Old Dog New Tricks: A New Look at OGO 6 Data

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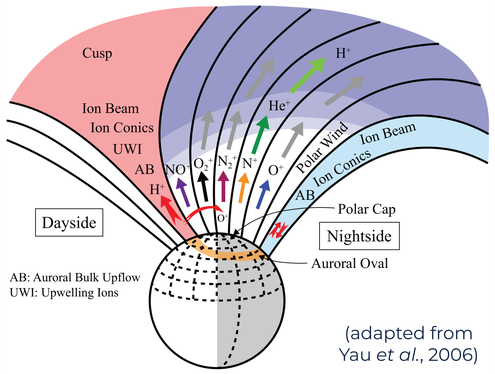
MOTIVATION

- Heavy ions outflowing from the ionosphere play an important role in magnetospheric dynamics.
- Understanding the environmental factors that affect ion composition in the ionosphere will provide us insight to the ionosphere–magnetosphere system.

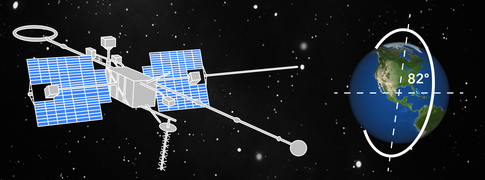
- How does the ionospheric plasma composition vary with seasons?
- What is the spatial variation of ion mass distribution?



(adapted from Yau *et al.*, 2006)

NASA's Orbiting Geophysical Observatory 6 (OGO 6)

Operation : June 5, 1969 — March 1972
Purpose : study high-altitude plasma parameters (26 experiments)

