Use of DEM in CHIANTI

ϵ - element abundance

G(T) - contribution function

Φ(T) - DEM

Line intensity
(erg cm^{-2} s^{-1} sr^{-1})

$$
\begin{aligned}
I &= \epsilon \int_T G(T)\phi(T)\mathrm{d}T \\
&= \epsilon \sum_{k=1}^{k=n} G_k \phi_k \delta T_k \\
&= \ln 10\, \epsilon \sum_{k=1}^{k=n} G_k \phi_k T_k \delta(\log_{10} T).
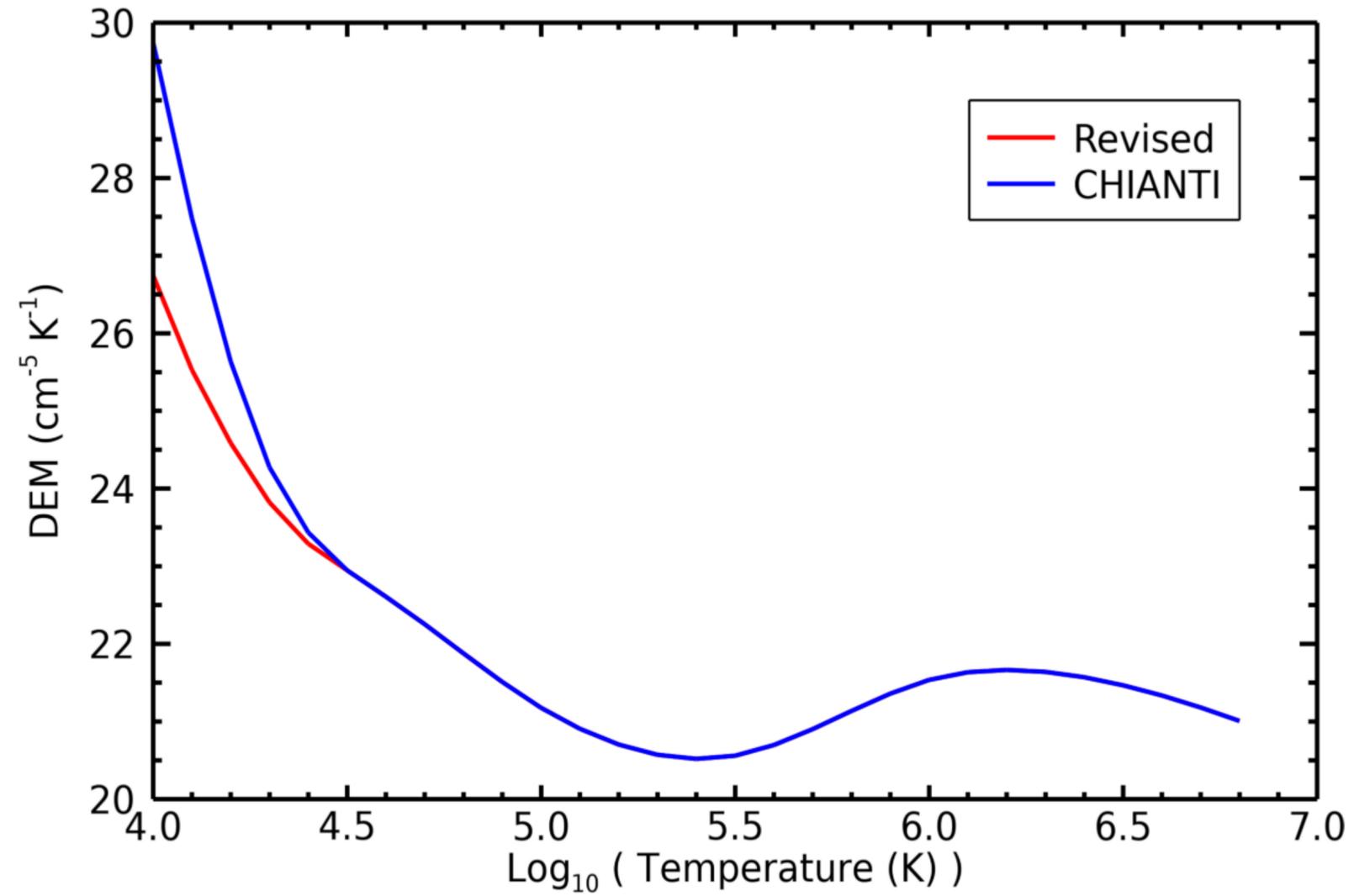\end{aligned}
$$

