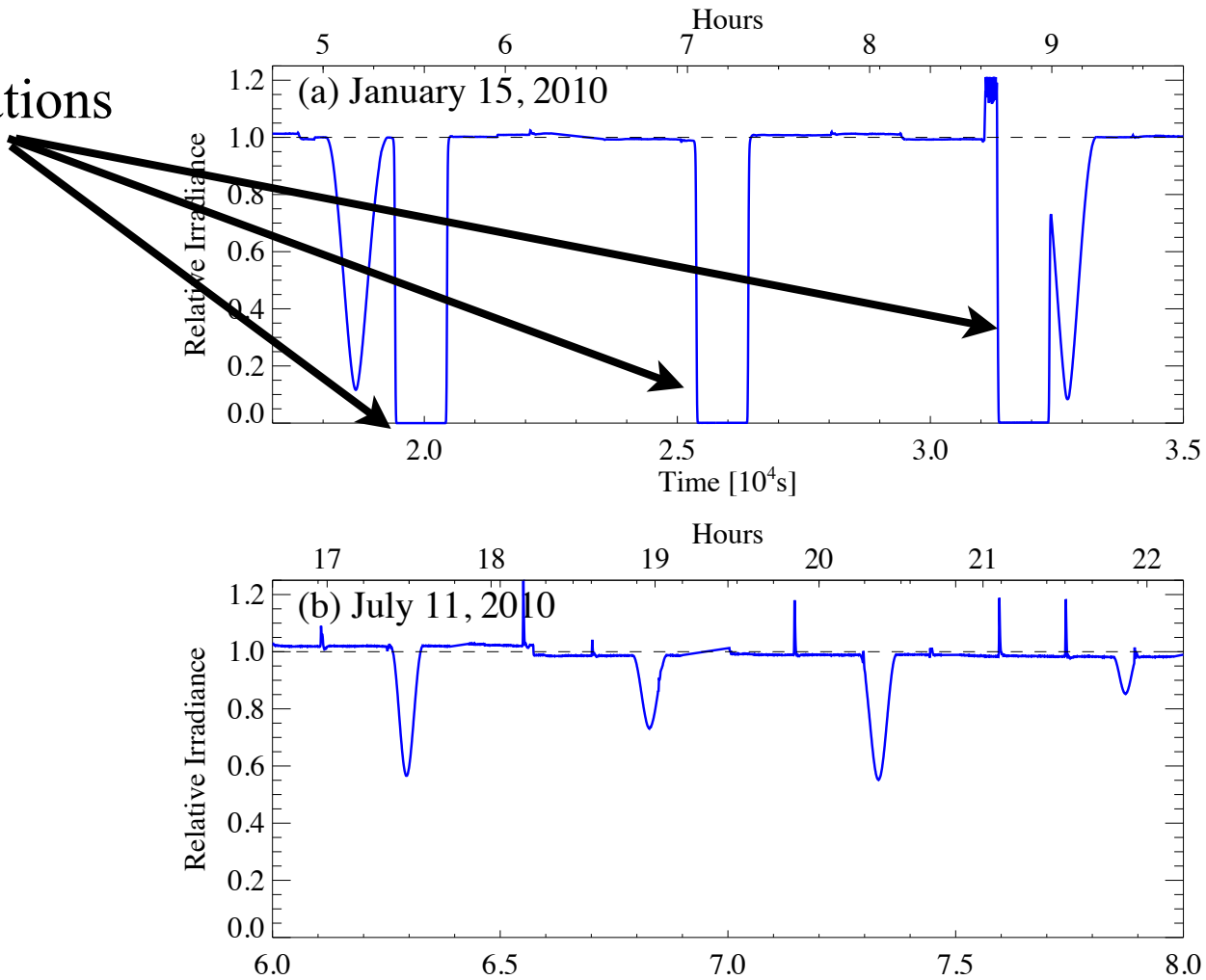


January 15, 2010

July 11, 2010

Eclipses and Occultations observed by LYRA

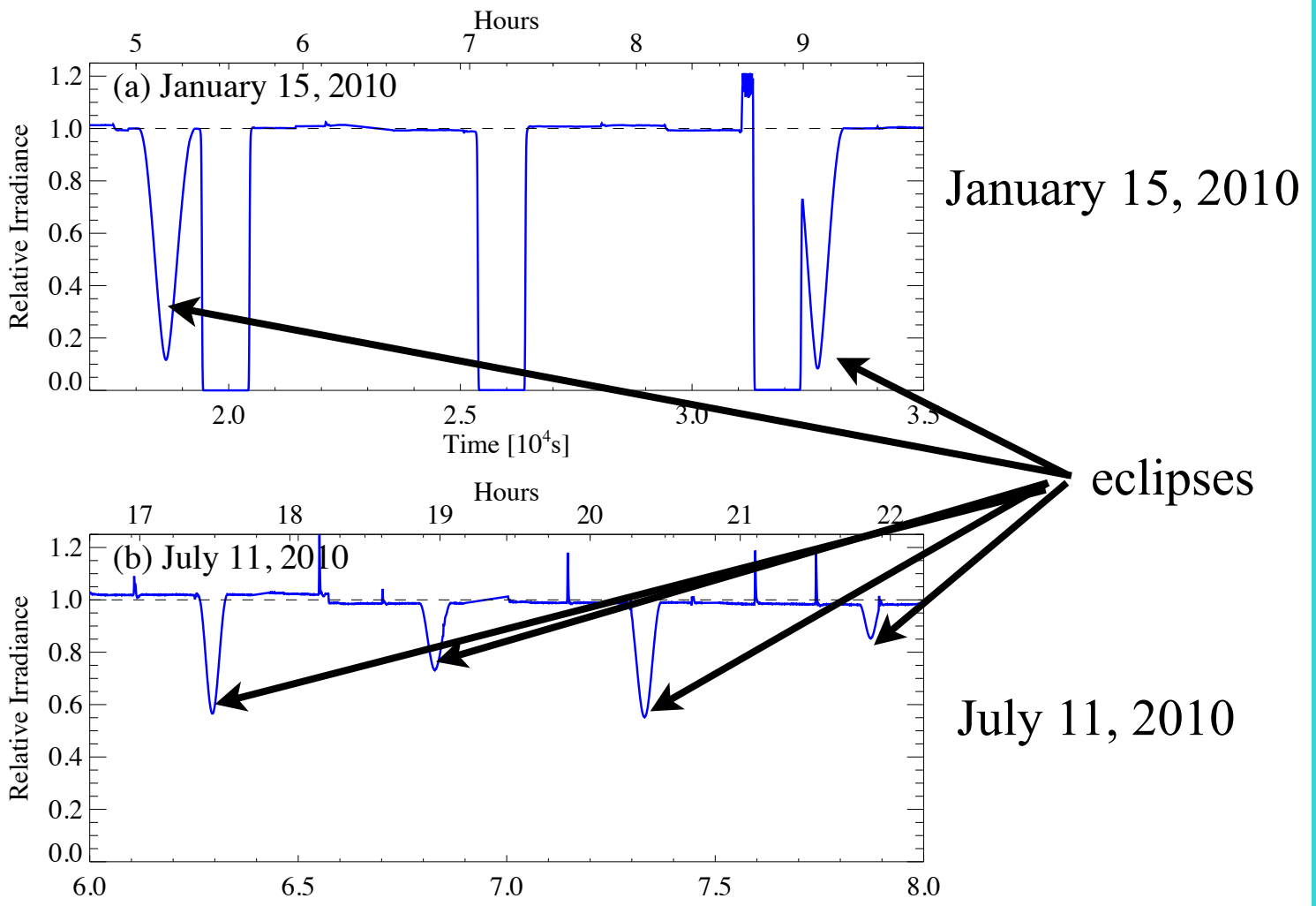
occultations



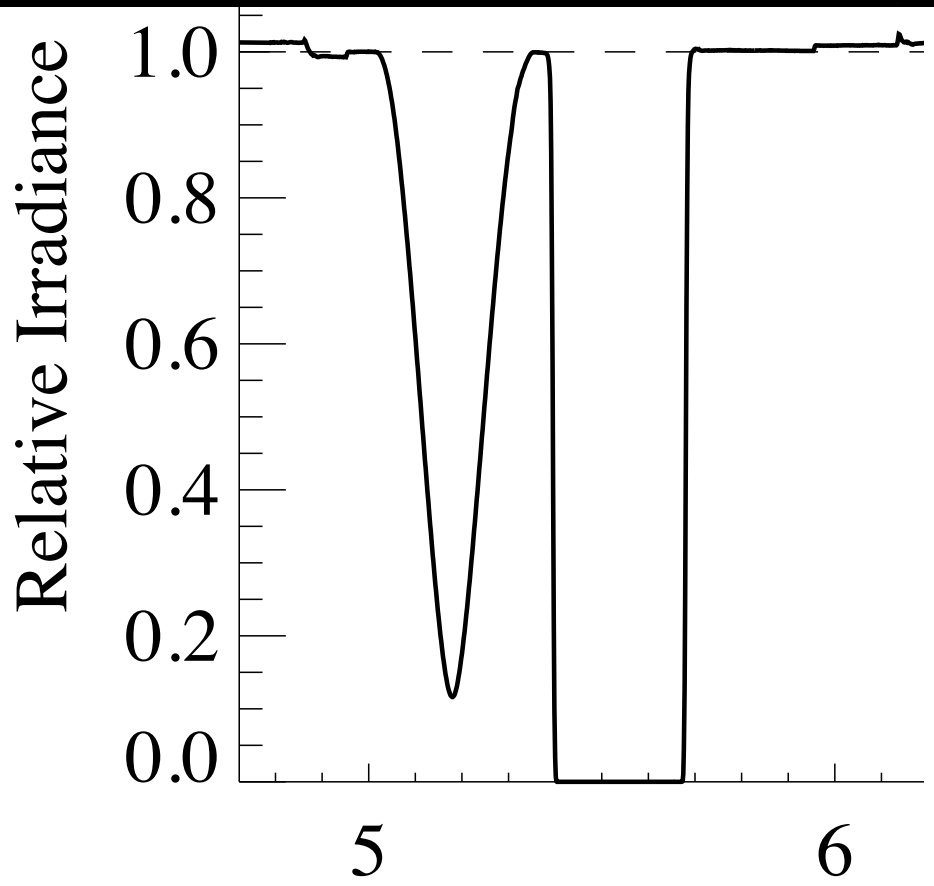
January 15, 2010

July 11, 2010

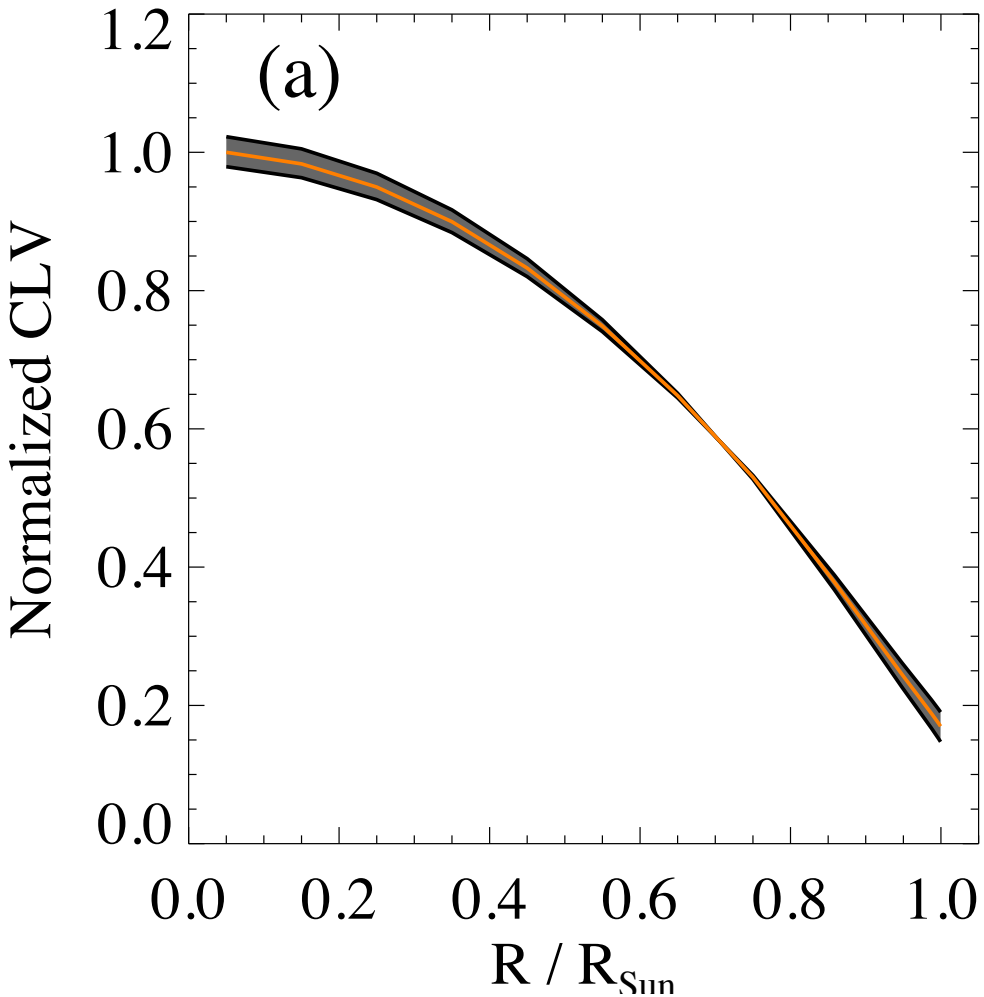
Eclipses and Occultations observed by LYRA



