Solar EUV Input to Ionosphere/Thermosphere Models

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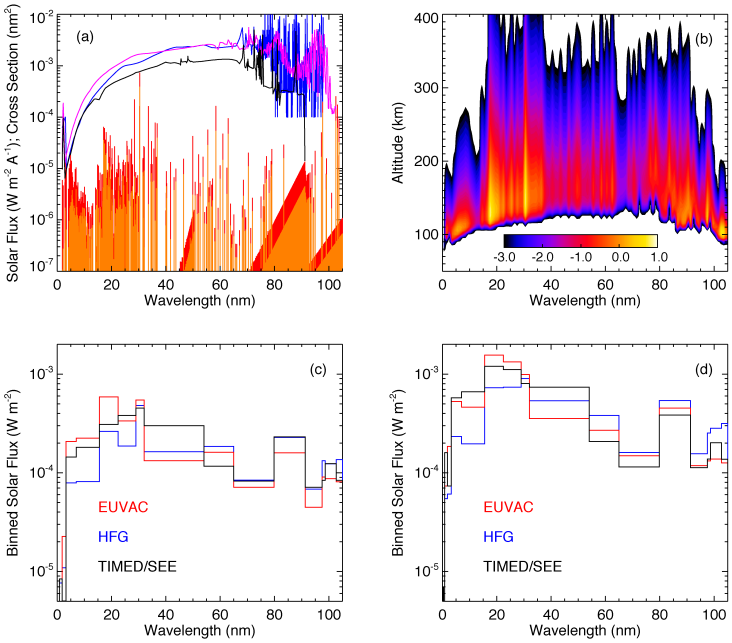
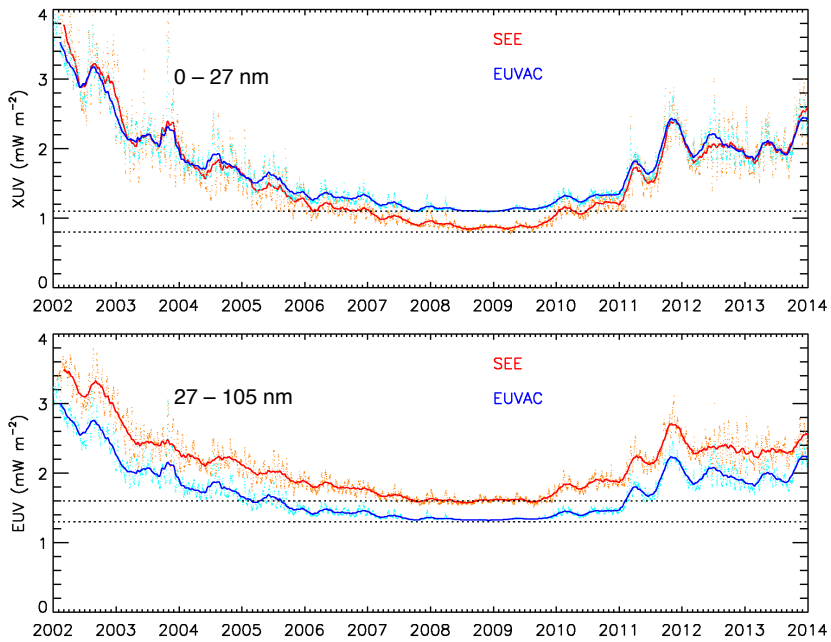
Solar EUV Parameterization Scheme for GCMs



Concerning the "XUV Problem"



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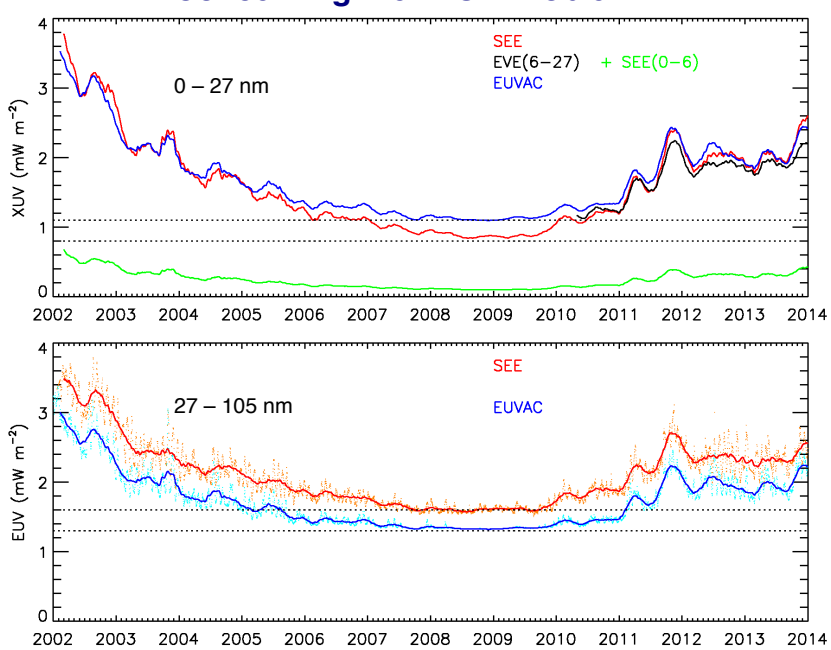
Concerning the "XUV Problem"