0.05 in CHIANTI

Emission measure $= 0.05 \ln 10\ \phi_k\, T_k$

CHIANTI Technical Report No. 3
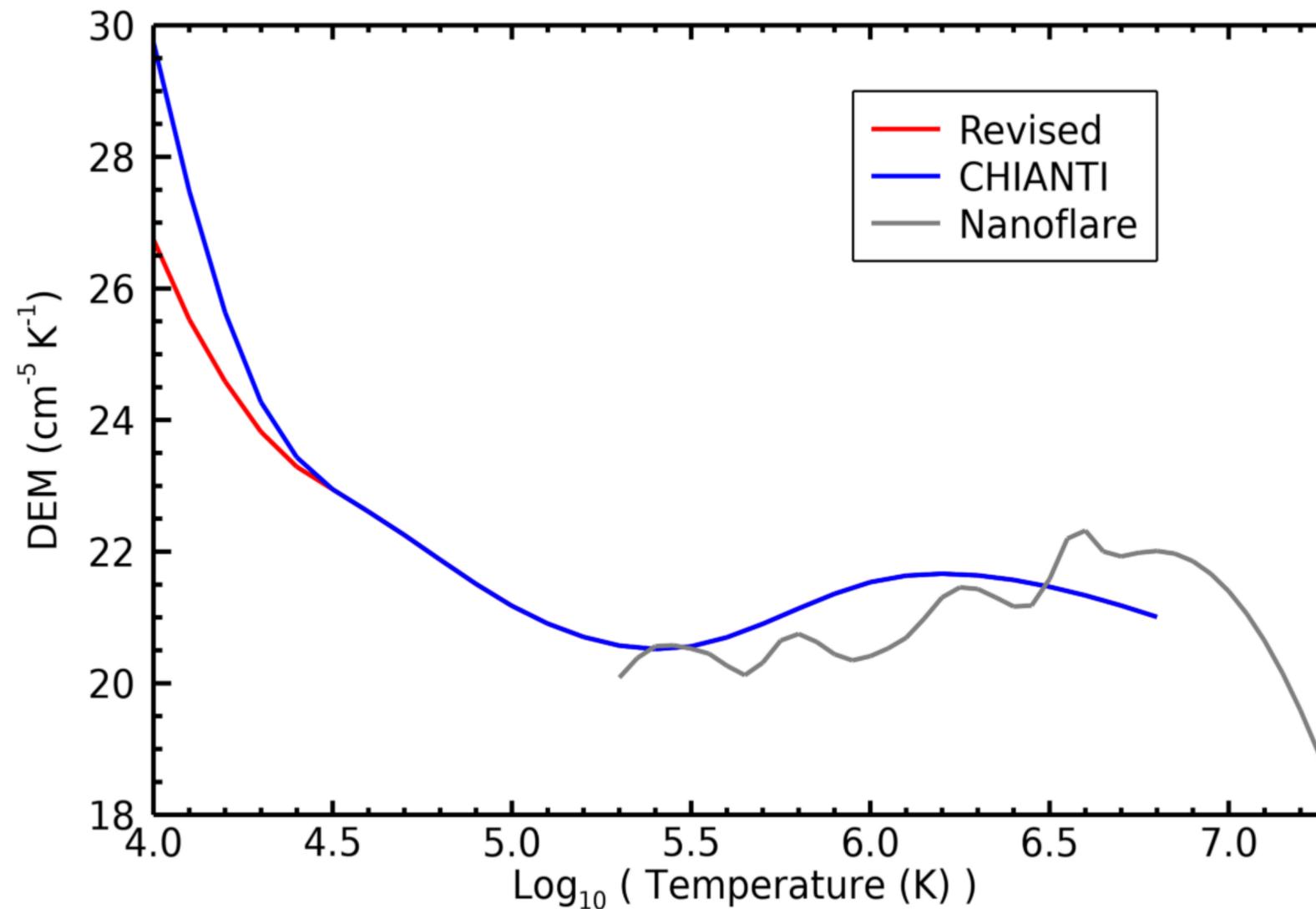
CHIANTI active region DEM