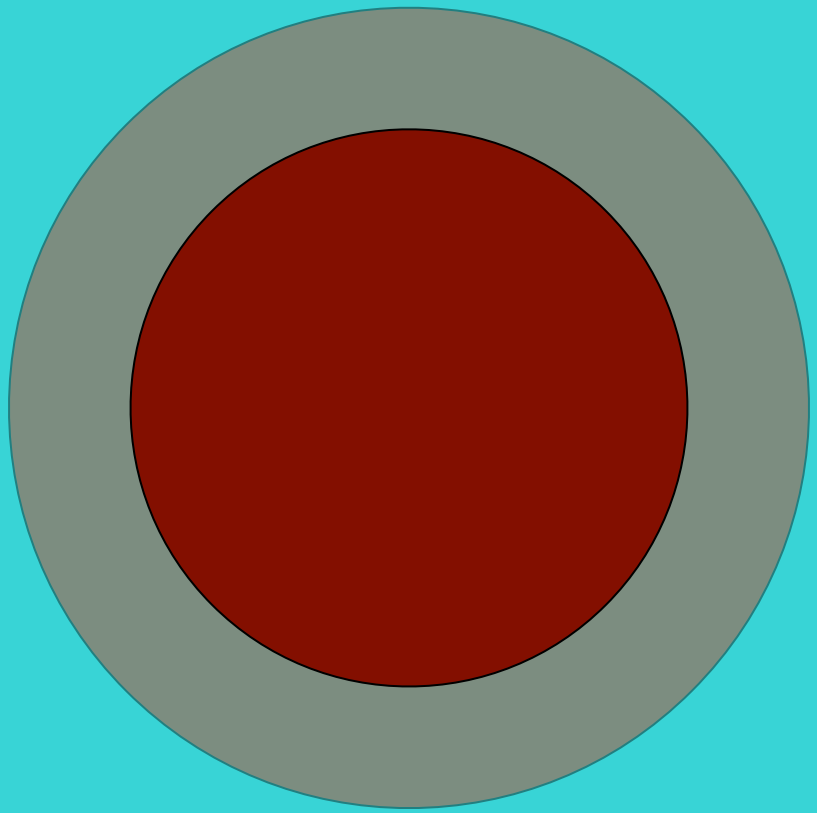
Extraction of the CLV

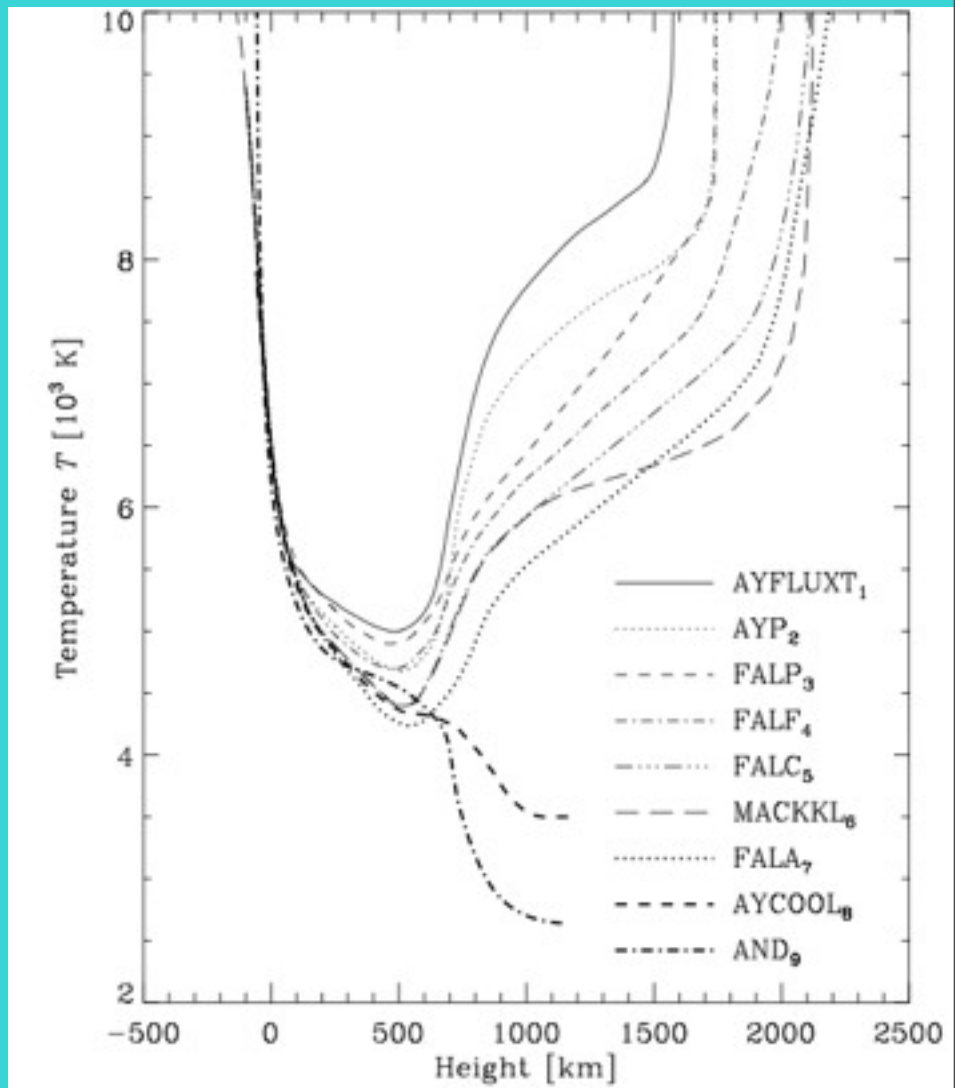


Center-to-limb variations

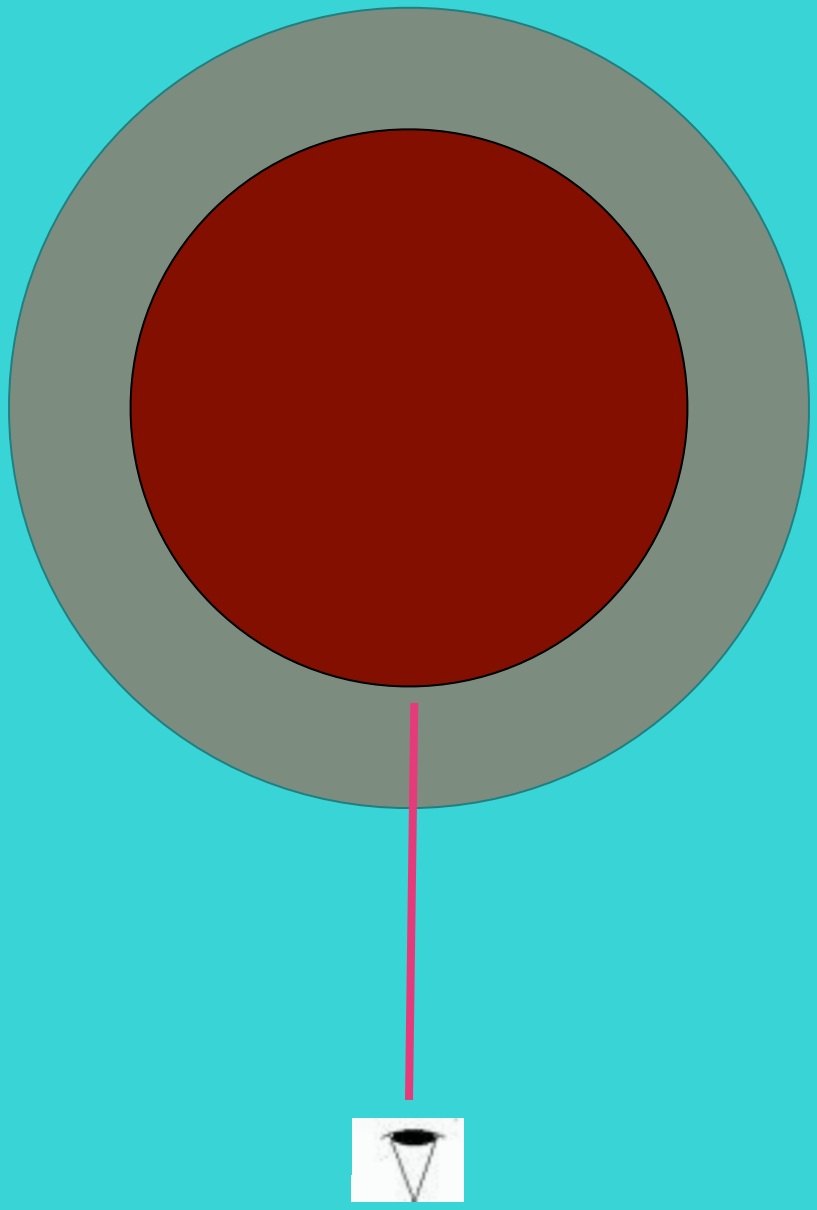


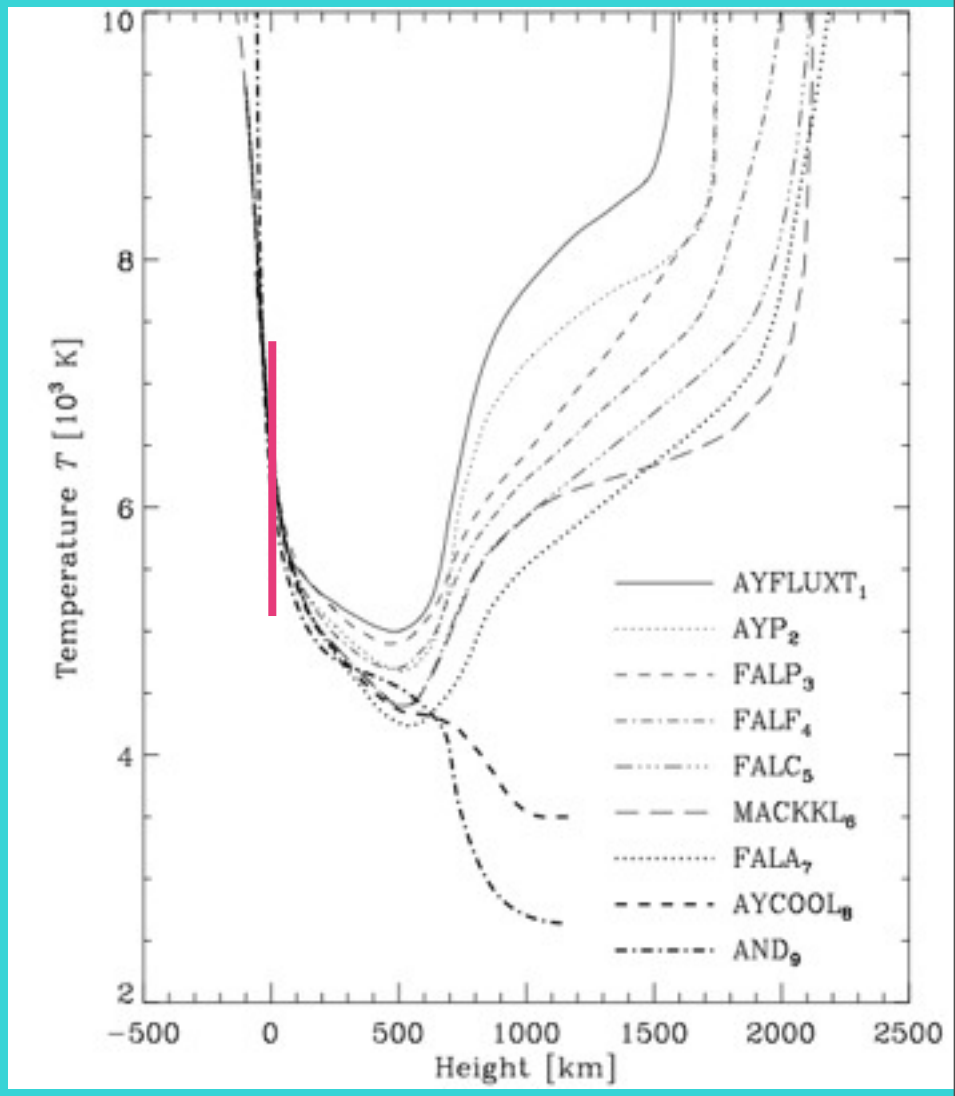
Center-to-limb variations



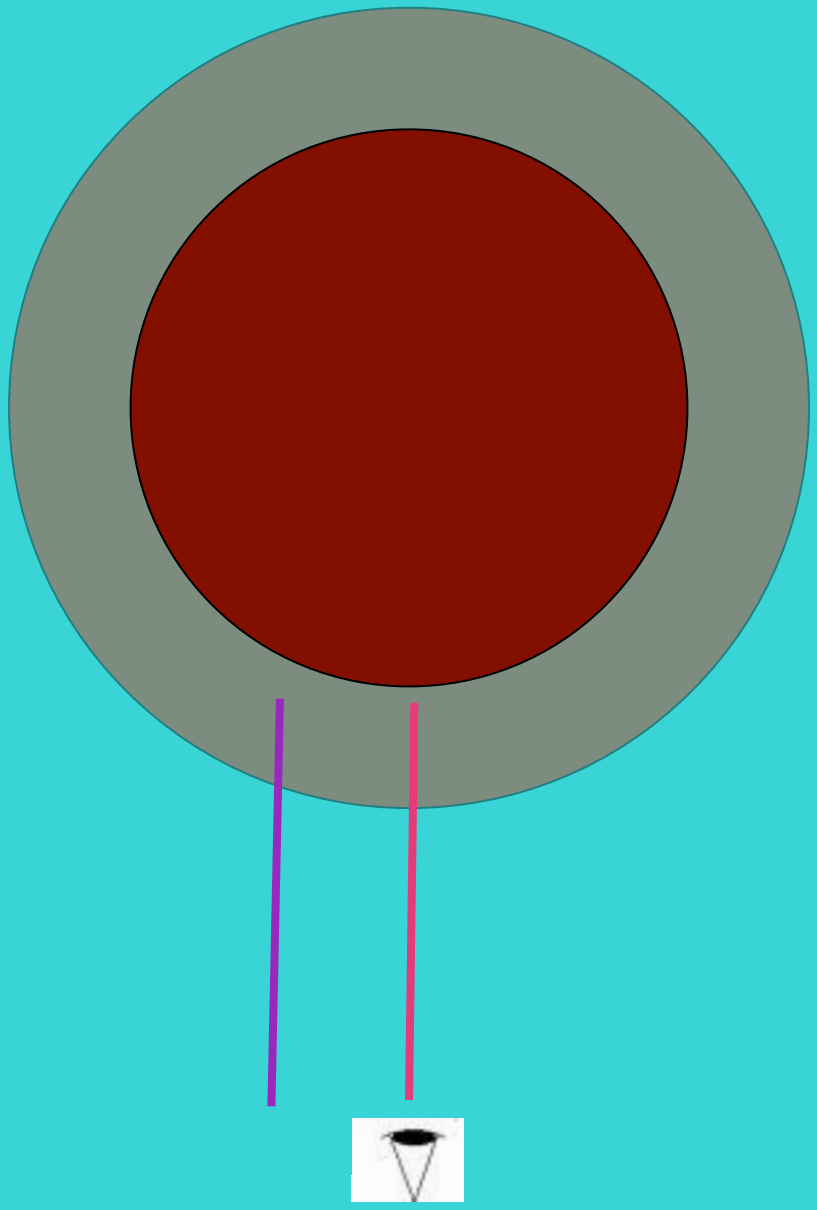


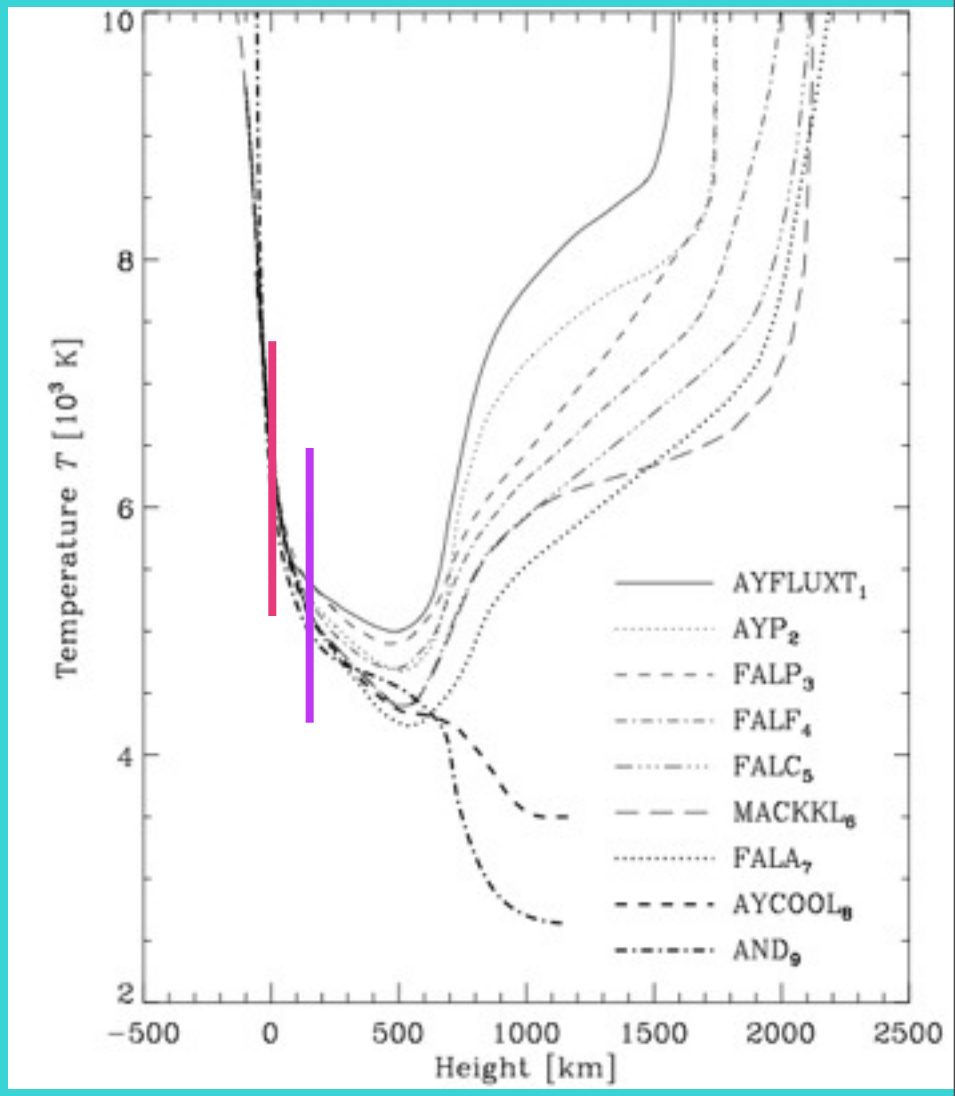
Center-to-limb variations



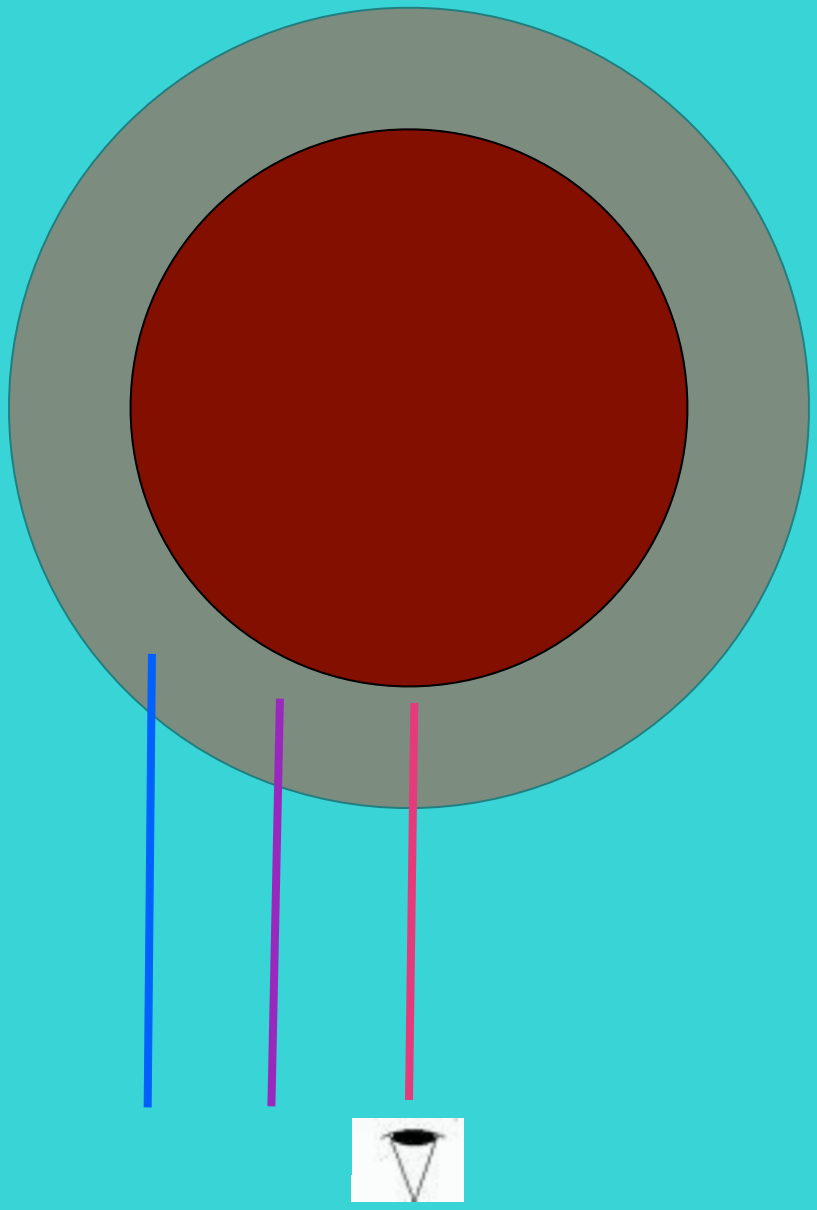


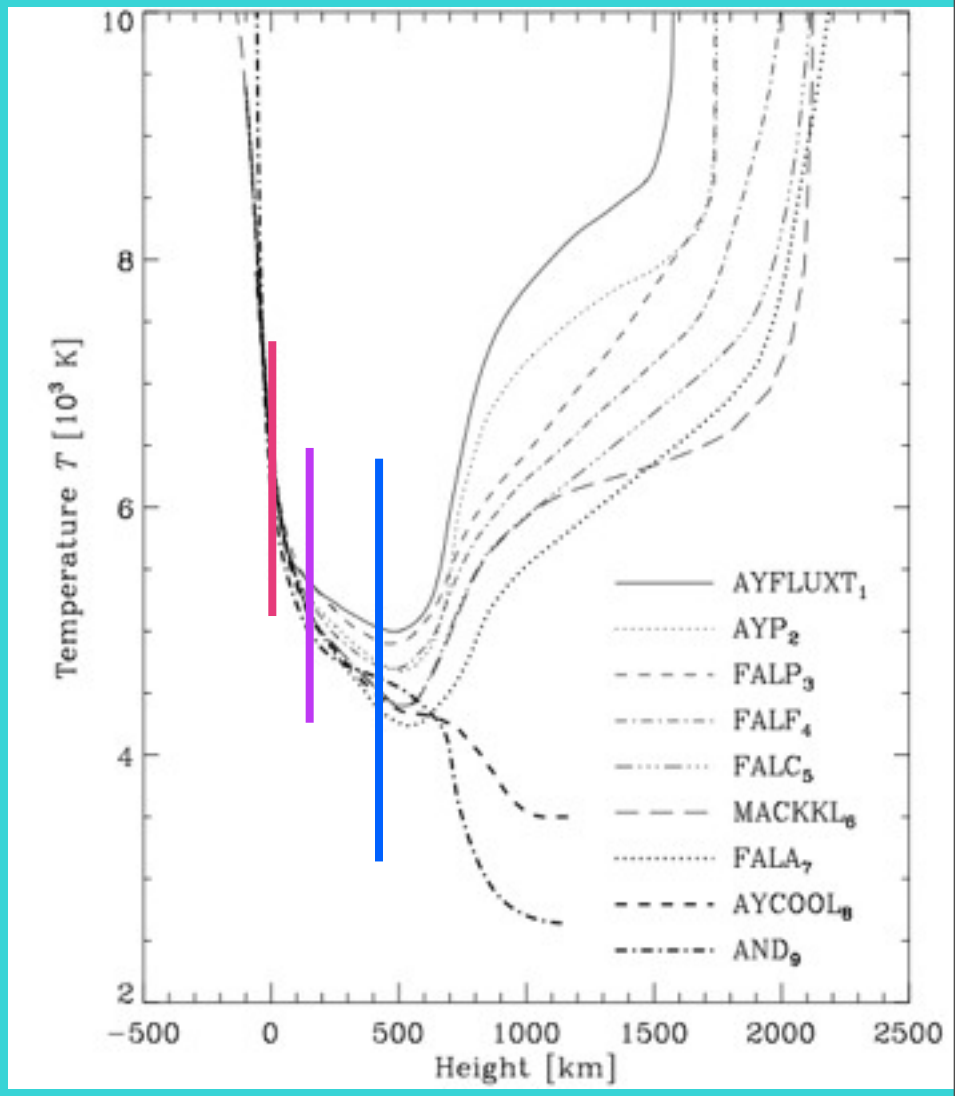
Center-to-limb variations



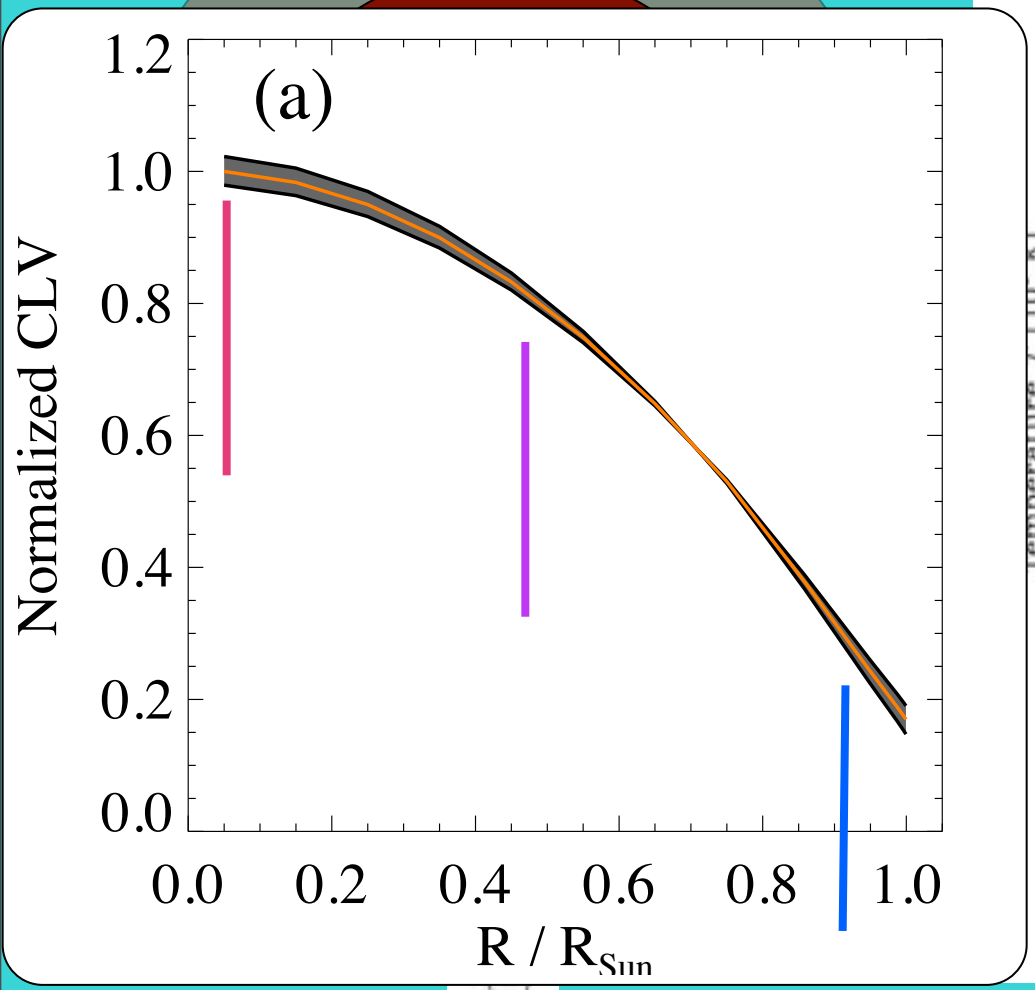


