

Modeling UV Emission in 1600Å and 1700Å Observations by AIA/SDO

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Background

- Reconnection takes place, releasing energy, resulting in heating
- Continuum + lines
- Carbon iv

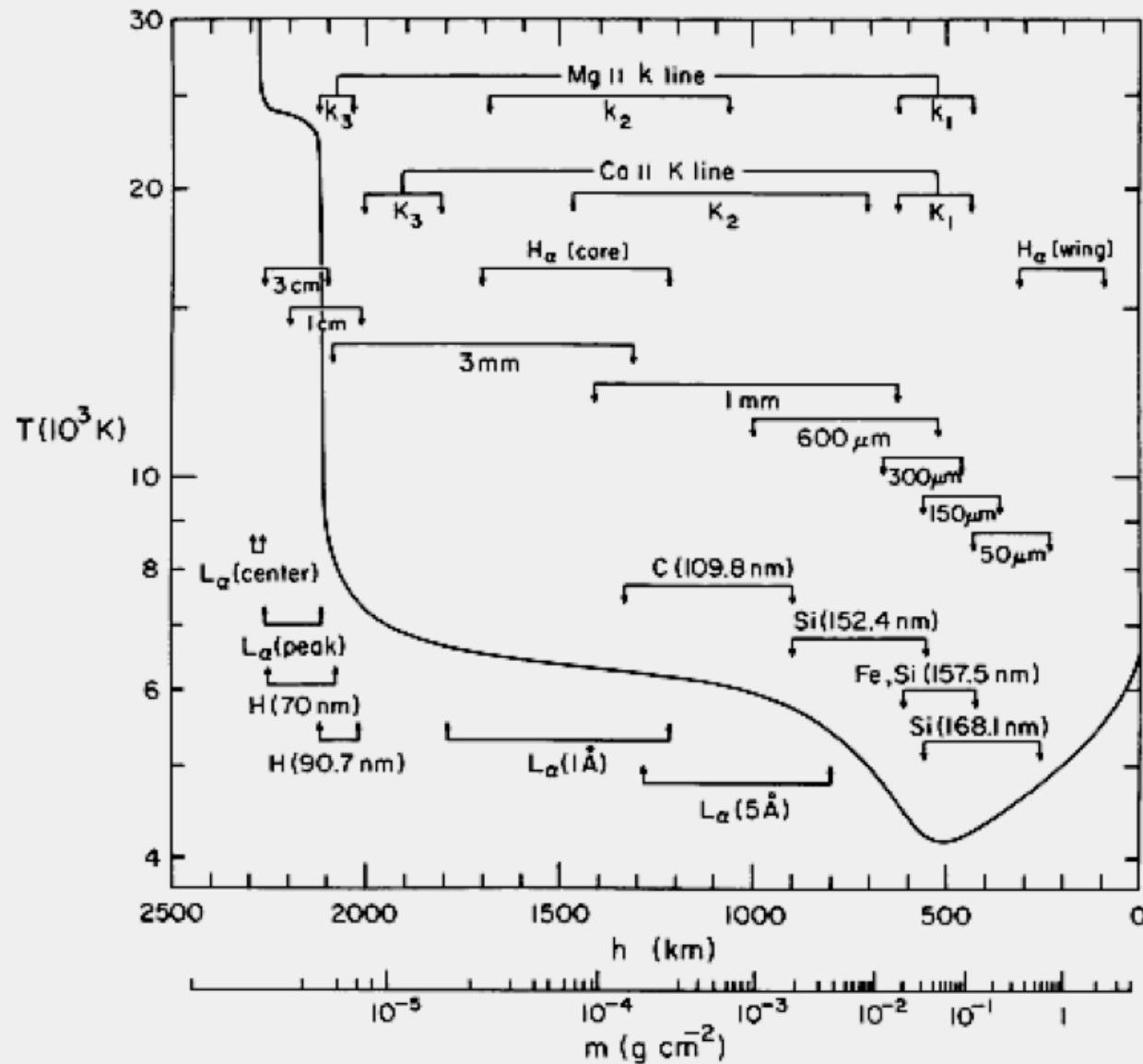


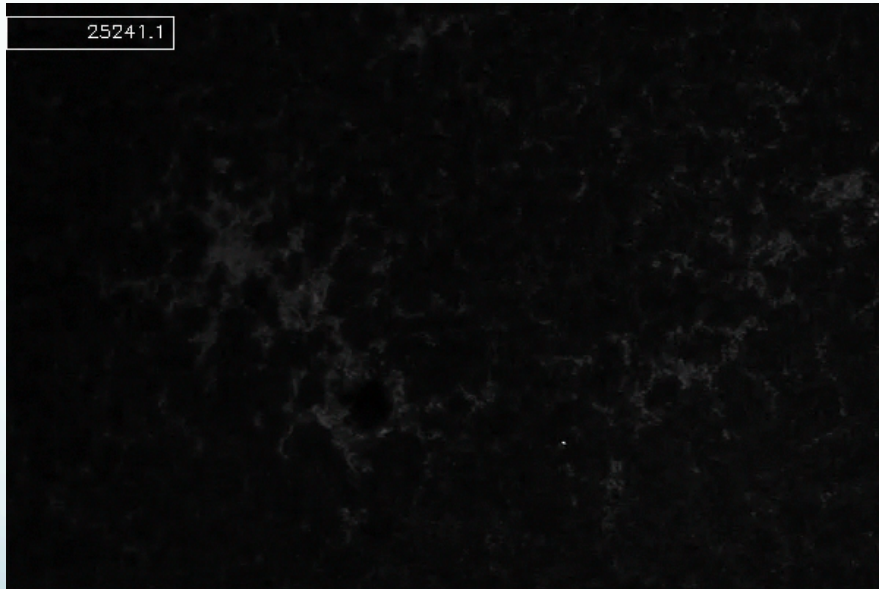
FIG. 1.—The average quiet-Sun temperature distribution derived from the EUV continuum, the L_α line, and other observations. The approximate depths where the various continua and lines originate are indicated.

