Observations and Modeling of Atomic/Molecular Composition in the Thermosphere

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GOLD is an ultraviolet imaging spectrograph that measures the temperature, composition, and electron content of the terrestrial upper atmosphere from geostationary orbit.
Atomic Oxygen 135.6 and N\textsubscript{2} LBH Emission Imaging
O 135.6 to N$_2$ LBH Emission Brightness Ratio

2018-11-01T15:10:29.364Z

13.06/LBH Ratio

12 LT

2018-11-01T22:10:29.252Z

13.06/LBH Ratio

17 LT
Comparison with Airglow Model

Date 18:30 UT 55000

12 LT

Date 18:30 UT 81000

17 LT
Comparison to “Constant Atmosphere” Model

Date 18305  UT 55000

Date 18305  UT 81000
Comparison with TIMED/GUVI
Can we see the Equinox-to-Solstice Transition?

30 September 2018

28 October 2018

13 November 2018
Another Infamous Geomagnetic Storm on a Minor Holiday

Top Ten Unexpected Effects of the Guy Fawkes Day Storm, 5 November 2018:

10. Freak geomagnetic storm during solar minimum stuns ionospheric physicists
9. $K_p$ index reaches 6, overflowing arrays on NOAA SWPC mainframe abacus
8. Aurora visible in the contiguous US, as far south as Fargo, North Dakota
7. Lights go out all across Quebec, starting around 12 UT
6. Town in North Ontario left helpless
5. Airplane bound for Denver lands in Colorado Springs
4. Uber drivers sleepless in Seattle
3. Magnetic field deviance causes hilarity and minor vandalism in the UK
2. Changes in thermospheric composition observed by the NASA GOLD mission
1. Pigeons flying around in circles near National Mall, Washington, DC
Composition Disturbances during the November 5th Storm
Conclusions

• GOLD is working great.
• The most exciting results so far are the night ionosphere observations, but,
• Daytime composition looks good too, although it will require some interpretation
• Equinox-solstice transition seen on a global scale
• Even a minor geomagnetic disturbance causes global composition change
• Temperatures, limb scans, occultations, coming soon

http://gold.cs.ucf.edu
More GOLD

This Monday afternoon:

Session SA13A, (1:40 – 3:40 PM), Convention Center – 202B
- SA13A-02: Science on Communications Satellites: Observing Earth from Geostationary Orbit
  – William E. McClintock

Session SA13B, (1:40 – 6:00 PM), Convention Center – Hall A-C
- SA13B-2769: Heat flow from the upper to the lower thermosphere
  – Alan G. Burns

Tomorrow Tuesday morning:

Session SA21A (8:00 AM – 12:20 PM), Convention Center – Hall A-C
- SA21A-3169 GOLD: Overview of O/N\textsubscript{2} and Q\textsubscript{EUV} Science Data Products
- SA21A-3170 Initial Measurements of Thermospheric O\textsubscript{2} Density Profiles from GOLD
  – Jerry D. Lumpe, et al.
- SA21A-3171 GOLD: Overview of Daytime Exospheric Temperature Science Data Product
  – Victoir Veibell, et al.
- SA21A-3172 GOLD: Overview of Daytime Neutral Temperature Science Data Product
  – J. Scott Evans, et al.
- SA21A-3175: Thermospheric Temperature Profiles from GOLD Disk Images and Applications
  – Clayton Cantrall, et al.