

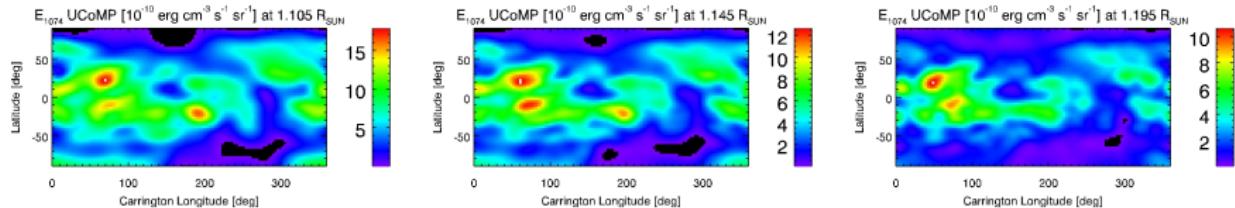
# Tomography: UCoMP versus AIA versus KCOR

- **Solar rotational tomography (SRT)** makes use of 1/2 solar rotation (14-day) long sequences of coronal images to determine the **3D distribution of various physical quantities** of the corona, depending on the observed wavelength range.
  - Using **WL pB** images (e.g. KCOR, C2, Metis), SRT allows determination of the **3D  $N_e$** .
  - Using **EUV** images with a given filter (e.g. AIA 171 Å), SRT allows determination of the **3D band-emissivity**. Based on the reconstructed band-emissivity for various filters independently (e.g. AIA 171, 193, and 211 Å), a local-DEM analysis can be carried out at each location of the corona to determine the **3D  $N_e$**  and  **$T_e$** . The combined procedure is known as DEM-Tomography, or **DEMT**.
  - Using **UCoMP** total-line (wavelength-integrated) images, SRT allows determination of the **3D line emissivity**.
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- For a specific period (September 2022), we carried out:
    - a) **UCoMP-SRT** with 1074 and 1079 nm images to determine their respective **3D emissivity maps**. The 1074:1079 emissivity-ratio can then be used to determine 3D  $N_e$ .
    - b) **AIA-DEMT** (using filters 171, 193 and 211 Å) to determine the **3D  $N_e$**  and  **$T_e$** , in turn used with CHIANTI to compute **3D synthetic emissivity maps** for the lines at 1074 and 1079 nm.
    - c) **KCOR-SRT** to determine the 3D distribution of  $N_e$ .
  - These instruments allow reconstructions over a common range of heights  $1.1 - 1.2 R_\odot$ . We compare:
    - 1) The tomographic UCoMP-SRT line emissivities against the synthetic prediction based on AIA-DEMT.
    - 2) The 3D  $N_e$  derived from UCoMP-SRT, derived from AIA-DEMT, and derived from KCOR-SRT.

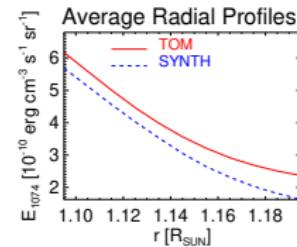
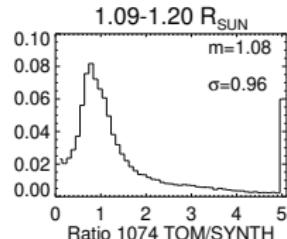
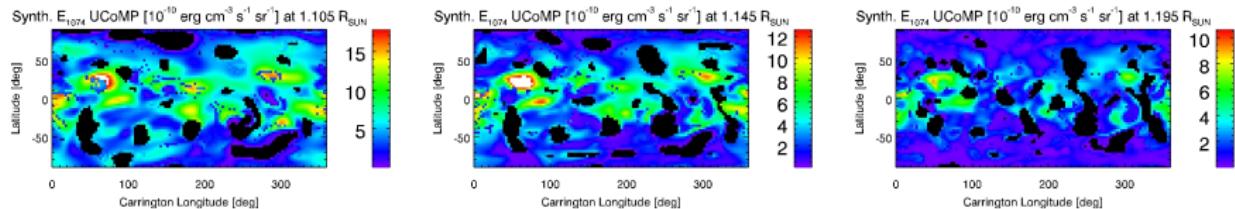
Fede: los resultados de las diapos 4 y 5 están copiados de la presentación que brindé en HAO durante nuestra visita pasada a UM. Entiendo que estos NO son los resultados más actuales, en particular que no tienen el ajuste de KCOR por pasar de mean-disk and disk-center Bsun. Cuando veas esto a la vuelta te pido actualices los gráficos con los correctos. Si querés podés subirlos vos mismo al repo, con igual nombre, y avisarme que haga pull.