- DEM derived by Ken Dere using *Skylab* active region intensities of Vernazza & Reeves (1978)
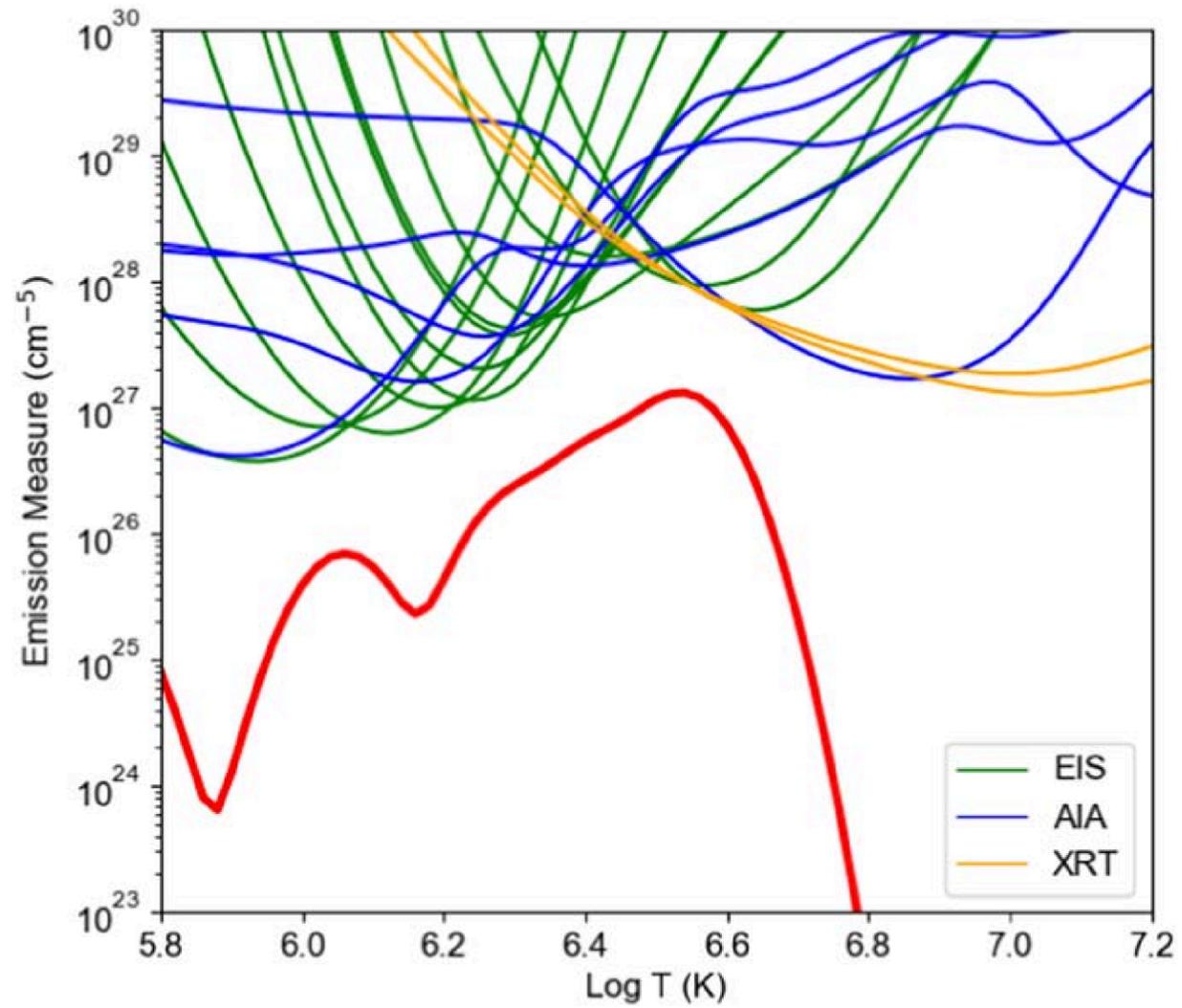- DEM is too high below log T=4.5