Motivation

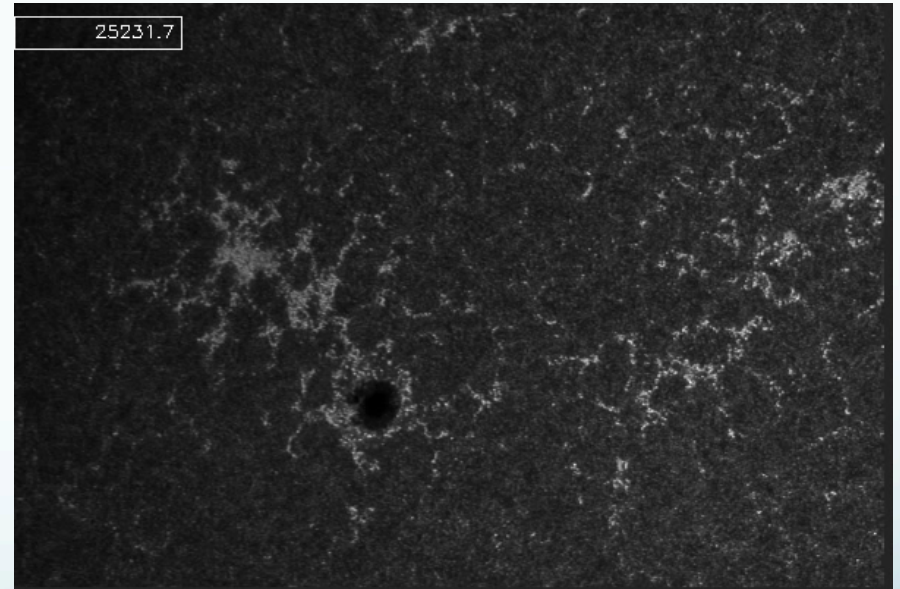
- Separating the C_{iv} emission, as this is related to heating

Data!

1600Å



1700Å



August 1, 2010

1st Model

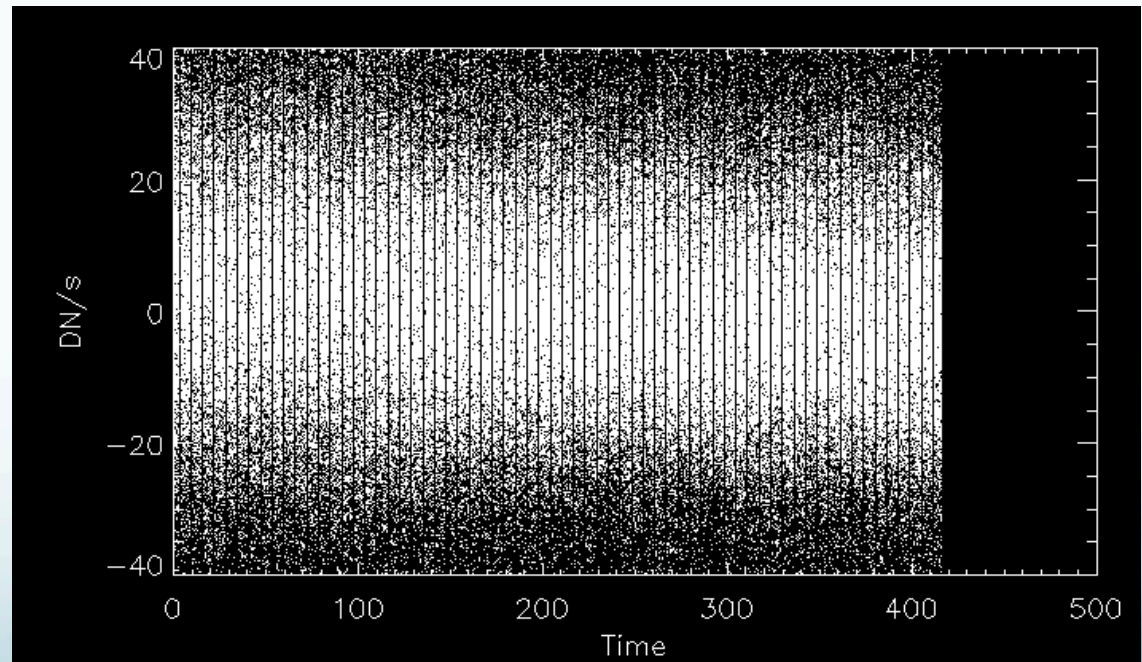
- Zero Dimensional
- Assumptions:
 - Constant Blackbody Temperature
 - 1700 Angstrom band contains no lines

1st Model

- Calculations:
 - Temperature (using 1700Å band)
 - Expected 1600Å data
 - Leftover attributed to C_{iv} emission

