Long term monitoring of global tropopause parameters using radio occultation.

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1. Introduction
• Global tropopause structure indicates and modulates climate change processes
• Radio occultation (RO) is an innovative new technology for monitoring the global tropopause.
• Several RO missions have been launched, including: GPS/Met, SAC-C, CHAMP, and COSMIC
• We analyze the sources and distribution of errors in RO-derived tropopause parameters, in order to investigate their potential for use in tropopause climate studies.

2. Errors in the GPS-RO tropopause
• We analyze RO tropopause errors in space and in time
• Errors in high latitudes have a slope, indicative of a phase speed of about 8 m s\(^{-1}\) / 2 m\(^{-1}\) for the high latitudes / tropics.
• Extrapolating to (0,0), errors are about 1.7 K and 500 m.
• Larger errors are due to natural differences between collocated measurements.

3. GPS-RO vs. Radiosonde measurements
• We compare meridional tropopause heights (not shown) and temperatures from RO and radiosonde datasets.
• GPS/MET and SAC-C tropopause temperatures contain errors due to processing.
• CHAMP and COSMIC average tropopause temperatures are within ~1 K of those from radiosondes, and biases are small for the globe.

4. GPS-RO intercomparison
• RO tropopause height differences are small for the globe.
• Temperature differences are small for similarly processed data (purple), but can be large for differently processed data (aqua).

5. Other Results
• Detected noticeable biases in India’s radiosonde network.
• Found spurious trends in a previously processed CHAMP dataset.

6. Conclusion
• RO allows more in-depth global tropopause analysis.
• RO can help to critique radiosonde networks.
• Consistent processing is important for RO data integrity.
• RO data generally is precise and stable enough for long-term tropopause studies.

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