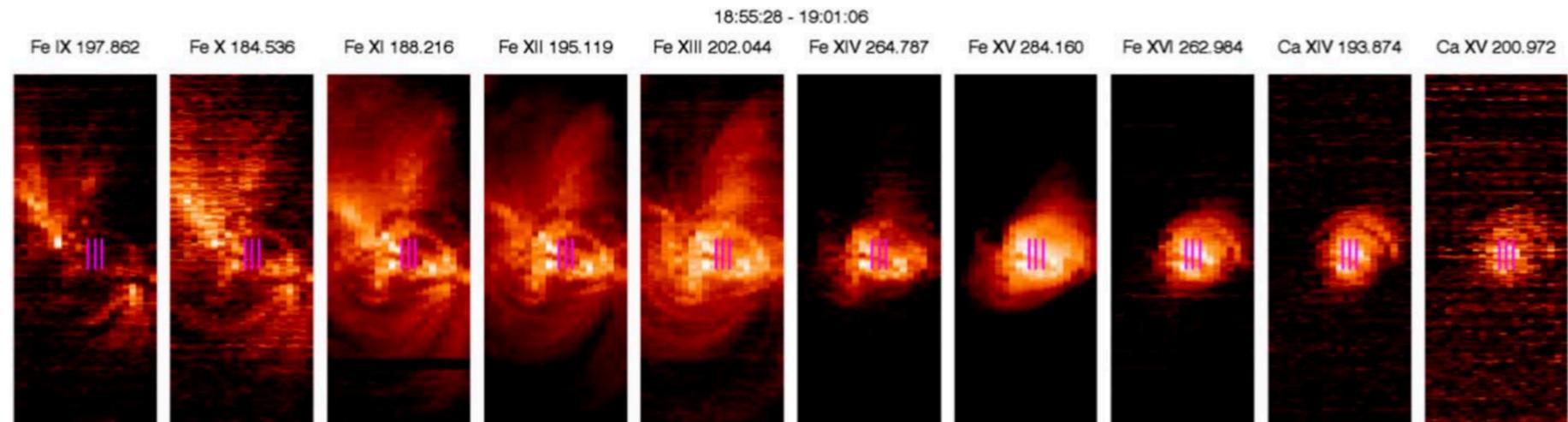# O'Dwyer et al. (2011) AR DEM