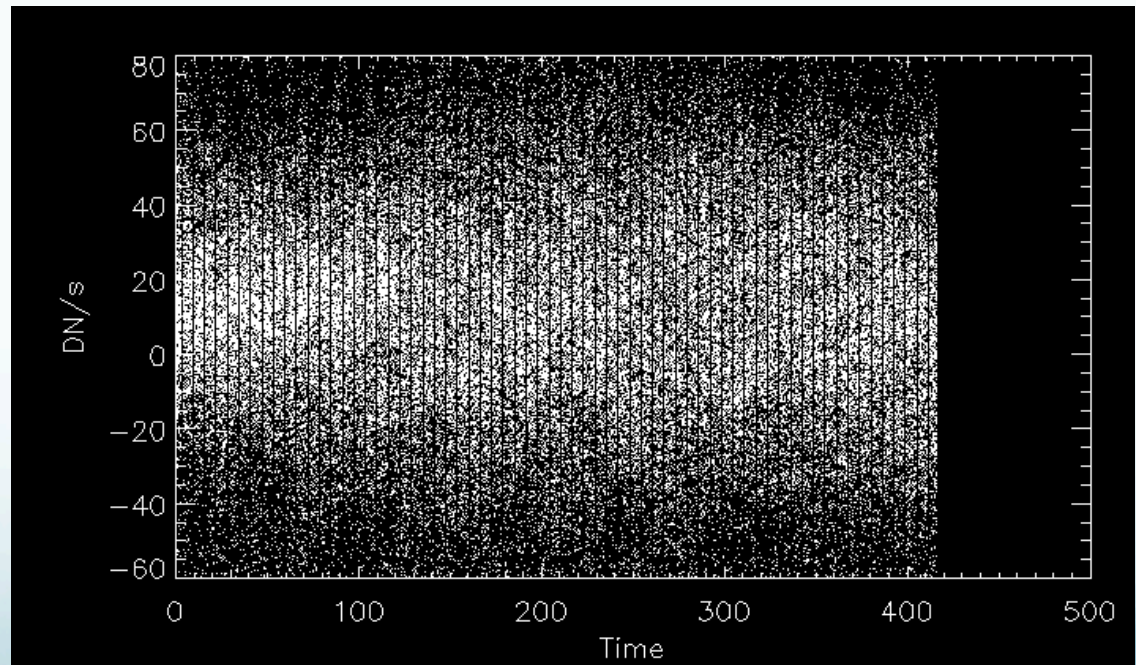
Results

- Quiet Sun:
 - Temperature: 4500-4600K
 - Added 1600 data:
 - Median:1.15



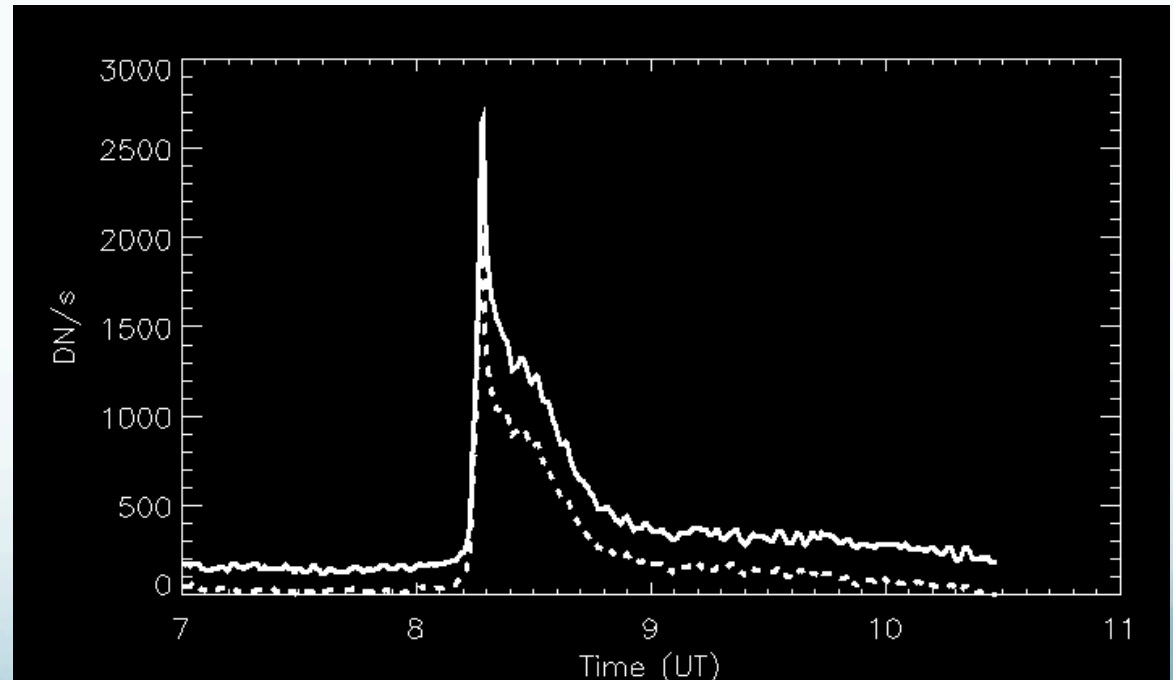
Results

- Active Region
 - Temperature: 4700-4900K
 - Added 1600 data:
 - Median:8.03



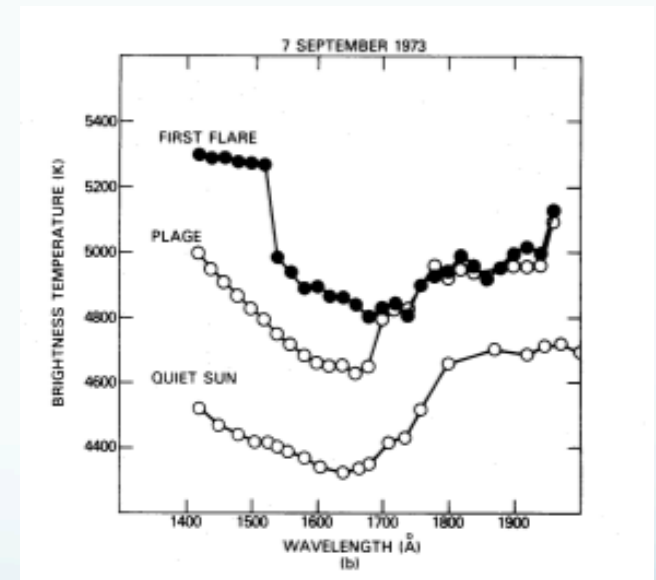
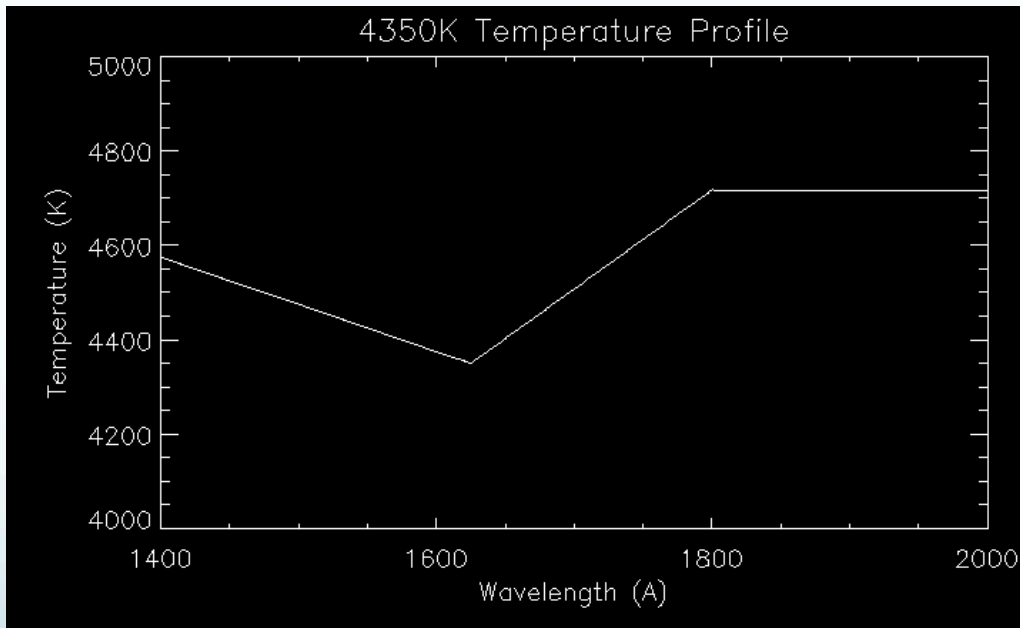
Results