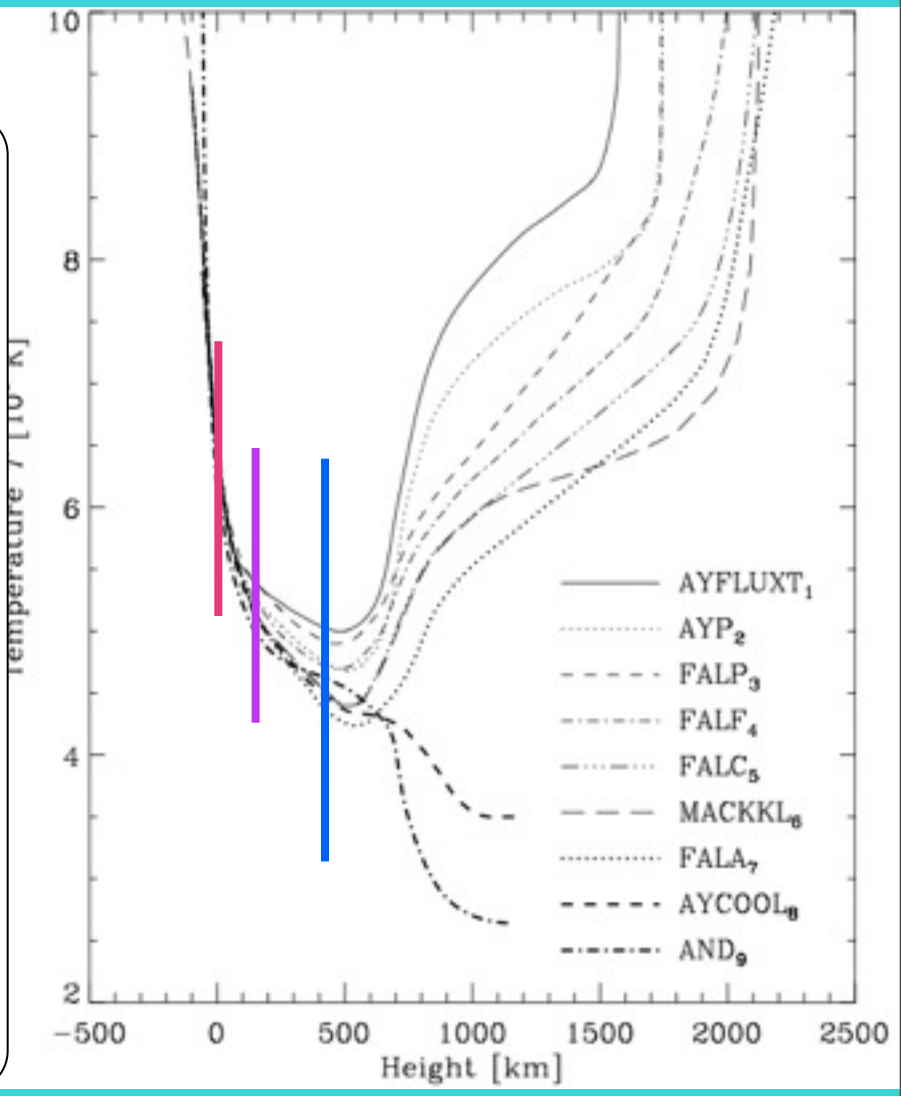
Center-to-limb variations





Center-to-limb variations



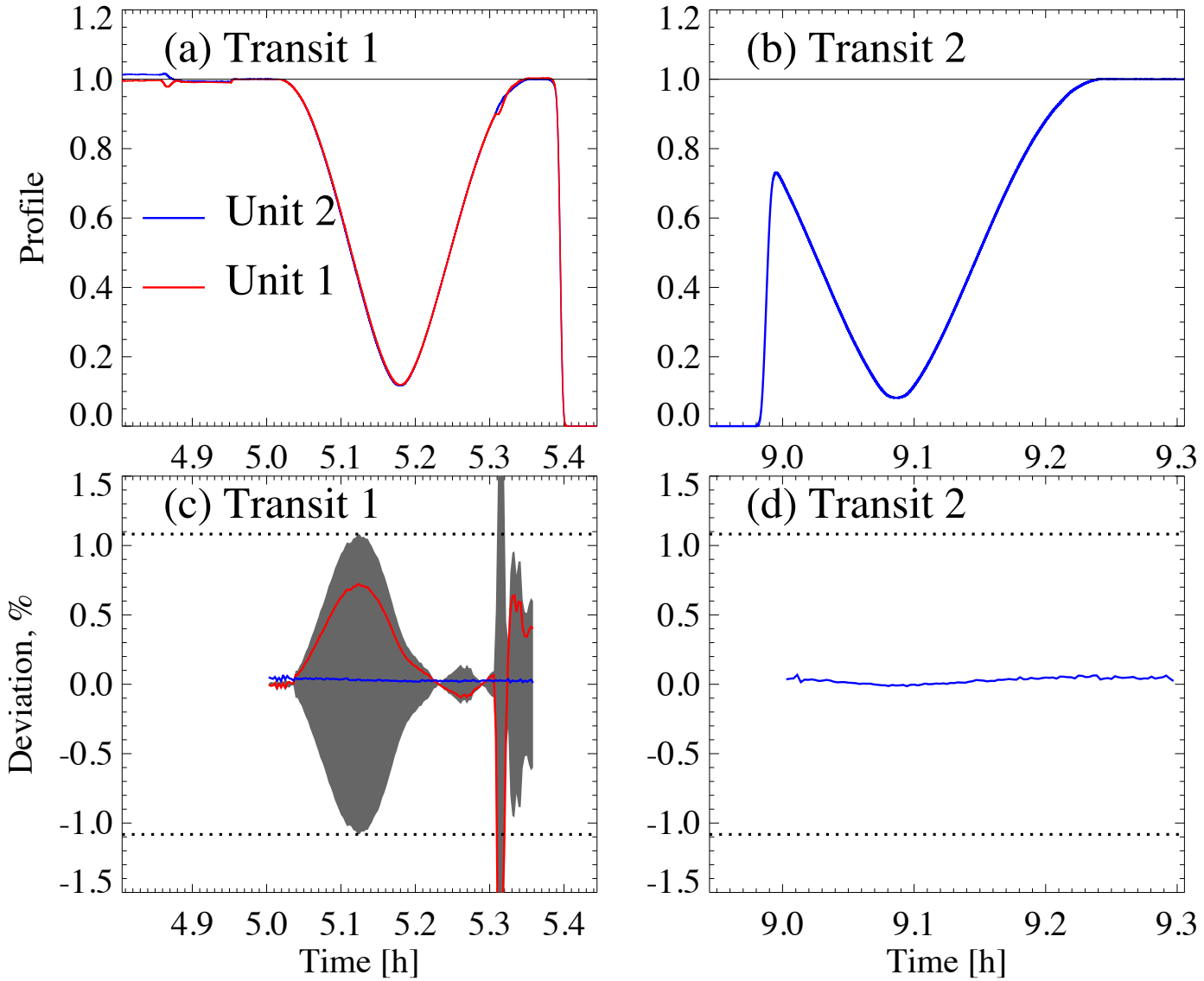


January 15, 2010 eclipse

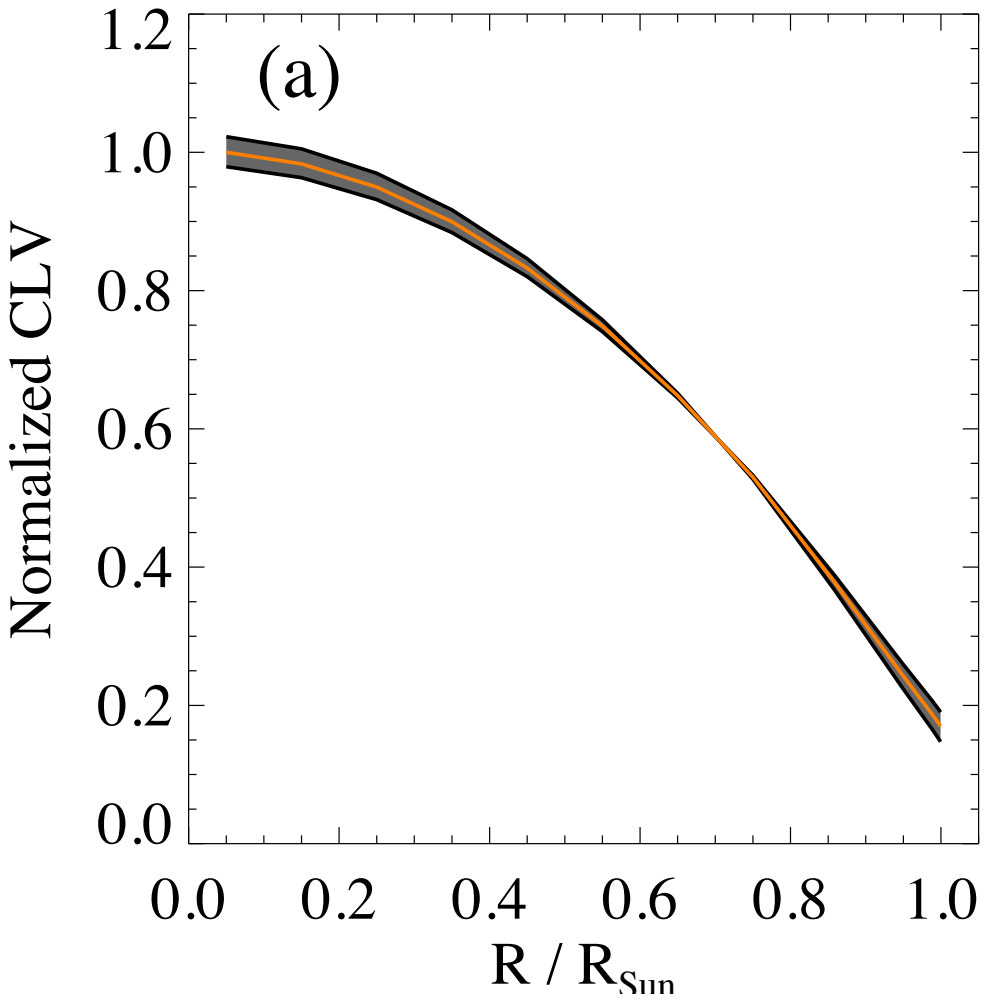
Herzberg channel

Level 1

Level 1 - Level 2

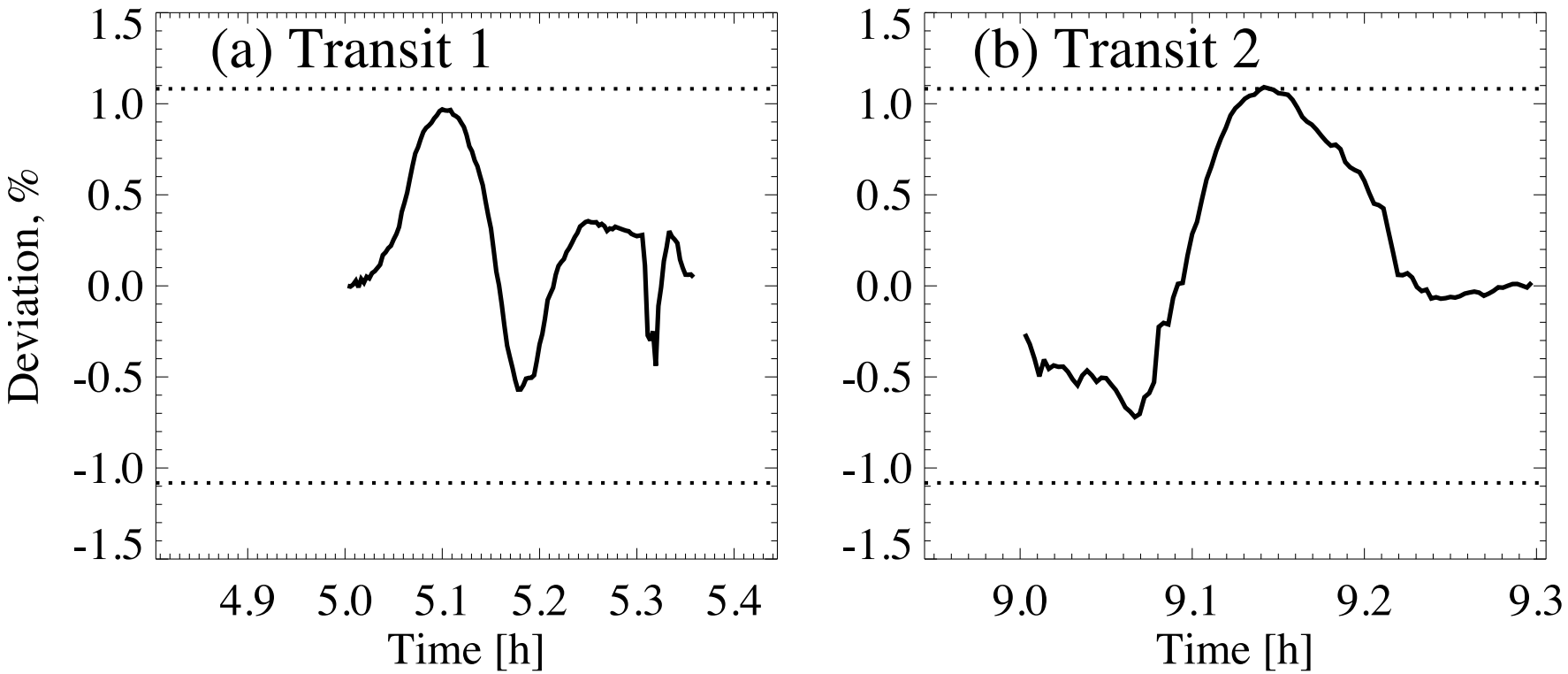


Empirical center-to-limb variations



Test of the CLV approximation

Empirical profiles - Observed profiles



Code for the Solar Irradiance

Millions of atomic and molecular transitions

Non-local thermodynamic equilibrium

Radiative Transfer Codes