# 3D Coronal Emissivity at 1074 nm

Lat/Lon maps of UCoMP 3D **Tomographic** 1074-Emissivity

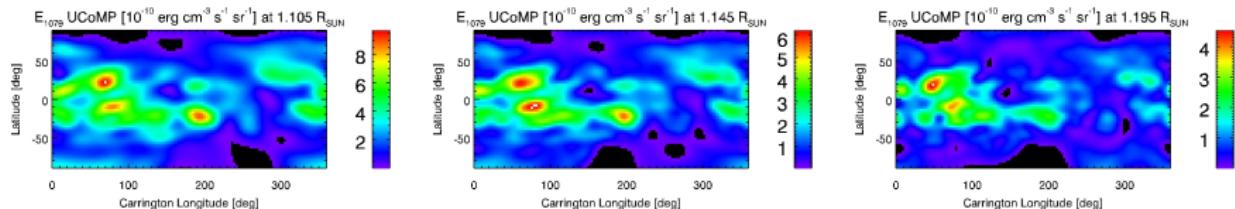


Lat/Lon maps of AIA(171-193-211)-DEMT 3D **Synthetic** 1074-Emissivity

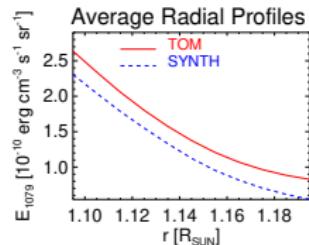
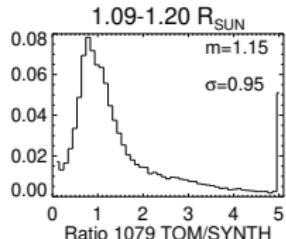
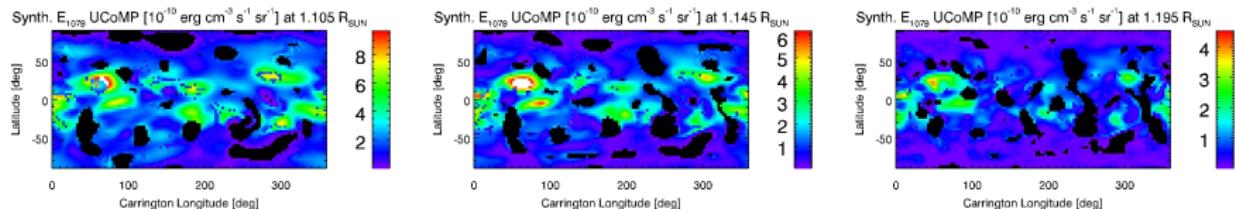


# 3D Coronal Emissivity at 1079 nm

Lat/Lon maps of UCoMP 3D **Tomographic** 1079-Emissivity

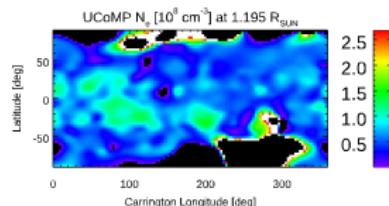
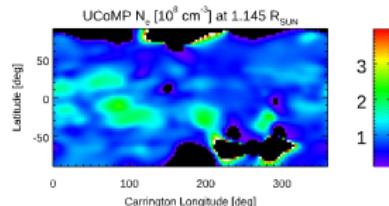
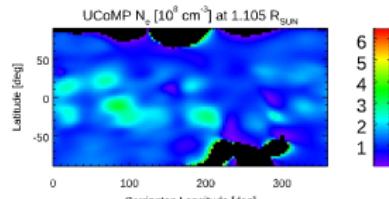


Lat/Lon maps of AIA(171-193-211)-DEMT 3D **Synthetic** 1079-Emissivity

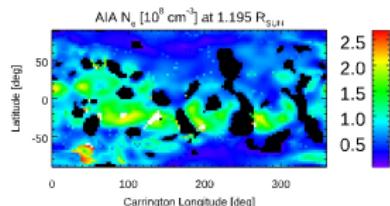
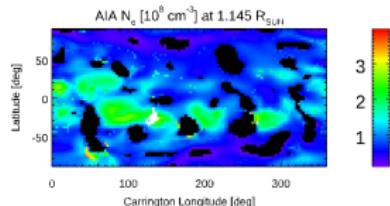
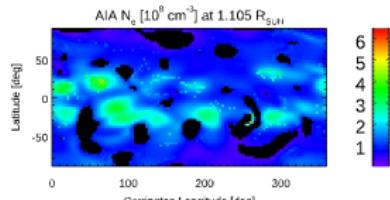