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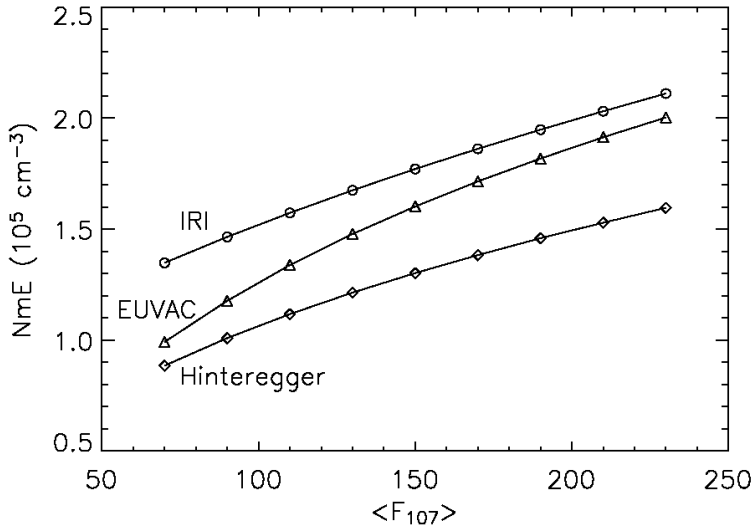
The *E*-region Electron Density Problem



Why does this matter?

— One reason is that the ionospheric electrodynamo is sensitive to conductivity in the *E*-region, and hence to its peak electron density *NmE*.

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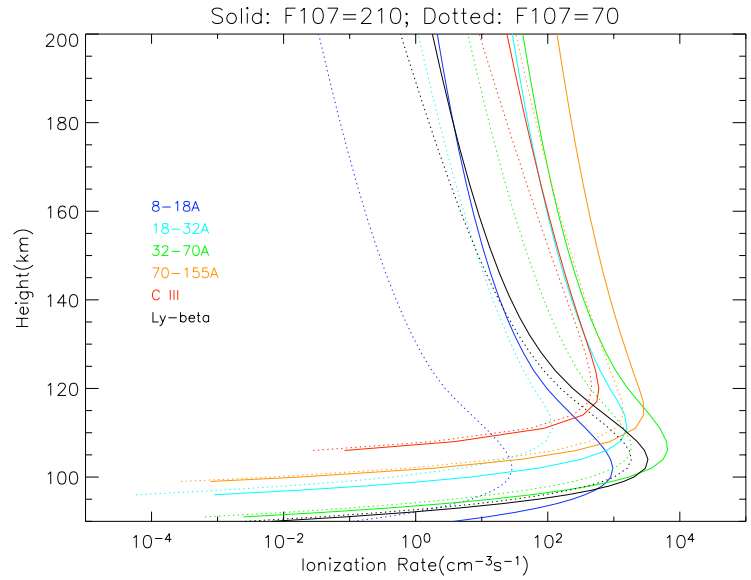
E-region Ionization Rate Profiles



The *E*-region is ionized by soft X-rays shortward of ~15 nm, and by the H Lyman-β line at 102.7 nm.

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The *E*-region Electron Density Problem

Possible Explanations:

1. Something is very wrong with the chemistry.
   ...but E-region chemistry is simple, electron density is controlled by dissociative recombination rates, which are all quite similar, and supposedly well-known at ~300 K. Also, this can't explain the solar cycle dependence.

2. Solar H Lyman-β 102.7 nm emission is underestimated in recent observations.
   ...note that some old Hinteregger measurements were significantly higher.

3. There is more solar soft X-ray flux than previously suspected.
   ...prime suspect is the region shortward of ~7 nm, where the solar spectrum is not well characterized. SNOE/SXP broad-band measurements at ~1~7 nm were significantly higher than TIME/SEE. After SNOE, we thought we had solved this problem!

MinXSS may help!

...but we still need to understand the ~3~6 nm region

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