- Flaring Pixel
- Pre-flare modeled as Active Region



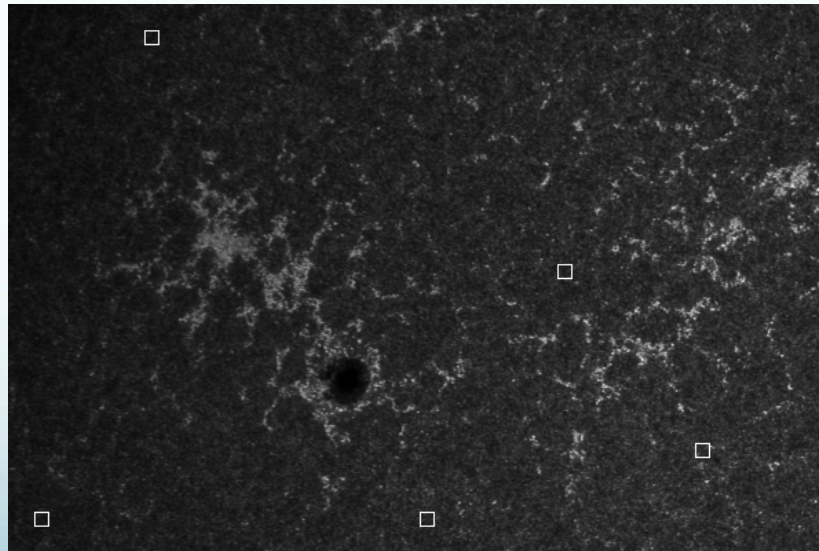
2nd Model

- Wavelength dependent temperature (Cook and Brueckner, 1973):



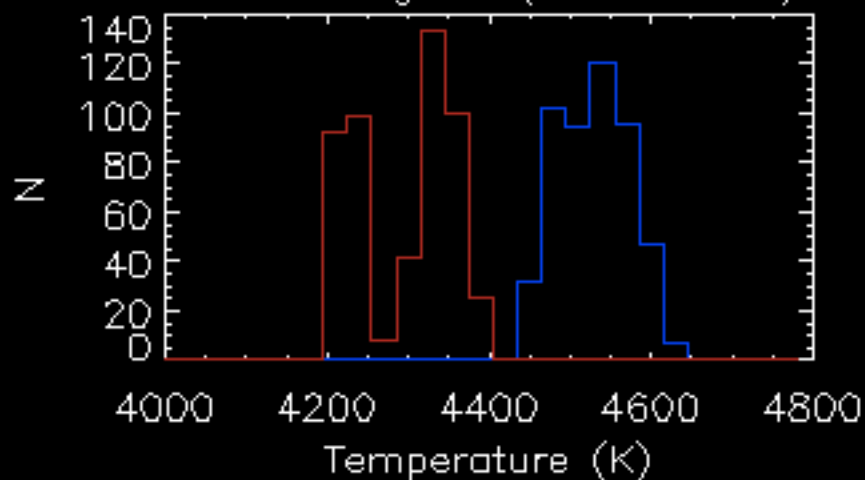
Quiet Sun/Active Region

- Same temperature model
- Temperature based on minimum (at 1625\AA)
- Result comparable with published data:

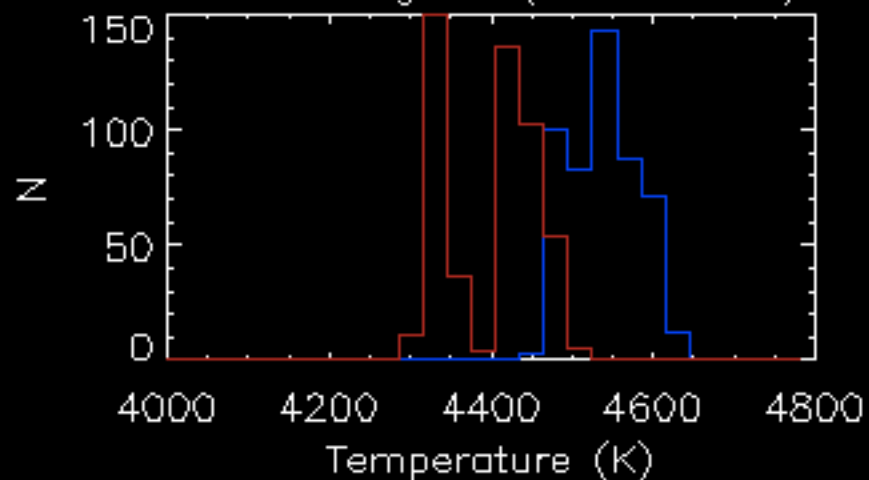


Calculated Temperatures

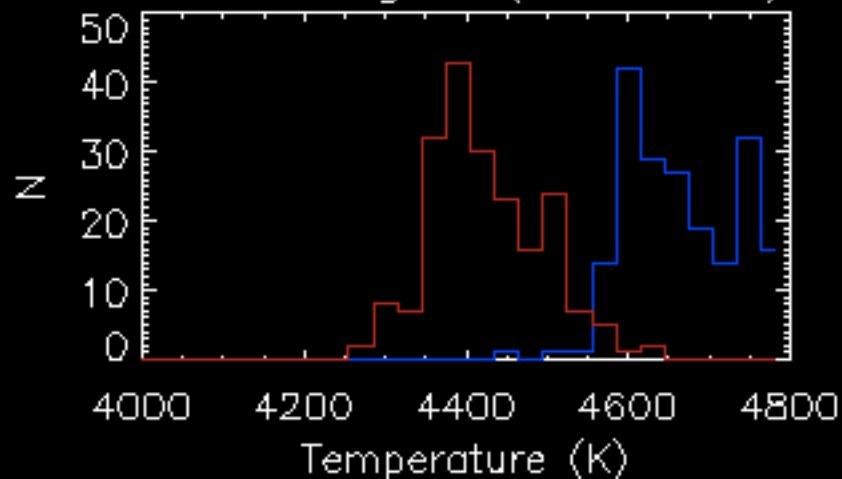
Quiet Region (min 1600)



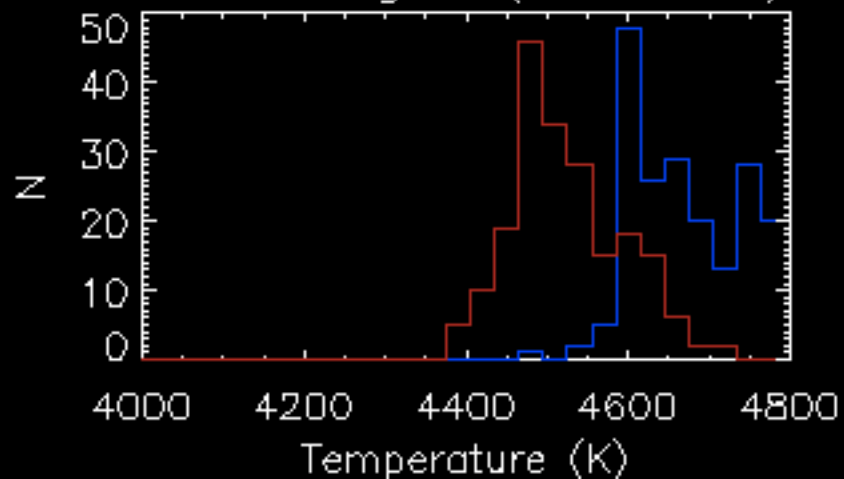
Quiet Region (min 1650)



Active Region (min 1600)

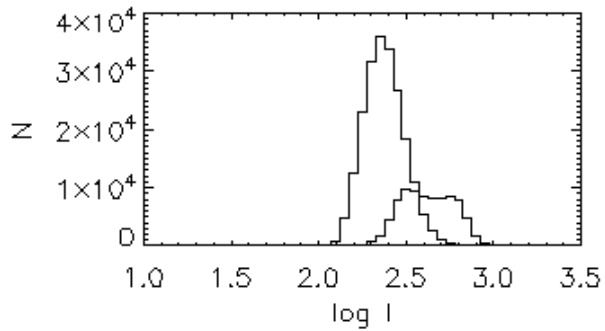


Active Region (min 1650)