# 3D $N_e$ with Three Diagnostics

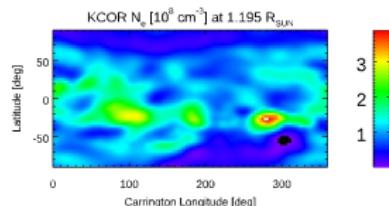
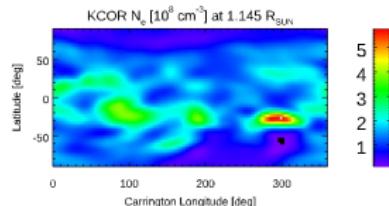
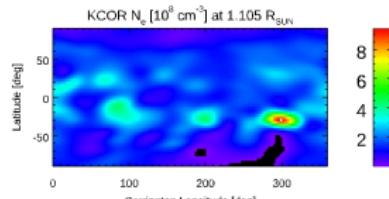
UCoMP-SRT



AIA-DEMT

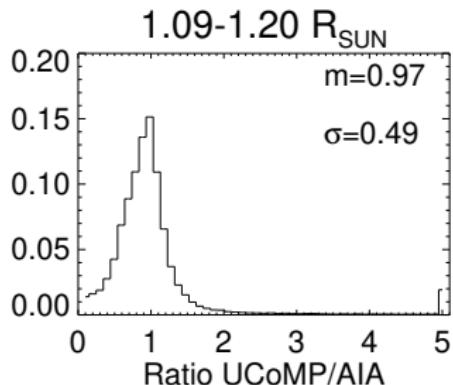


KCOR-SRT

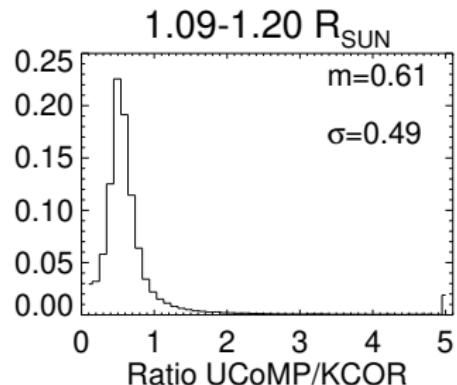


# Comparison of Reconstructed $N_e$

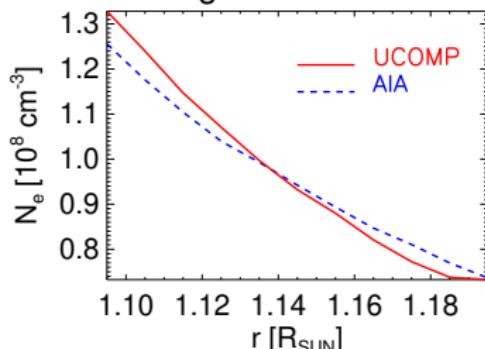
UCoMP versus AIA



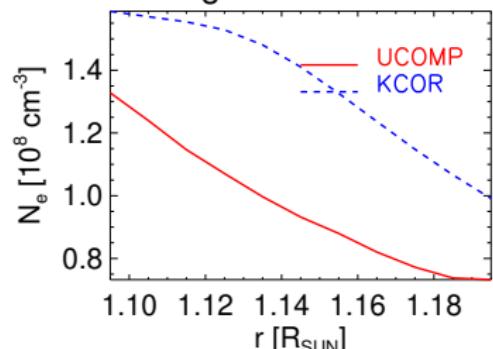
UCoMP versus KCOR



Average Radial Profiles



Average Radial Profiles



# A Few Comments

Solo copié los comments de las diapos de la charla de CO. Juntémonos a discutir y ver de enriquecer y avanzar en esto. Un comentario general: en las comparaciones previas (histogramas y perfiles radiales promedio) se incluyen todas las latitudes? Si es así, miremos que pasa si limitamos al rango  $\pm 60$  deg, como para eliminar las zonas donde UCoMP tiene muy mala señal.

- The UCoMP 1074:1079 emissivity ratio provides a direct diagnostic of  $N_e$  that can be compared to those of DEMT or KCOR-SRT. In addition, the comparison of the UCoMP 3D tomographic emissivities against the DEMT+CHIANTI synthtic maps provides an indirect consistency check for  $T_e$  as well.
- Emission lines to which UCoMP and AIA are sensitive are produced by Fe ions.
- While the UCoMP-SRT  $N_e$  is independent of [Fe], AIA-SRT  $N_e \propto 1/\sqrt{[Fe]}$ . Comparison of their reconstructed  $N_e$  can in principle provide constraints on the 3D distribution of [Fe], as well as the coronal filling factor affecting emission lines.
- The significantly larger SRT-KCOR  $N_e$  compared to SRT-AIA  $N_e$  has been consistently found for other periods ([Lloveras et al. 2019](#)). Discrepancy can be due to calibration issues, coronal [Fe], and/or coronal filling factor.