The COSI code

COde for Solar Irradiance

NLTE Model Atmosphere Code

~10^2 levels

Spectrum Synthesis Program

~10^7 lines

The COSI code

COde for Solar Irradiance

Populations of the NLTE Levels

NLTE Model Atmosphere Code

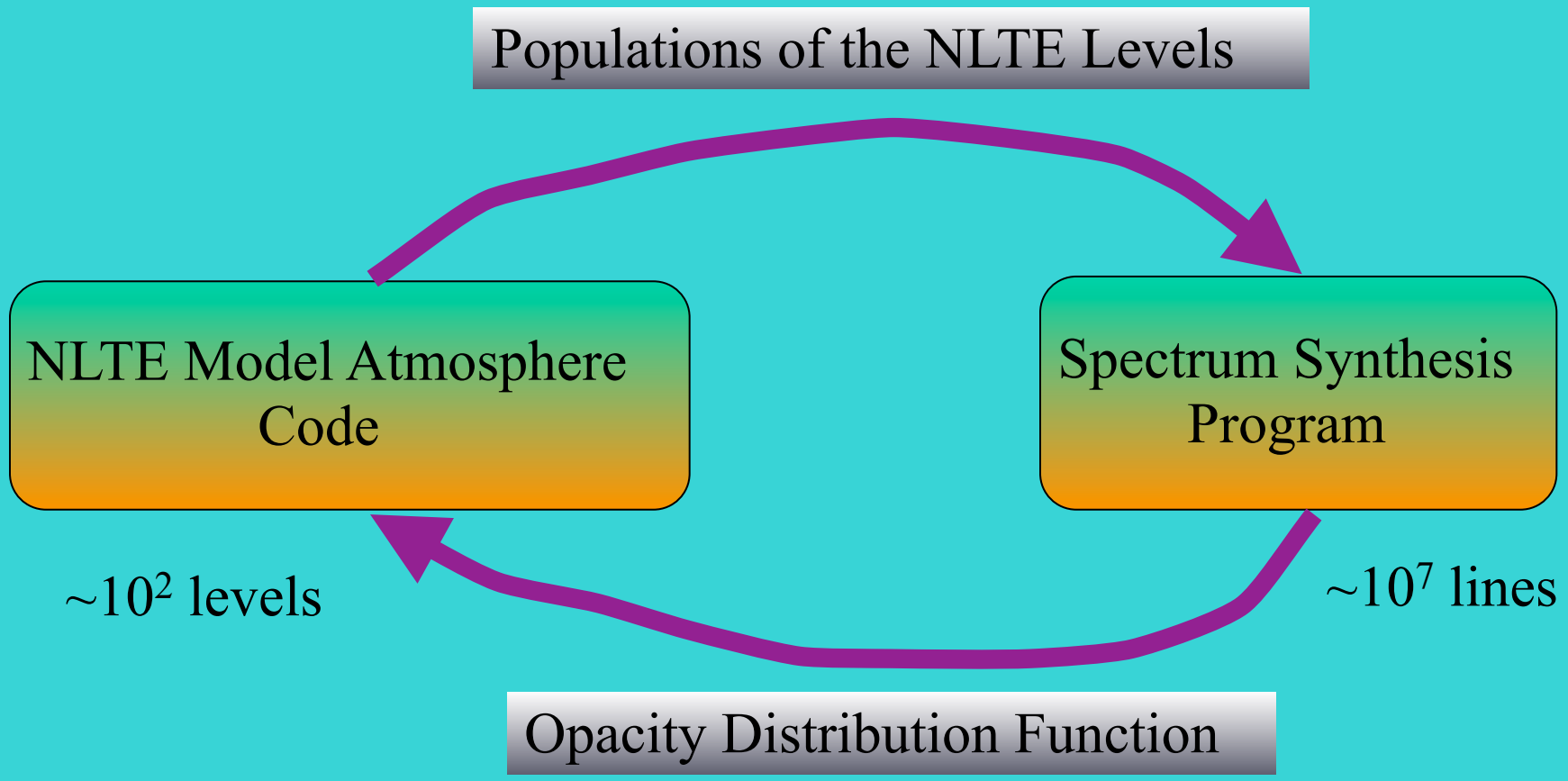
Spectrum Synthesis Program

~10^2 levels

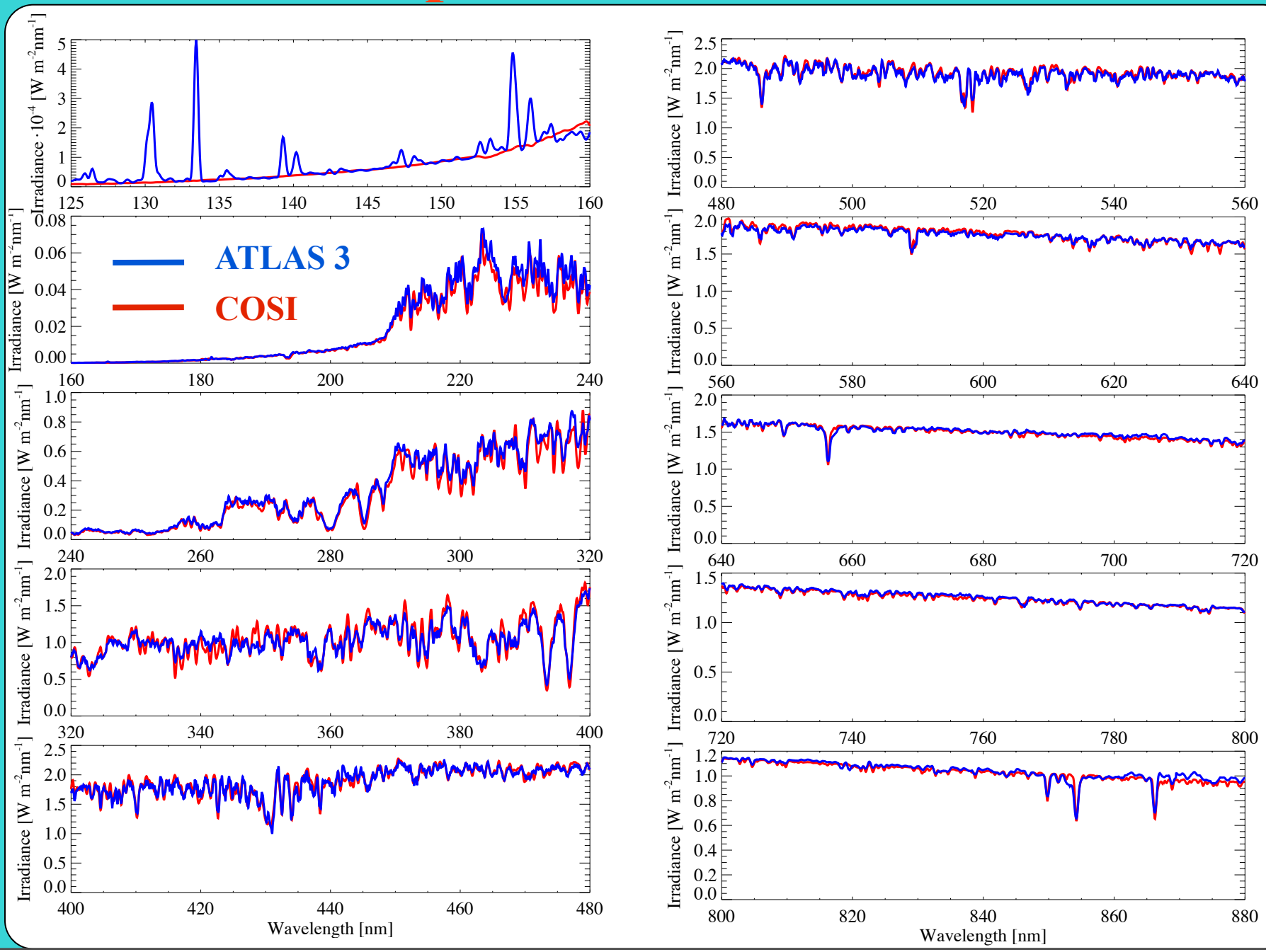
~10^7 lines

The COSI code

COde for Solar Irradiance



Comparison with ATLAS 3



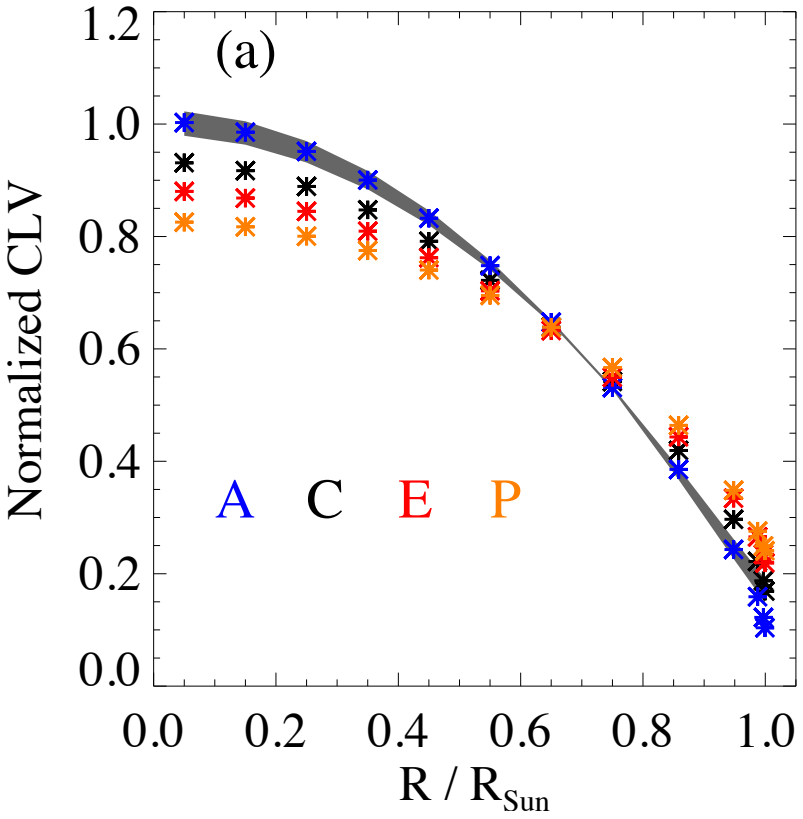
Test of the temperature structure

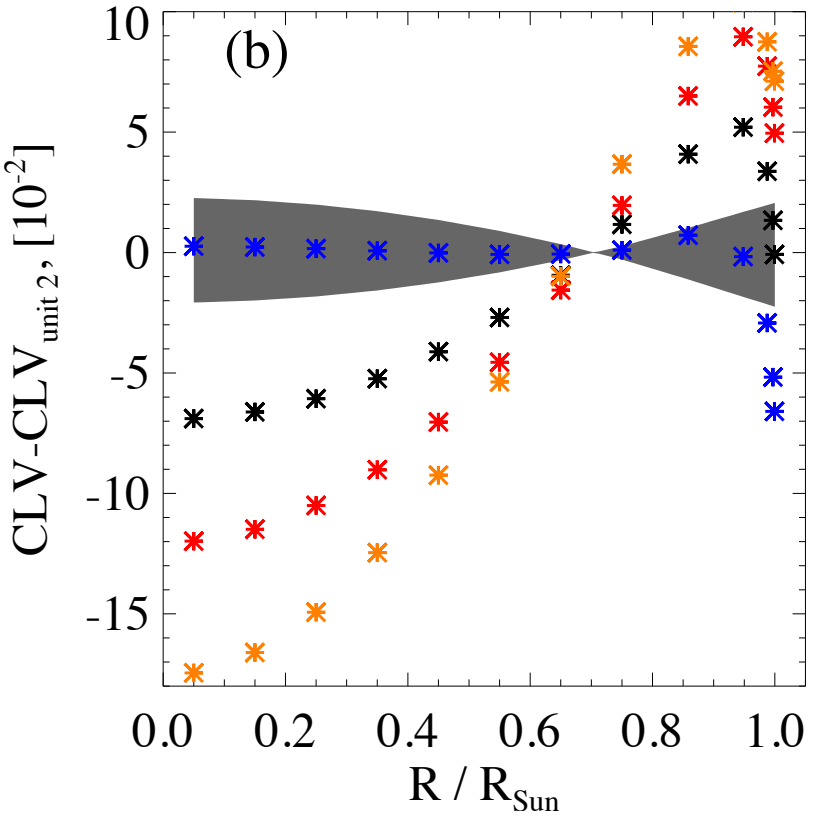