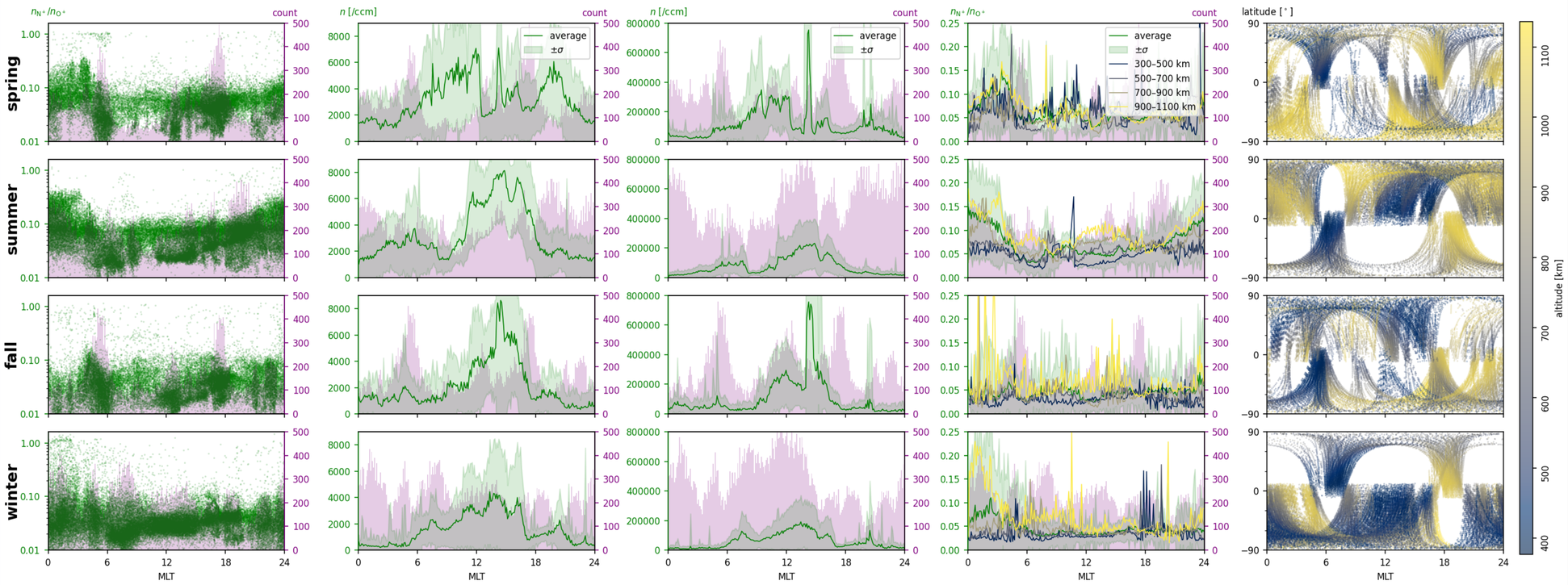


perigee: 413.00 km apogee: 1077.00 km T = 99.70 min

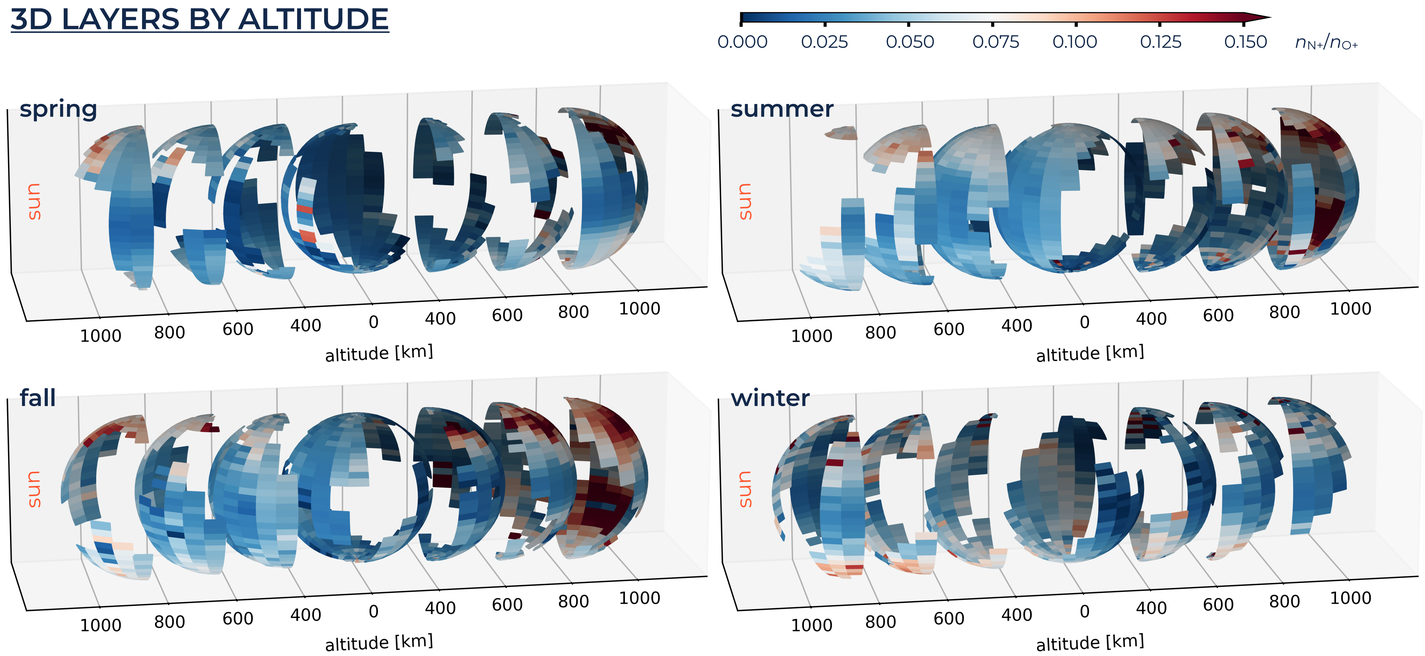
BIMS : one of the first & few instruments to measure densities for 7 ion species
H^+, He^+, N^+, O^+, N_2^+, NO^+, O_2^+

Duration : June 12, 1969 – December 31, 1970
Mass Range : 1 – 45 amu
Mass Resolution : 1 in 20 amu
Spatial Resolution : 2° in latitude
Frequency : every 36.8 s
Sensitivity : 1.0×10^6 – 10 ions/ccm

SEASONAL VARIATION OF HEAVY ION DENSITIES



3D LAYERS BY ALTITUDE



CONCLUSION

- For all seasons, the maximum of n_{N^+}/n_{O^+} occurs on the night side while the minimum occurs on the day side.
- In winter, n_{N^+}/n_{O^+} is significantly higher for high altitudes on the night side.
- In spring and fall, n_{N^+}/n_{O^+} has the least variation with altitude.
- In spring, n_{N^+}/n_{O^+} has the most variation across MLTs.
- Both n_{N^+} and n_{O^+} have extreme values at similar MLTs: maximum on the day side (~ 14 MLT) and minimum on the night side (~ 0 MLT).
- n_{N^+}/n_{O^+} increases with altitude.

ACKNOWLEDGMENTS

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