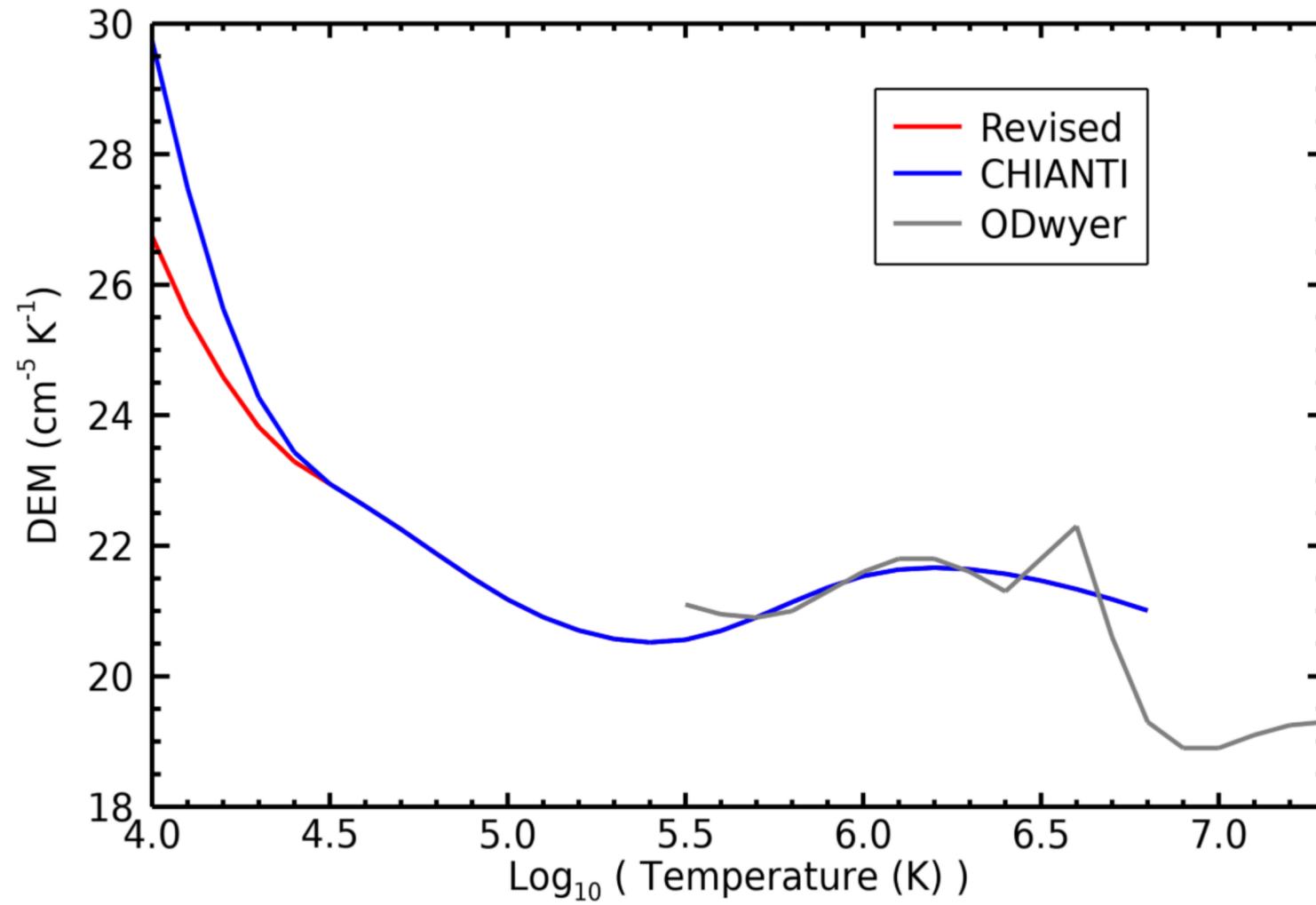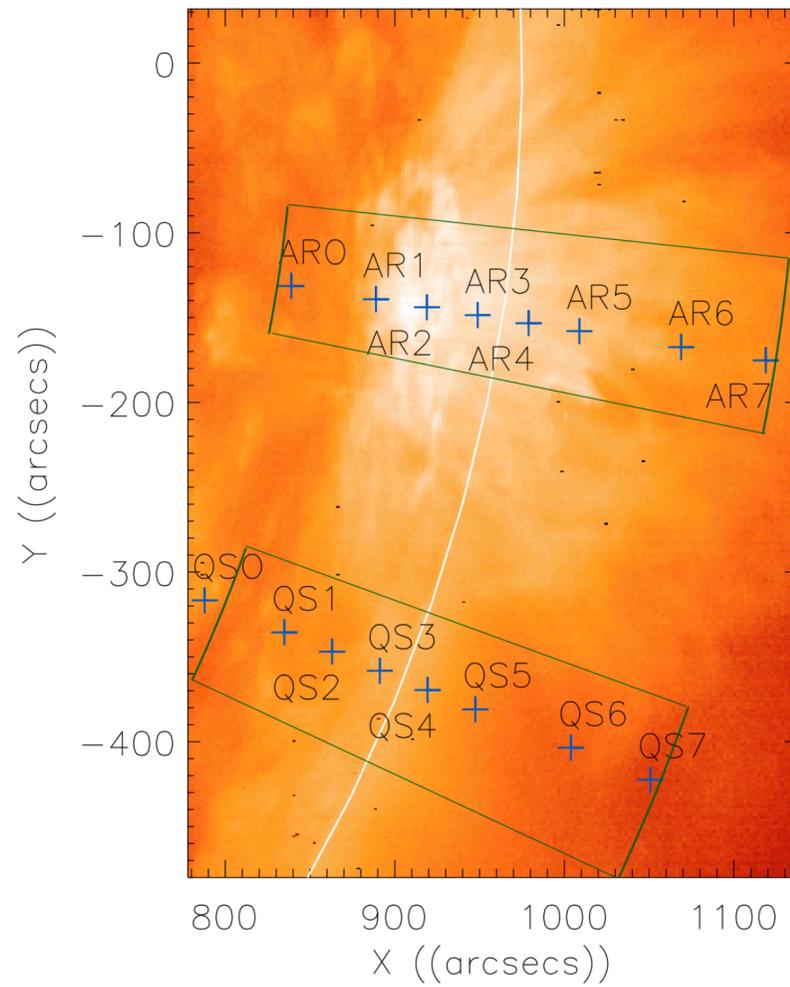
AR2 DEM