Plage Model P

Quiet network Model E

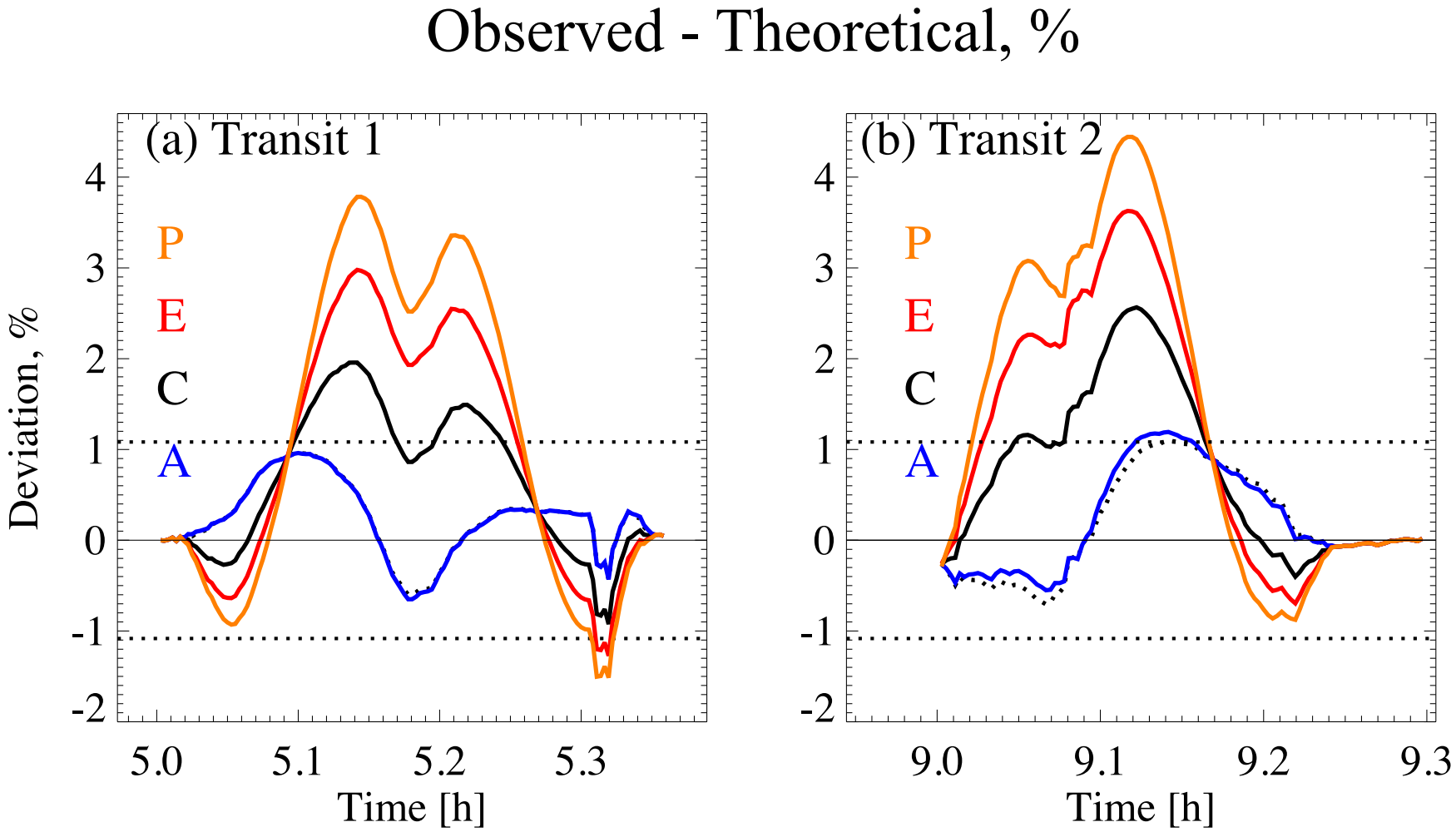
Average Quiet Sun Model C

Faint supergranule cell interior Model A





Test of the temperature structure



“Dark opacity”

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99% of molecular and atomic lines are predicted only theoretically

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Missing opacity

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99% of molecular and atomic lines are predicted only theoretically