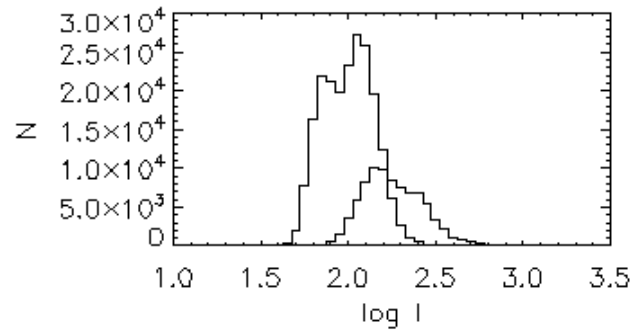
1600 data

1515A

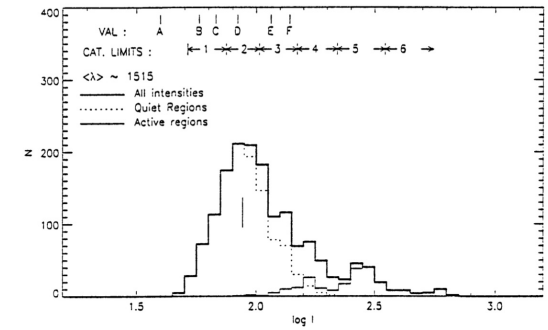


1700 data

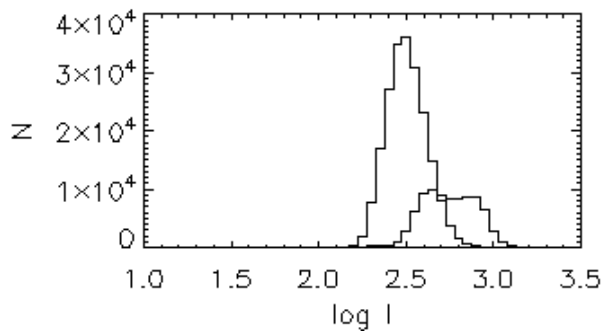
1515A



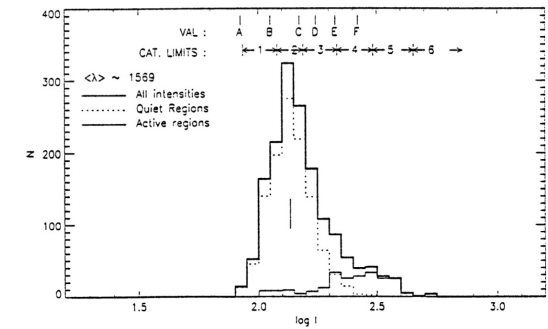
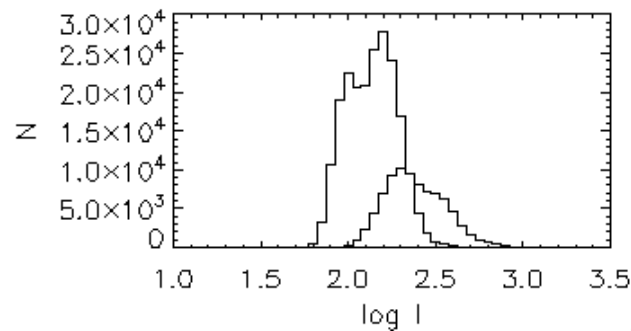
Published



1569A

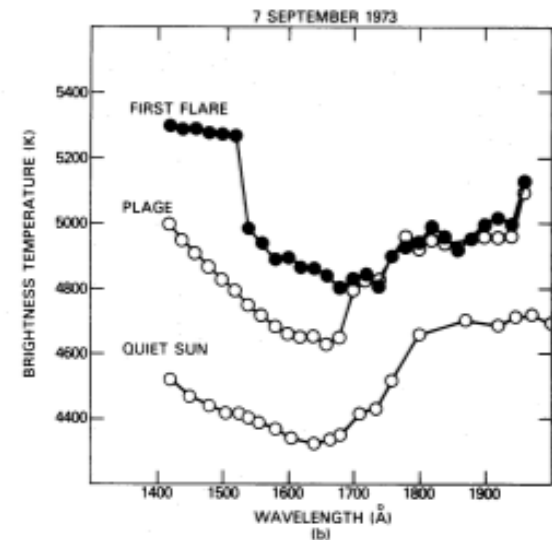
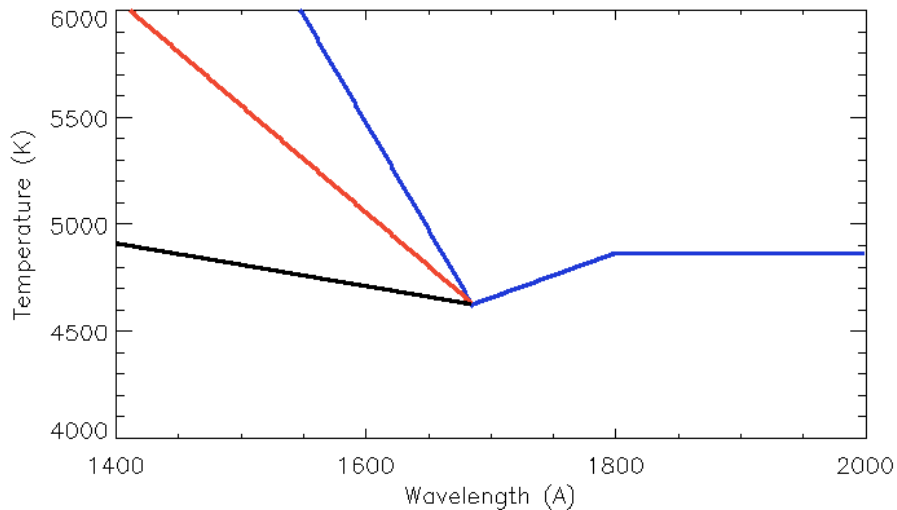