AR nanoflare DEM

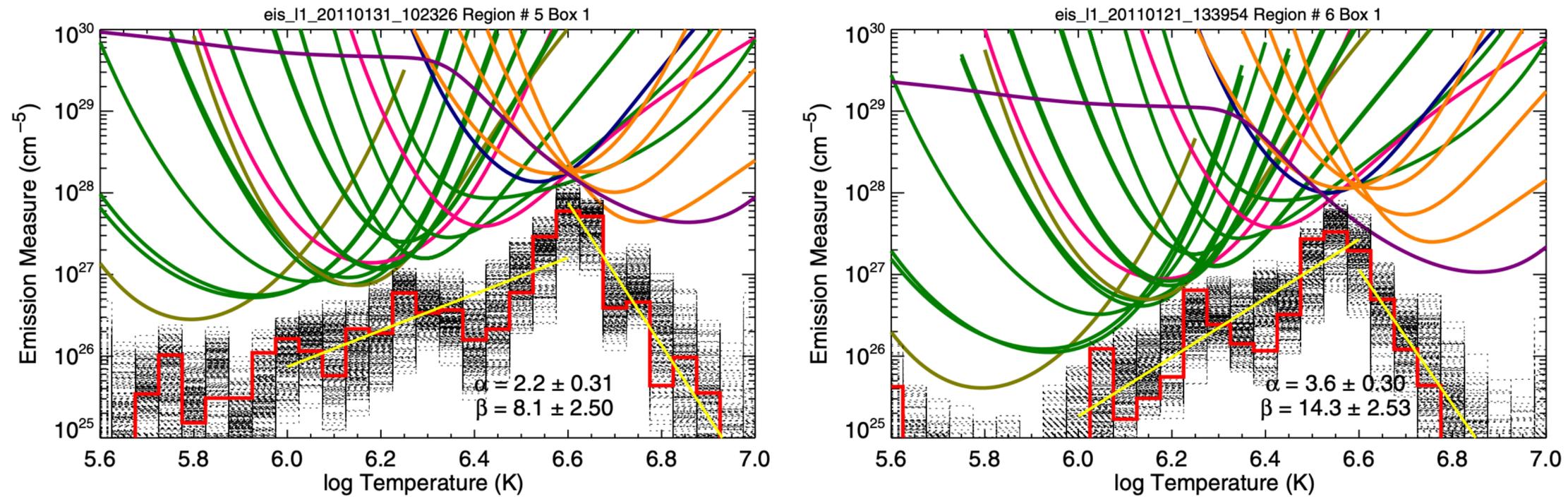- AR core DEM of Harry Warren *plus* a Gaussian bump at log *T* = 6.8

Warren et al. (2020, ApJ)