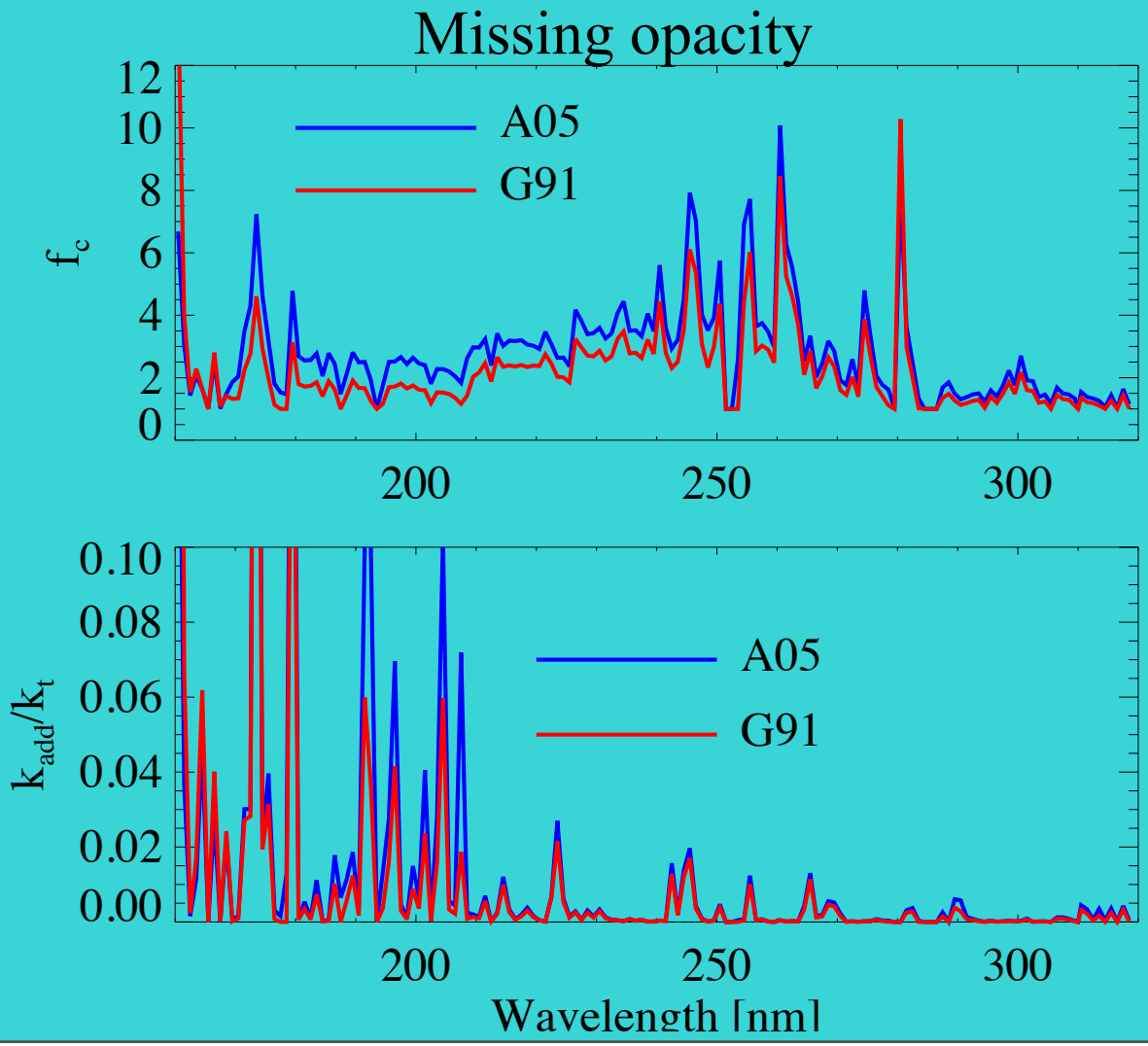
Missing opacity

Busa et al. 1999

Short & Hauschildt 2009

“Dark opacity”

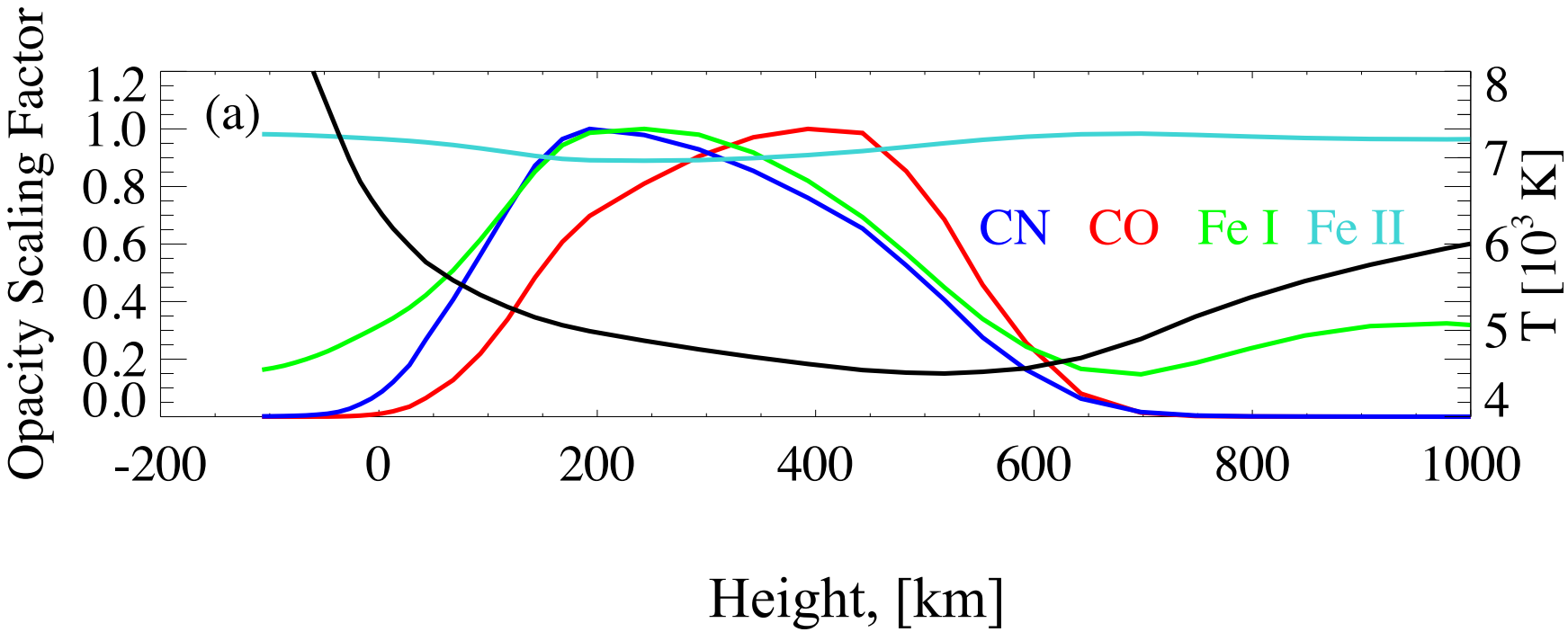
99% of molecular and atomic lines are predicted only theoretically



Continuum factor

Additional/ Included

Missing opacity

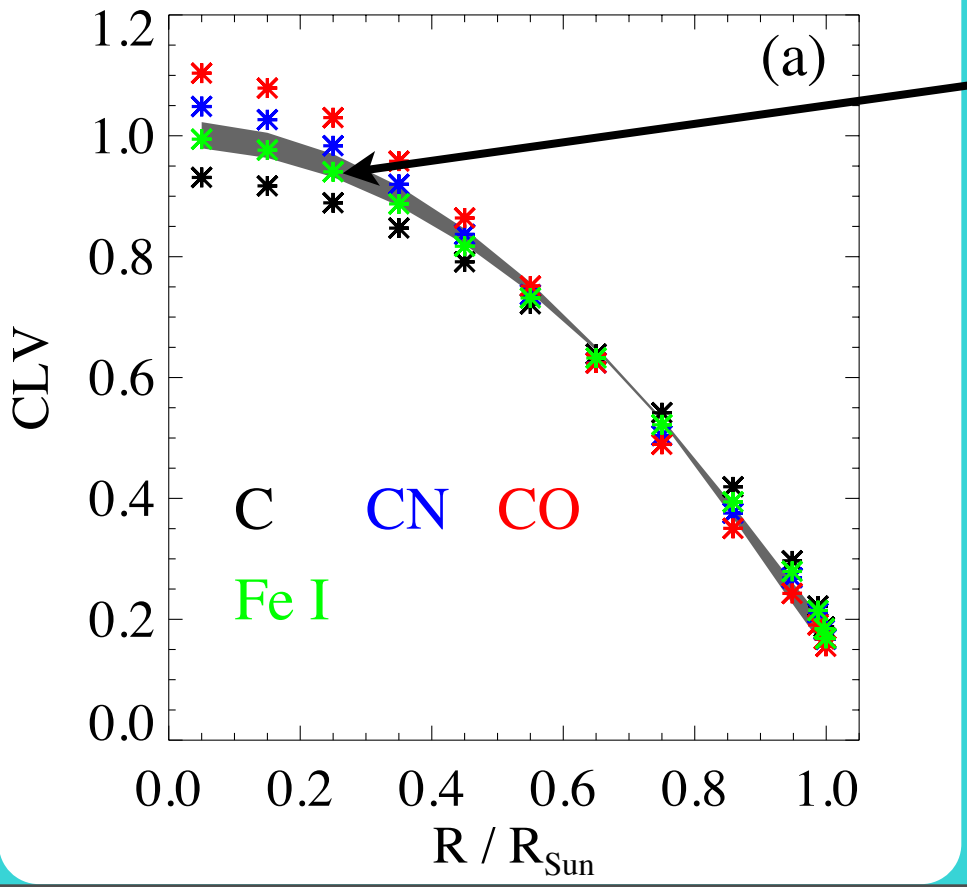


Different sources of the additional opacity

99% of molecular and atomic lines are predicted only theoretically

This leads to the underestimation of the UV opacity

Analysis of the CLV can hint at the source of the missing opacity



Empirical CLV determined from the eclipse analysis

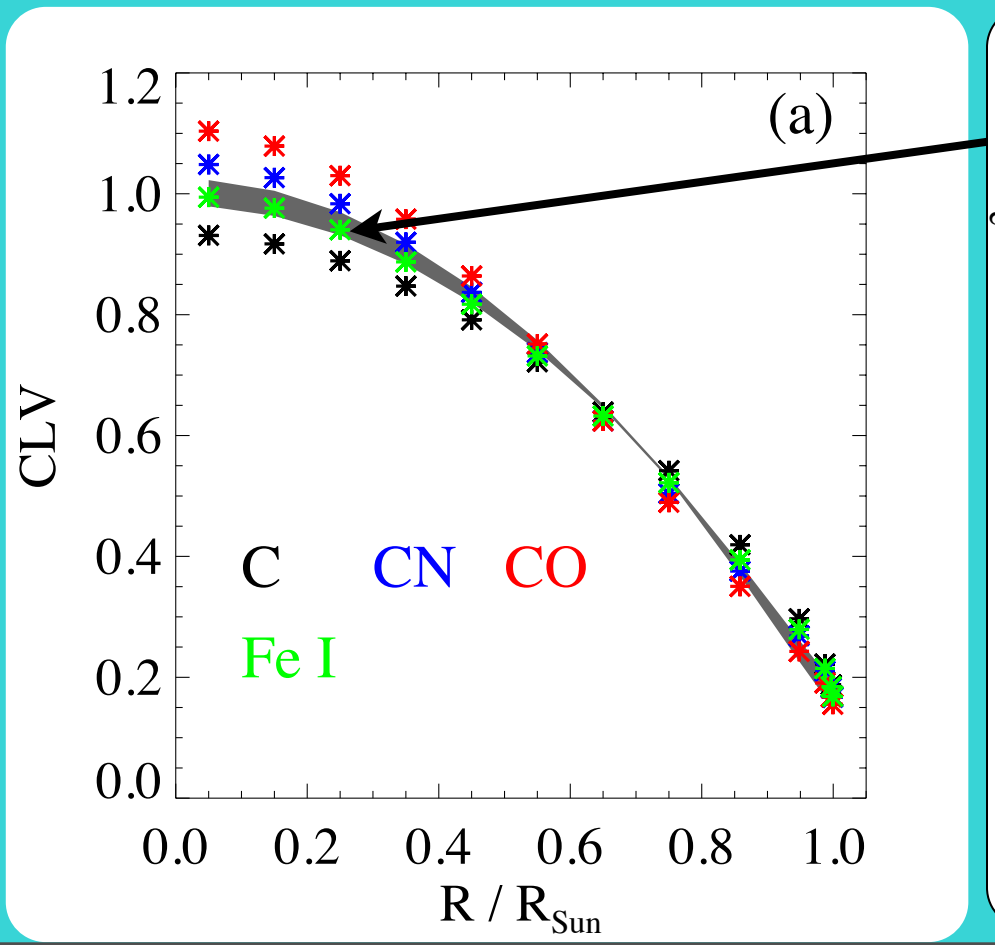
'C' means no preferable source

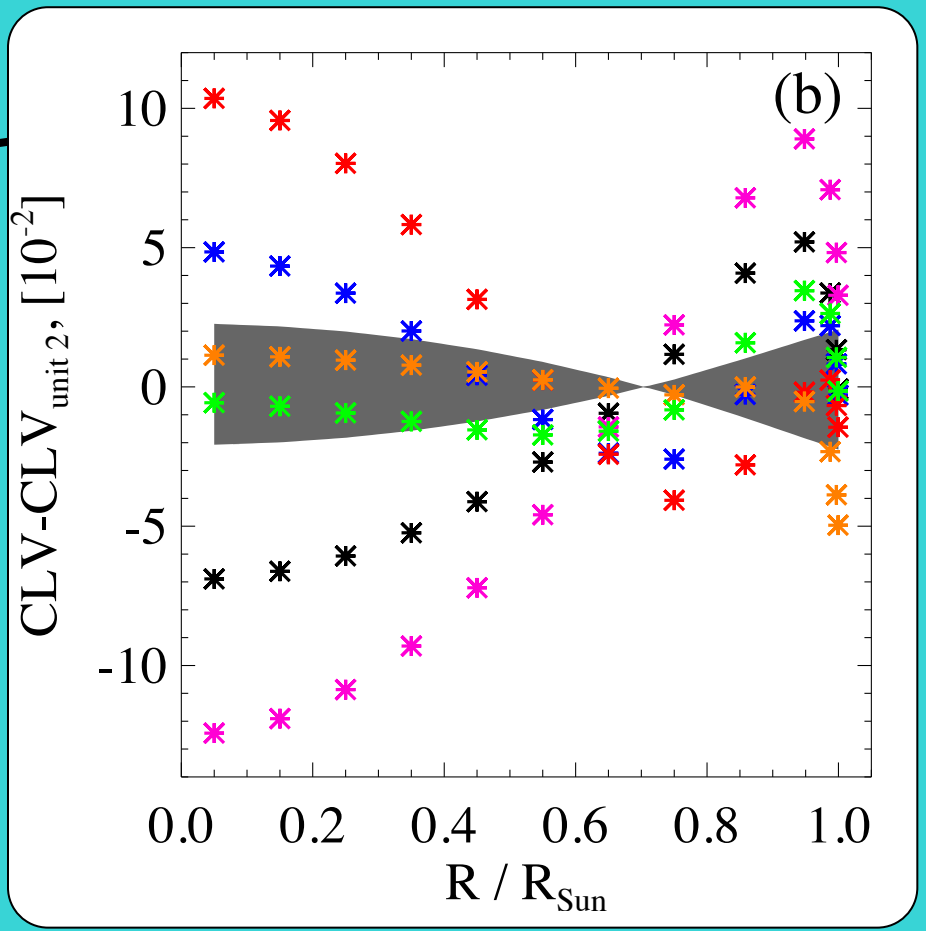
Different sources of the additional opacity