1569A



Flaring Pixels

- Minimum at 1685Å
- Variable slope below 1685Å
- Constant Minimum Temperature (with time)



Flaring Pixels

- Silicon edge at $\sim 1500\text{\AA}$
- Other lines in 1600 band (C_{iv})
- Assume no significant lines in 1700 band

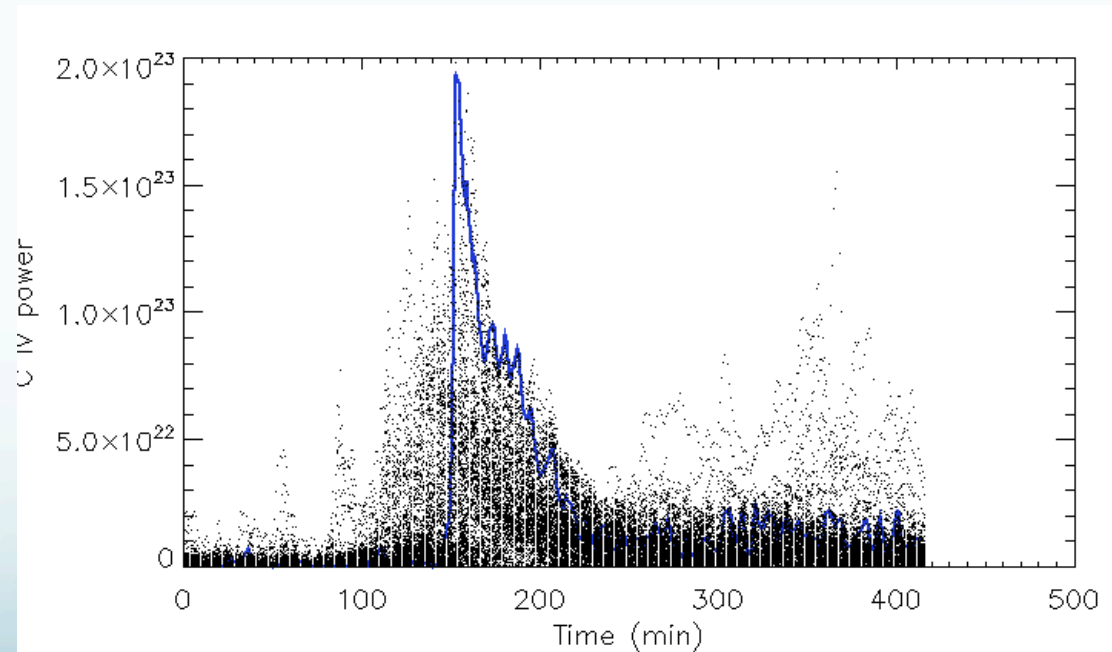
Finding C_{IV}

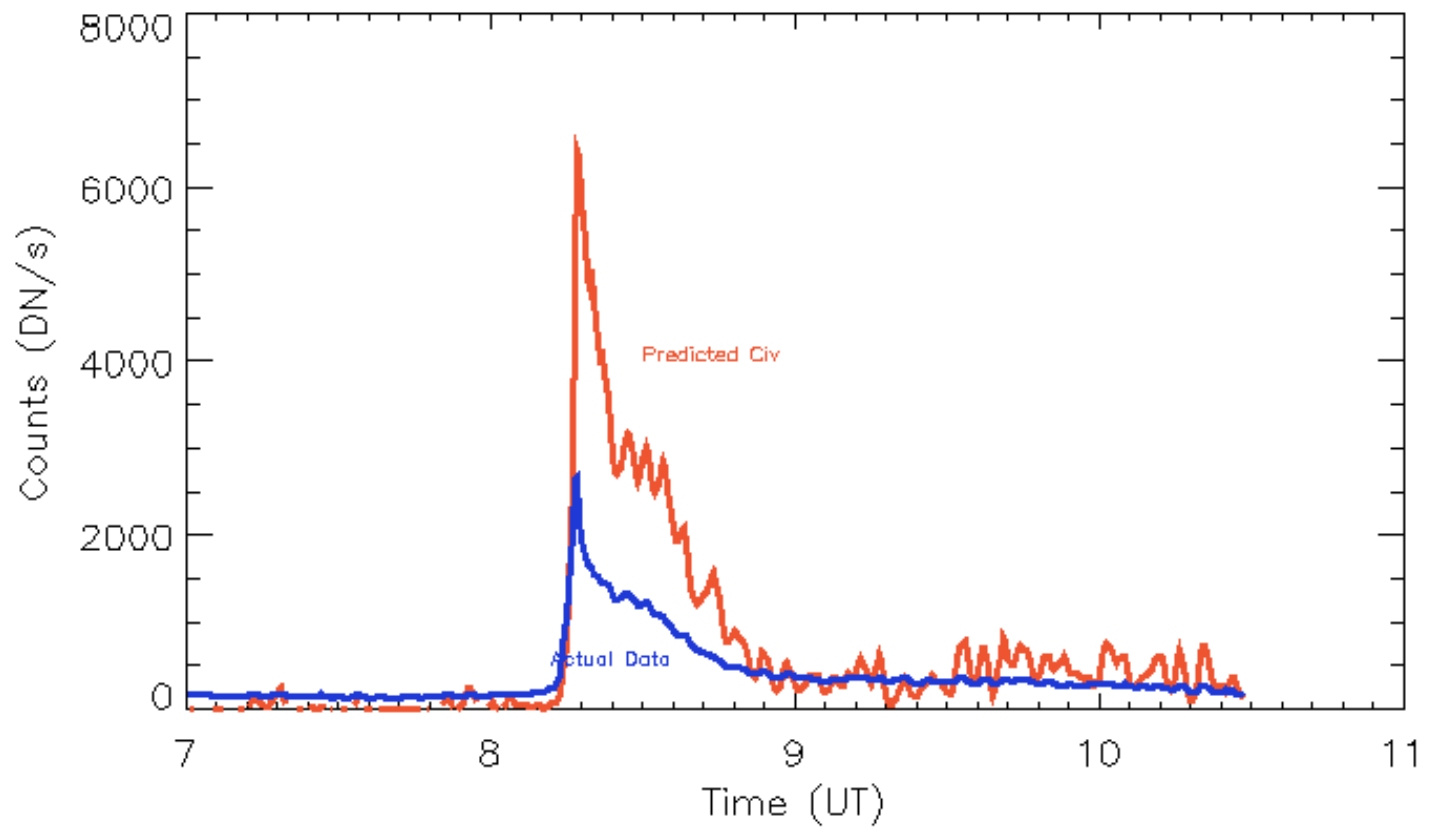
- Published models:

$$\log(1595 \text{ \AA continuum power}) = 1.04(\pm 0.09) \log(C_{IV} \text{ power}) - 2.9(\pm 2.4)$$

$$\log(1595 \text{ \AA continuum power}) = 1.02(\pm 0.14) \log(C_{IV} \text{ power}) - 2.3(\pm 3.8)$$

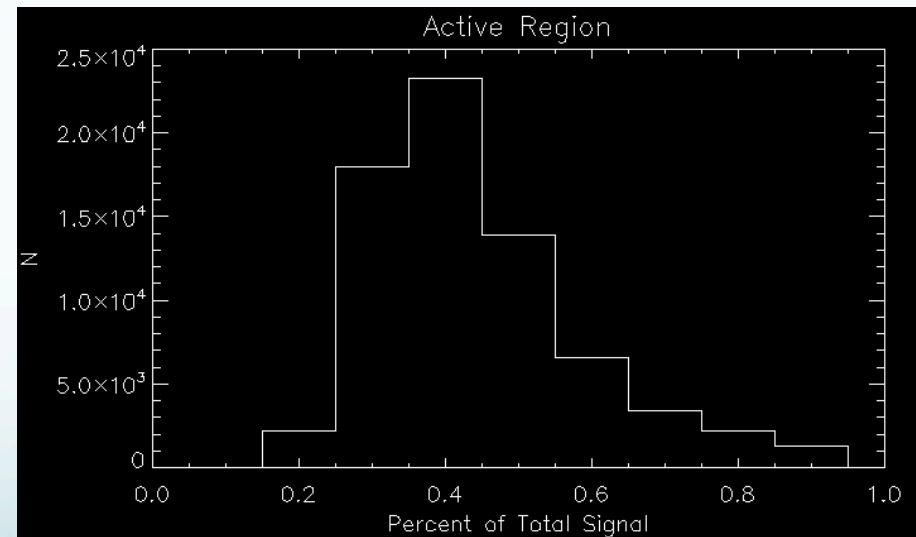
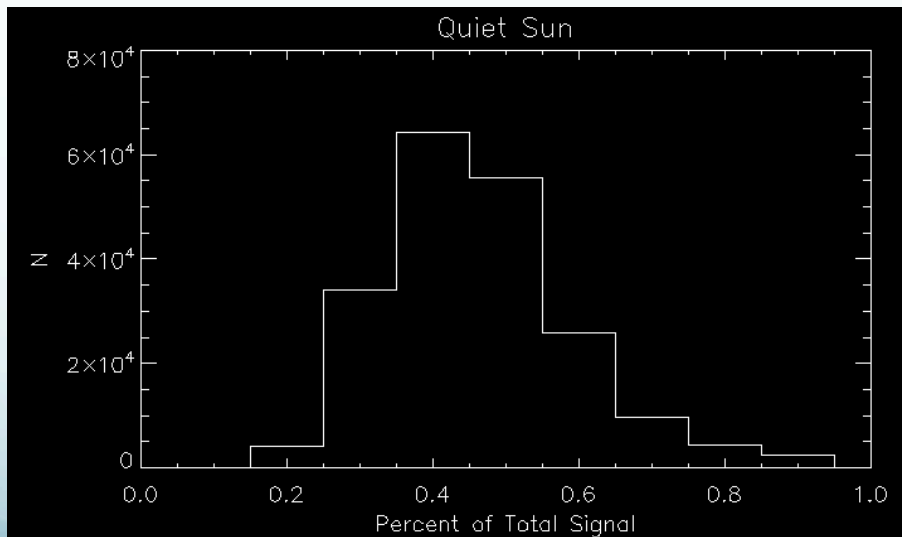
- Results:





Conclusions

- Worked well for Quiet Sun, Plage
 - Temperatures: 4300-4500K, 4400-4600K
 - C_{iv} emission:



Flares?

- Lines in 1700
- Calibration of instrument
- Old models unreliable?