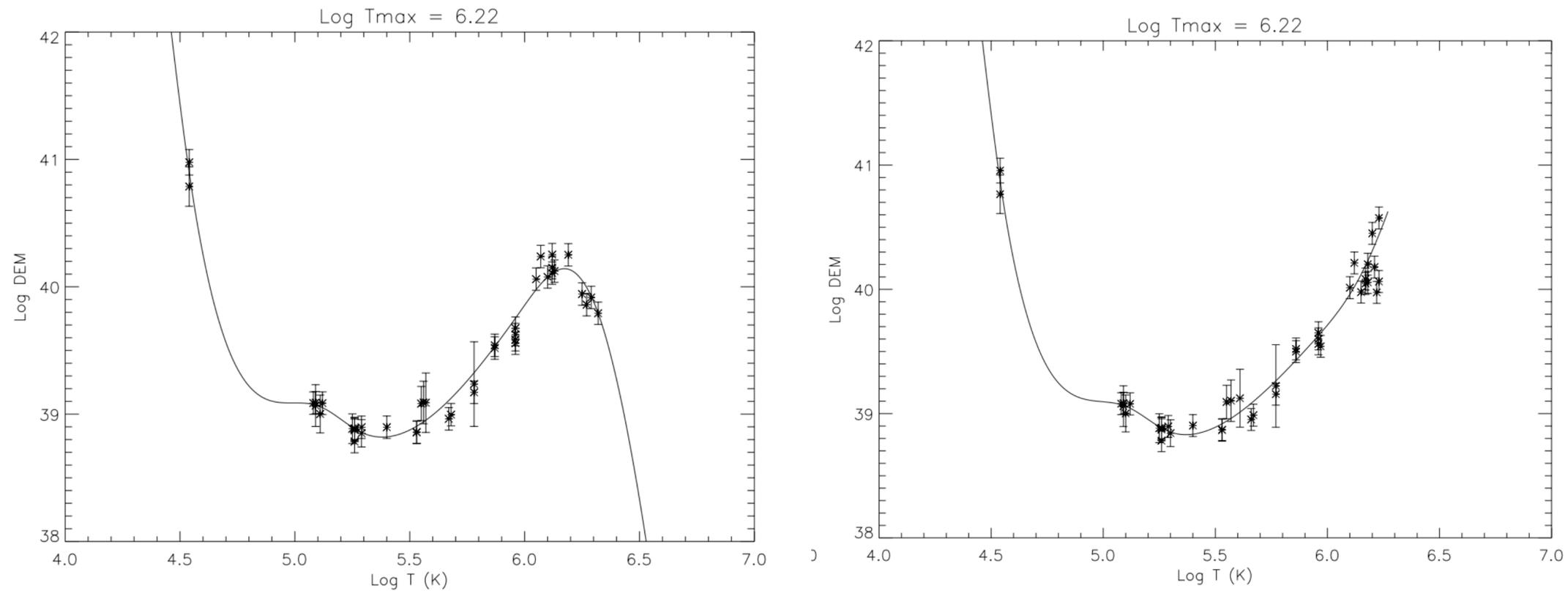- AR observed during Hi-C 2 flight

18:55:28 - 19:01:06

Fe IX 197.862 | Fe X 184.536 | Fe XI 188.216 | Fe XII 195.119 | Fe XIII 202.044 | Fe XIV 264.787 | Fe XV 284.160 | Fe XVI 262.984 | Ca XIV 193.874 | Ca XV 200.972

Warren et al. (2012, ApJ)

- Study of high-*T* emission in a set of active regions with EIS

Del Zanna (2013, A&A) - AR core

# Landi & Landini (1998, A&A) - AR data from CDS

- CDS has access to cooler lines than EIS

- Left panel is a standard DEM; right panel imposes a maximum temperature

- Note that *volume* emission measure is being displayed

Feldman et al. (2009, ApJ)

Average intensities
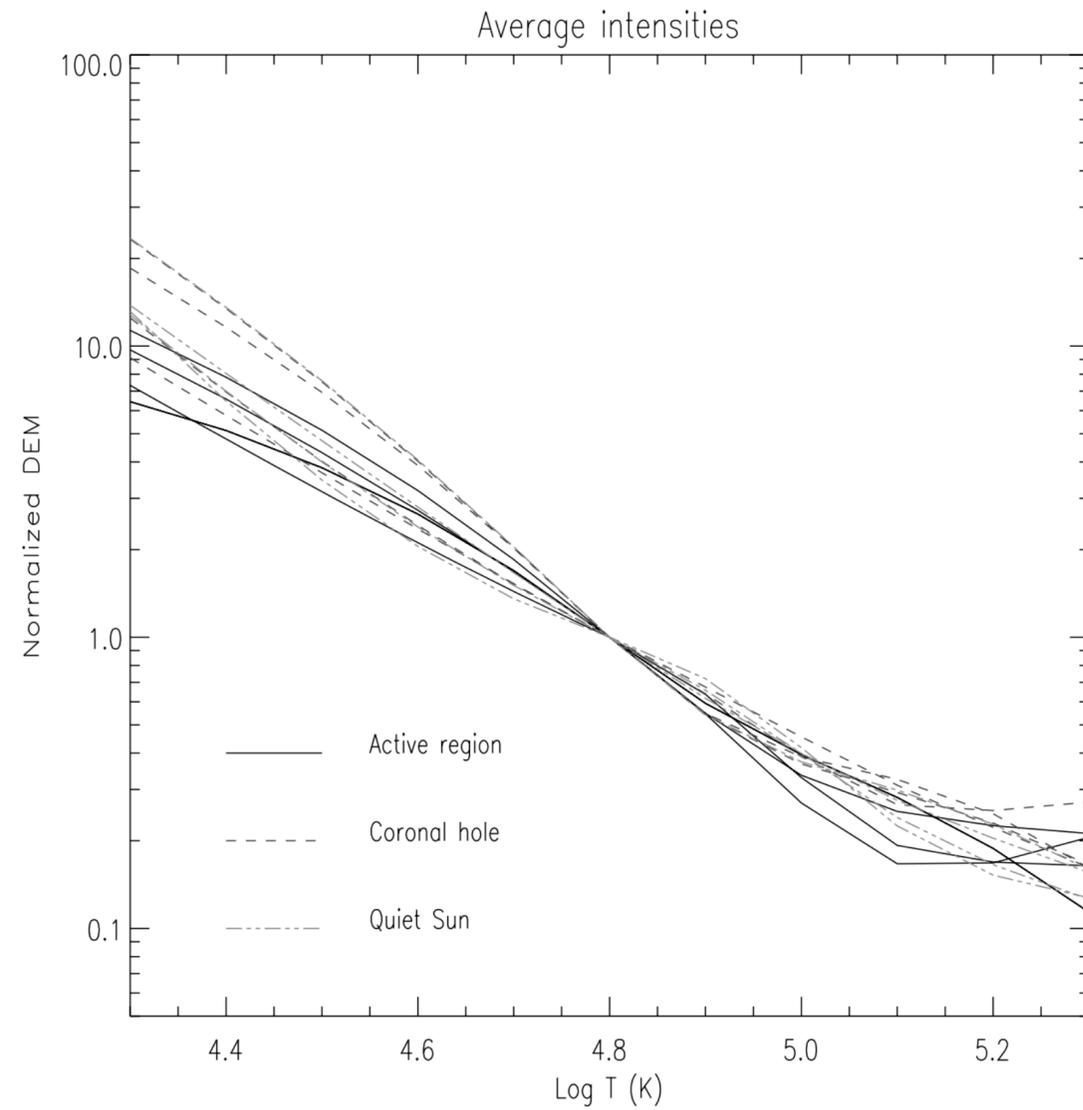
- Finds that the *slope* of the DEM is approximately the same in CH, QS and AR
- Data from SOHO/SUMER