99% of molecular and atomic lines are predicted only theoretically

This leads to the underestimation of the UV opacity

Analysis of the CLV can hint at the source of the missing opacity

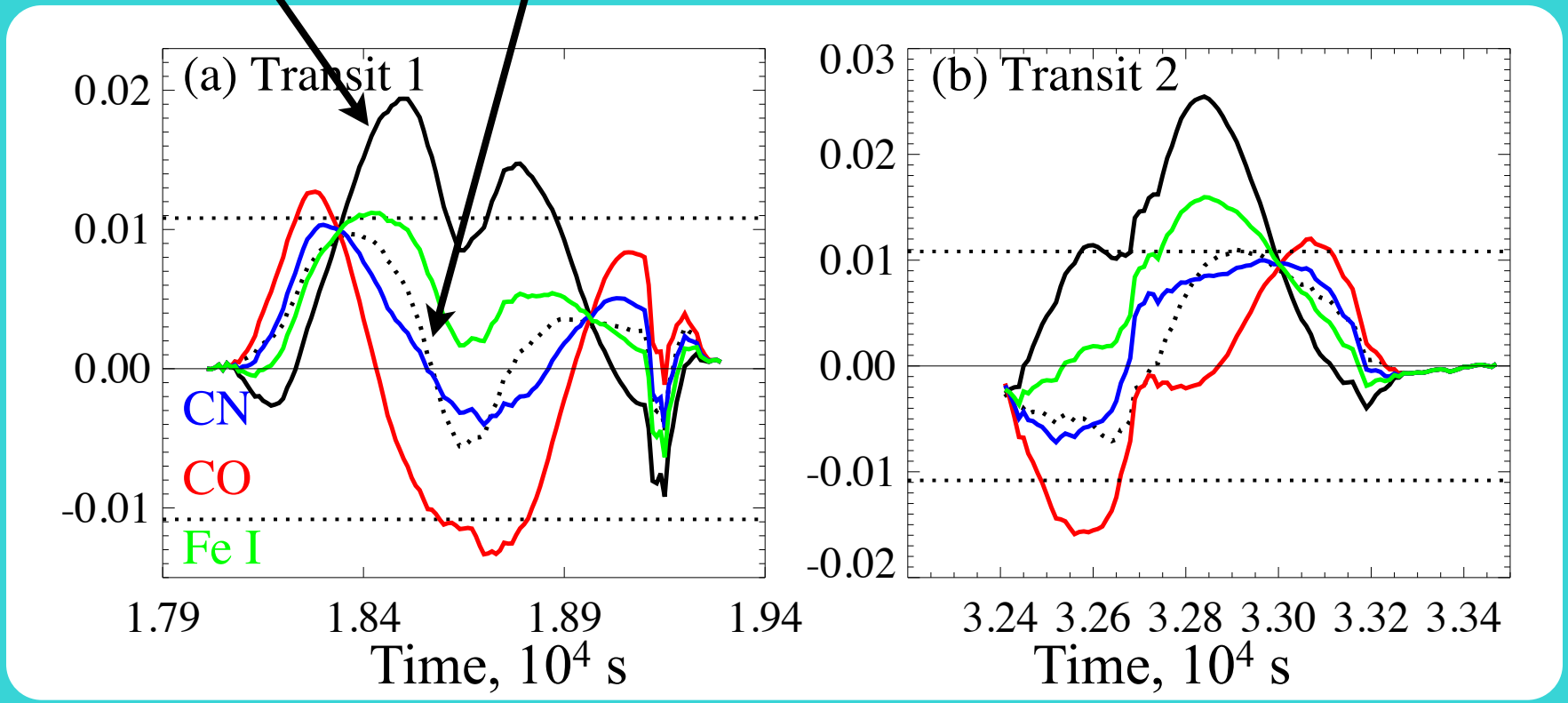




Results II. Profiles

no preferable source of the missing opacity

best empirical profile with monotonic CLV

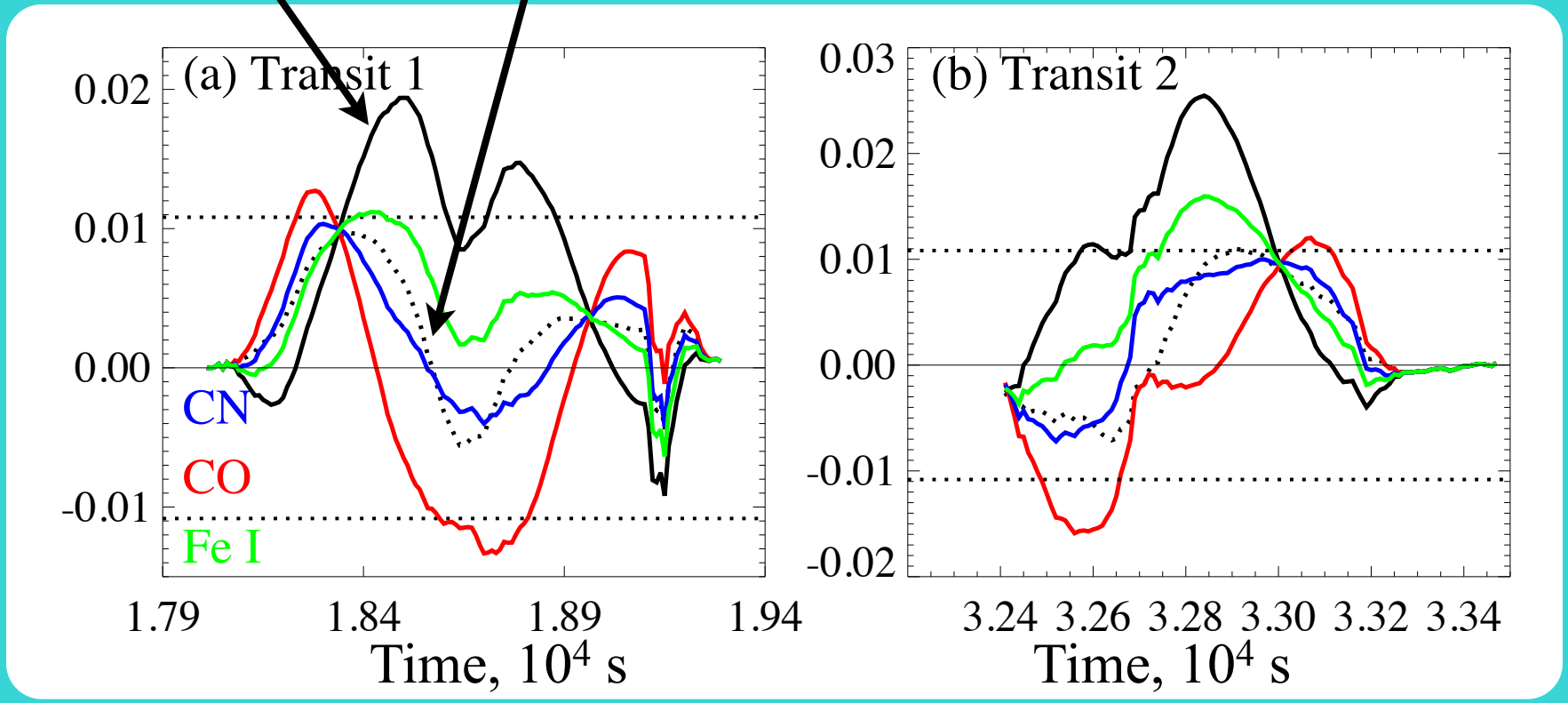


Results II. Profiles

no preferable source of the missing opacity

best empirical profile with monotonic CLV

the agreement between theoretical and measured profiles is in order of 1%



Results II. Profiles

no preferable source of the missing opacity

best empirical profile with monotonic CLV

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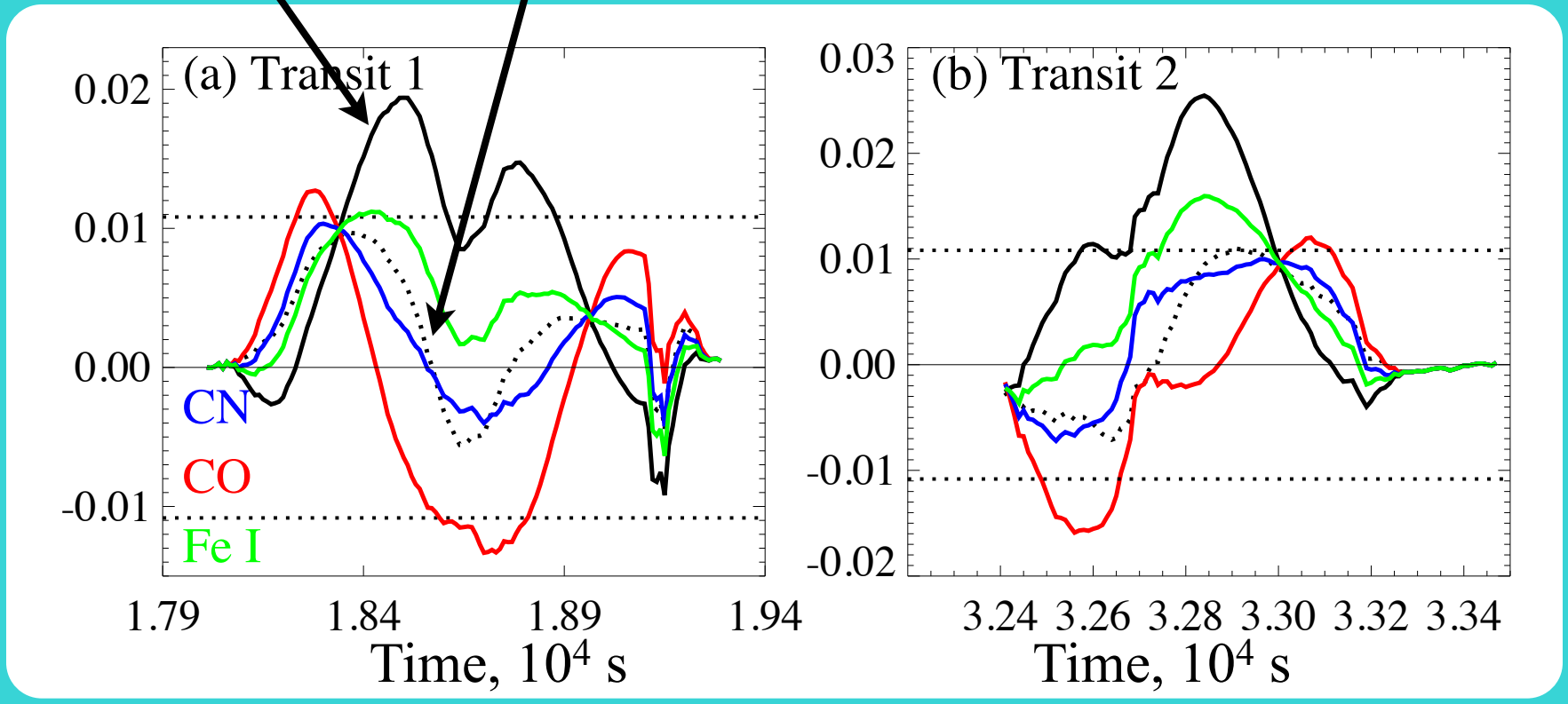
molecules as well as neutral iron or another element with the similar ionization potential (e.g. silicon or magnesium) could be the source of the missing UV opacity



Results II. Profiles

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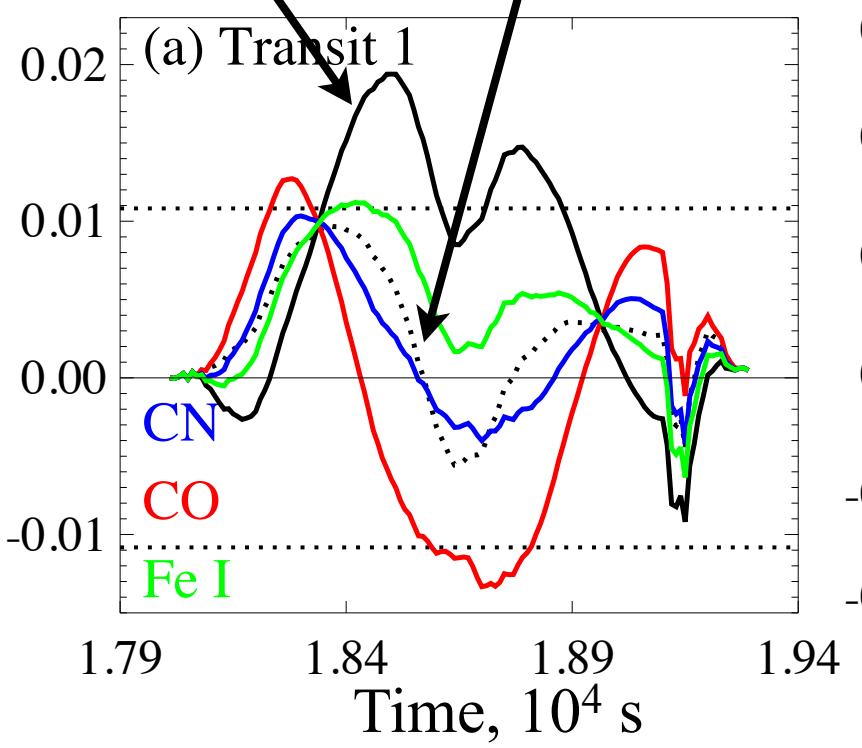
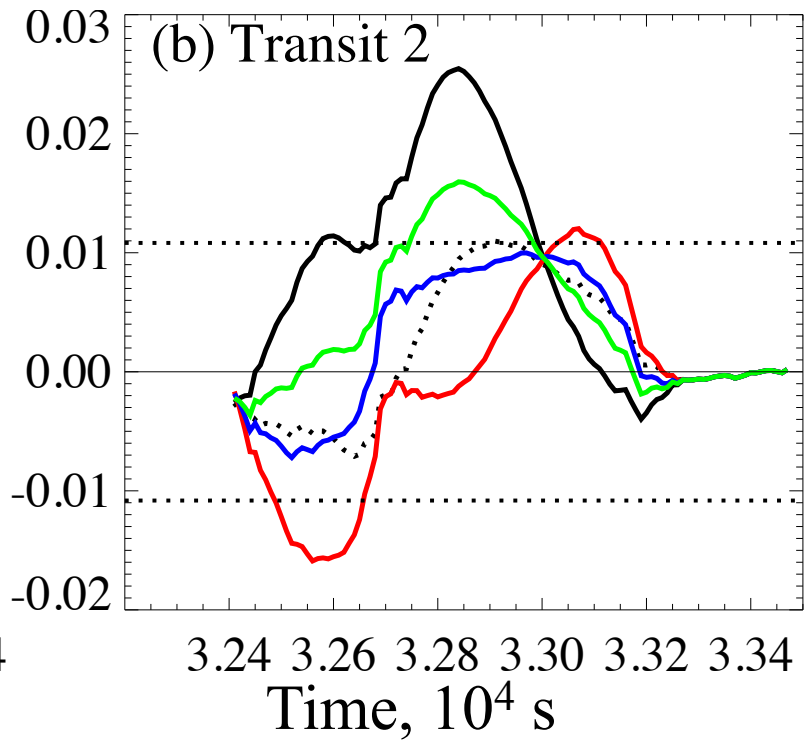
nother
otential
the