MacPherson & Jordan (1999, MNRAS)
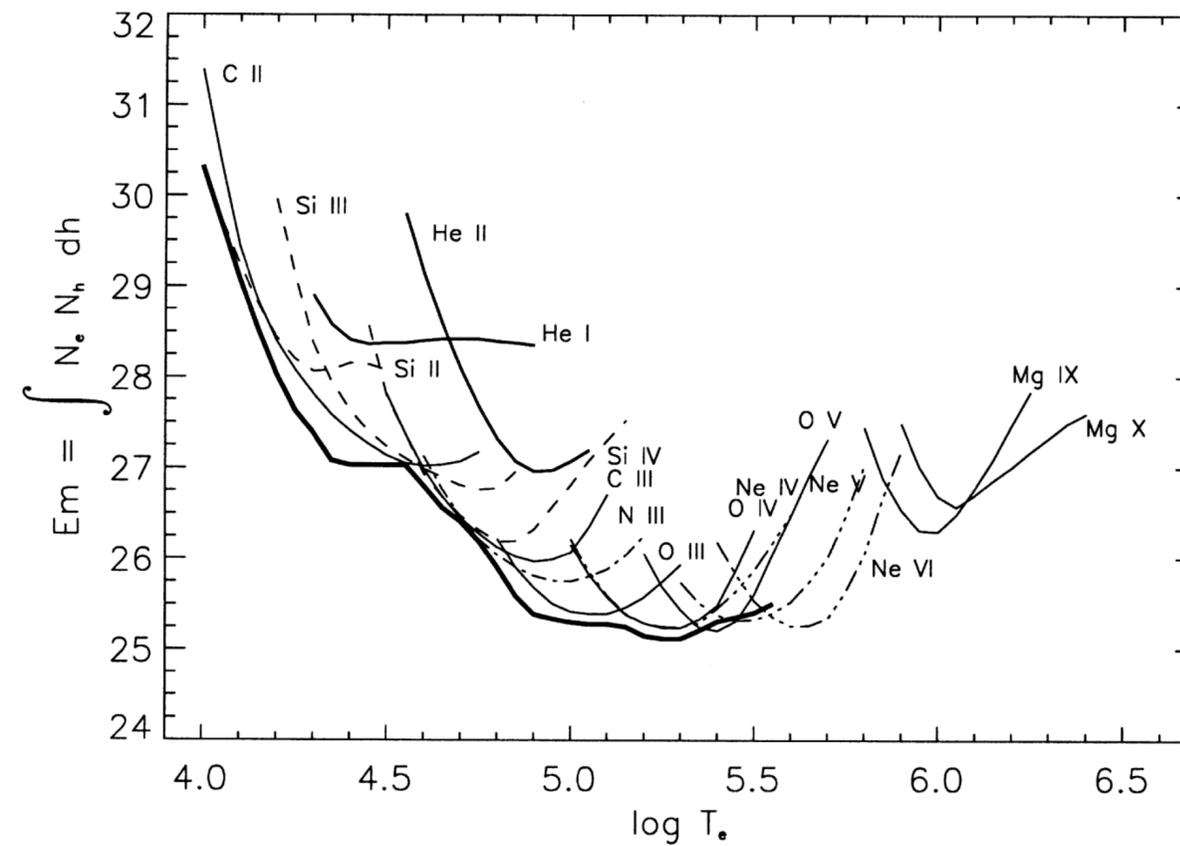
- EM distribution for quiet Sun network
- Combined data from SUMER and CDS