The fact that the calculations with COSI are in a good agreement with the measurements strongly supports its suitability for the modeling of the solar irradiance variability





Theory - Measurements

Results II. Profiles

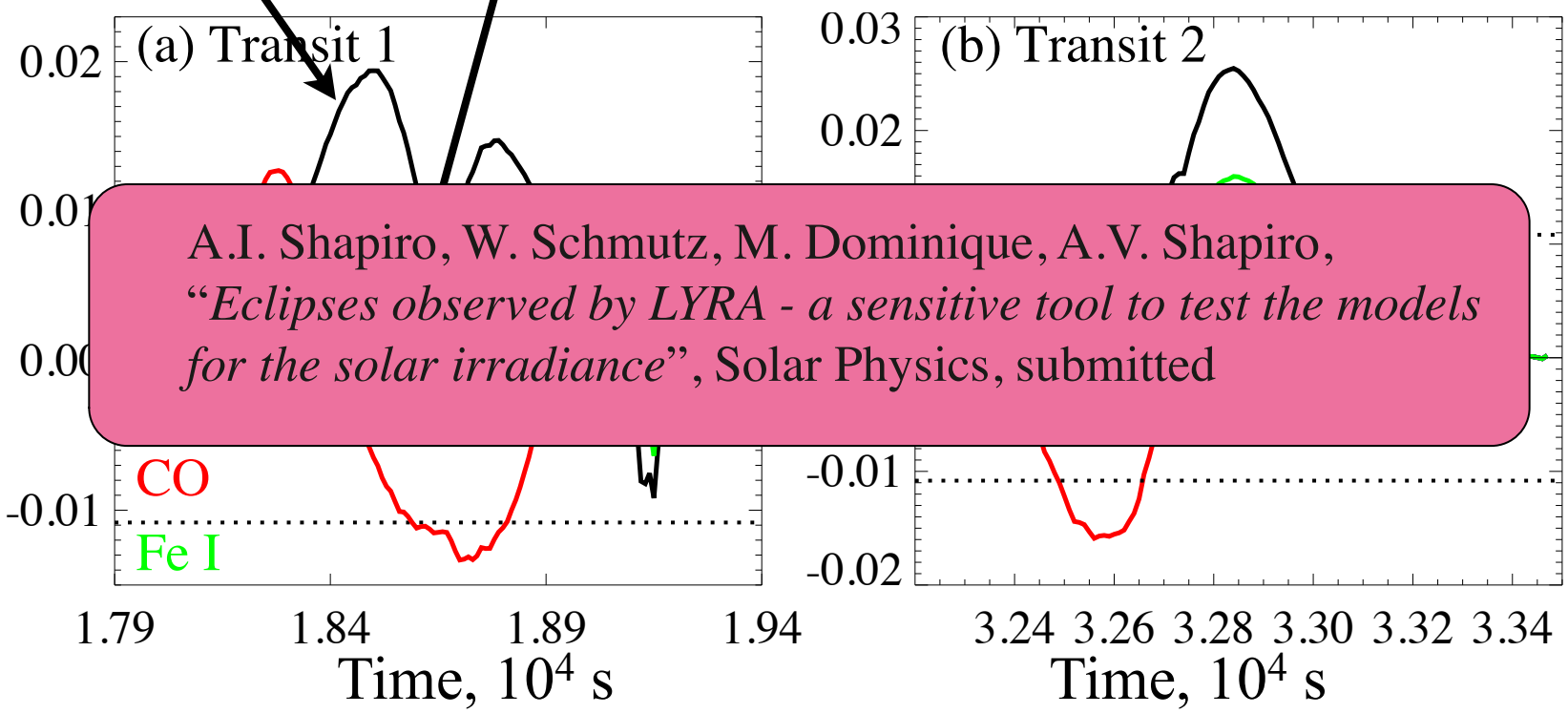
no preferable source of the missing opacity

best empirical profile with monotonic CLV

the agreement between theoretical and measured profiles is in order of 1%

nother
otential
the

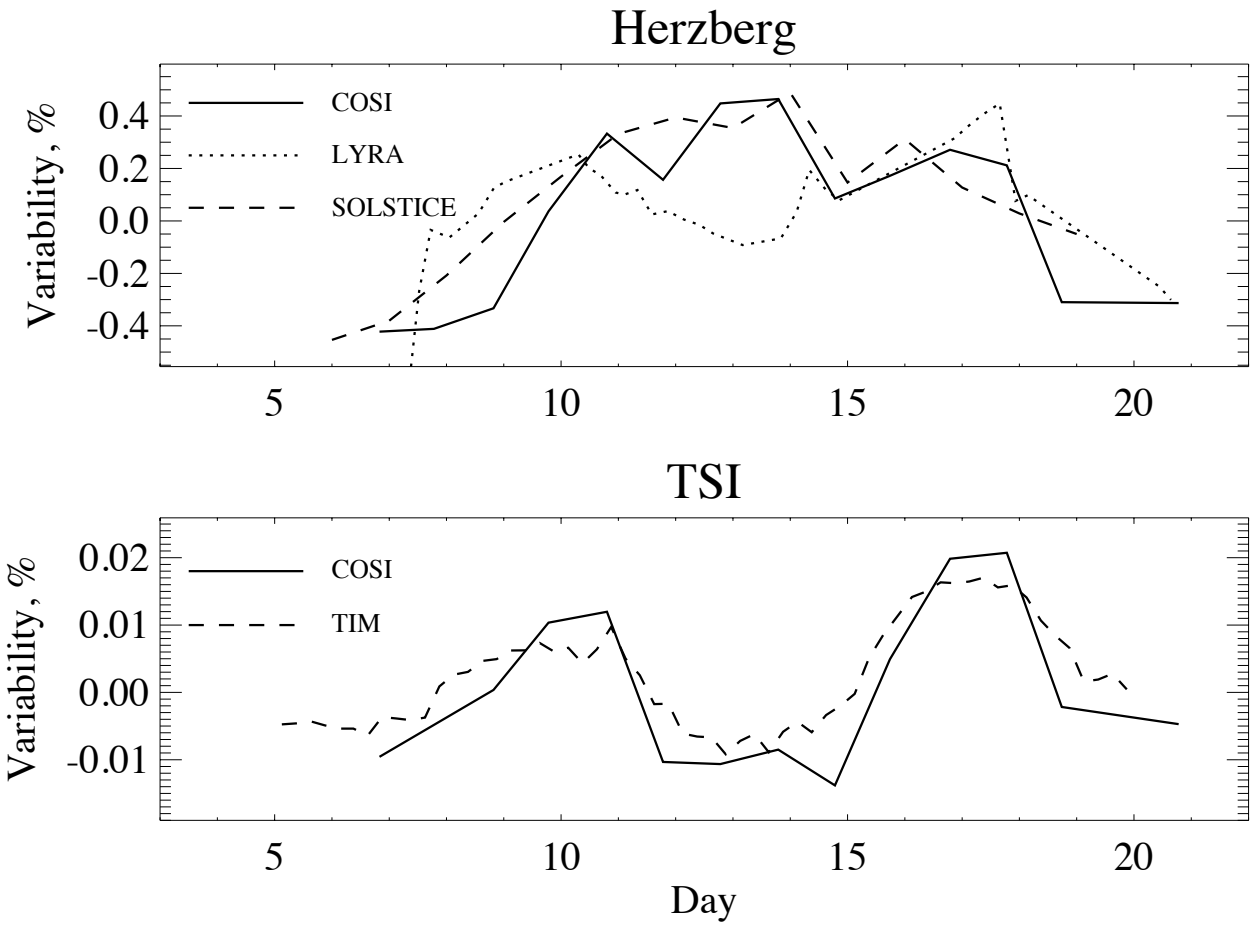
The fact that the calculations with COSI are in a good agreement with the measurements strongly supports its suitability for the modeling of the solar irradiance variability



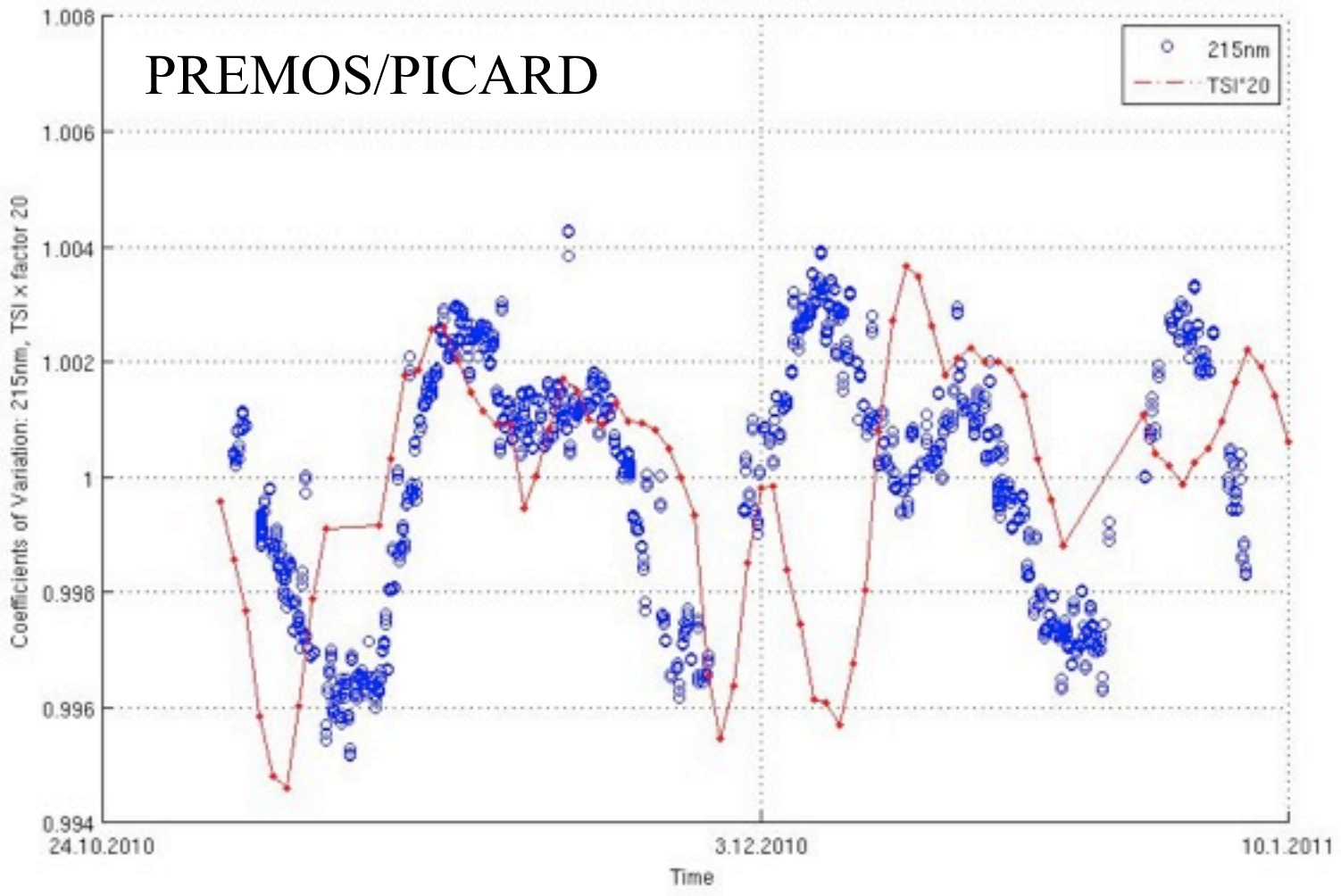
A.I. Shapiro, W. Schmutz, M. Dominique, A.V. Shapiro, "*Eclipses observed by LYRA - a sensitive tool to test the models for the solar irradiance*", Solar Physics, submitted

Modeling of the solar rotational cycle

Modeling of the solar rotational cycle

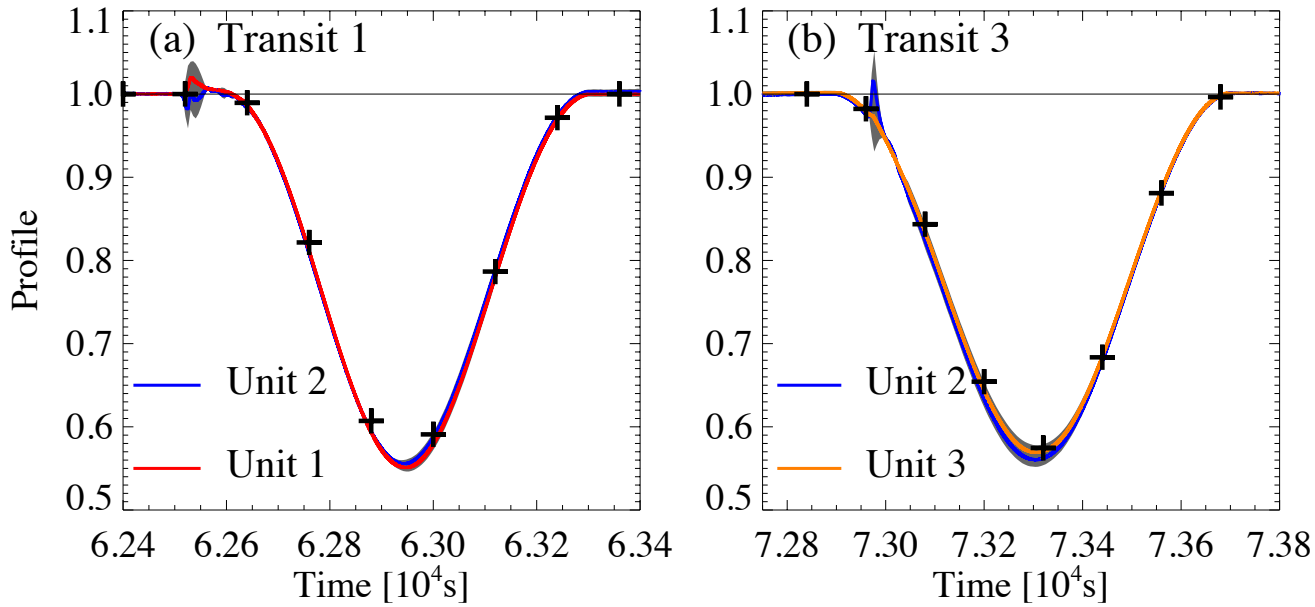


Modeling of the solar rotational cycle



Day

July 11, 2010 eclipse



January 4, 2011 eclipse