

Trajectory and atmospheric structure reconstruction from entry probes: Demonstration of a real-time reconstruction technique using a simple direct-to-Earth radio link

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Abstract 30.11

Wednesday 2010.10.06 15:30-18:00

DPS meeting 2010, Pasadena CA

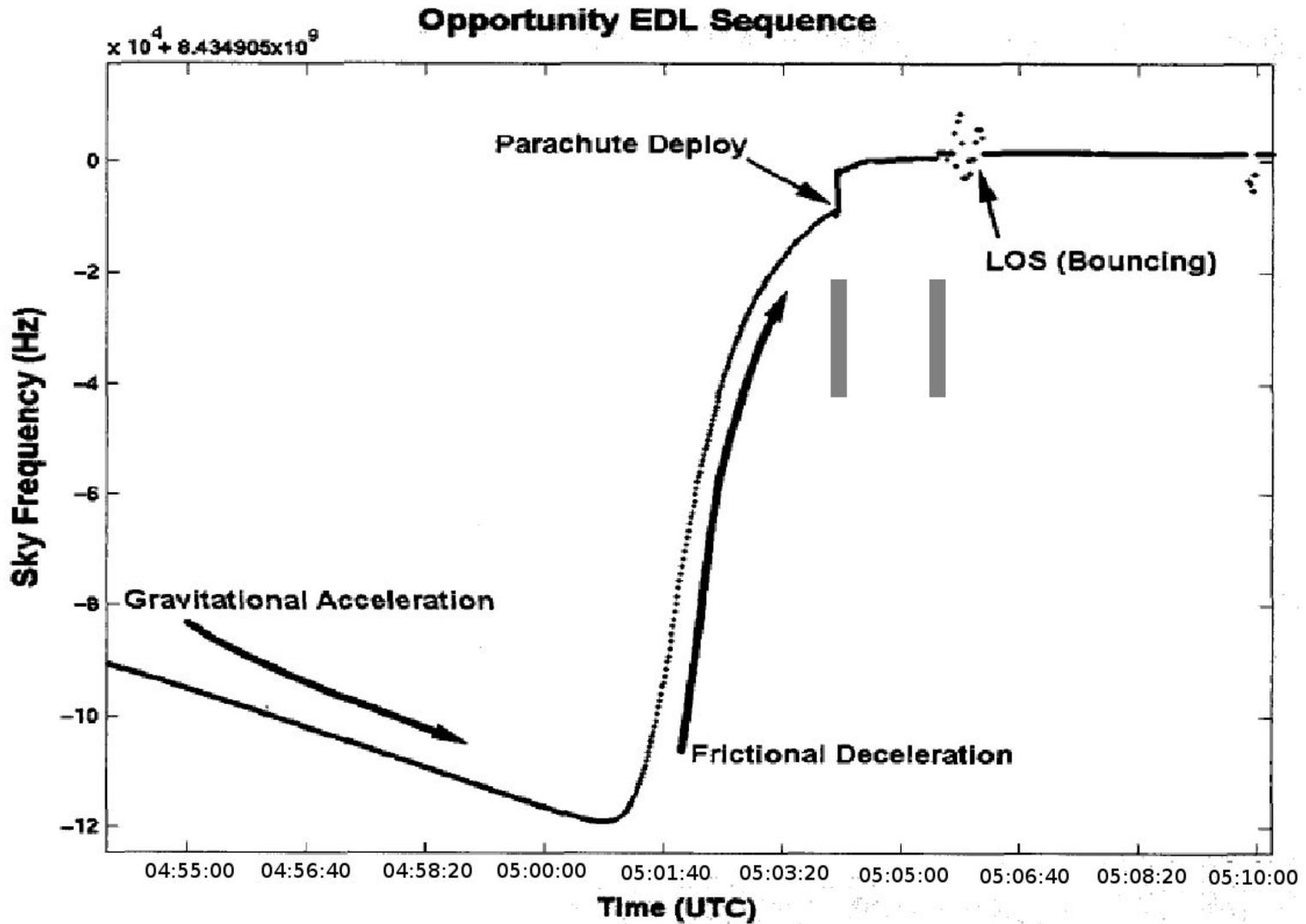
Manuscript in review at Planetary and Space Science

Why bother?

- Engineering
 - Immediate estimate of landing site location
 - Identification of anomalous events during EDL
 - Immediate assessment of accuracy of predicted atmospheric conditions
- Outreach
 - Instant data product available during period of greatest public attention
- Insurance
 - Scientific results and engineering information in the event of mission failure

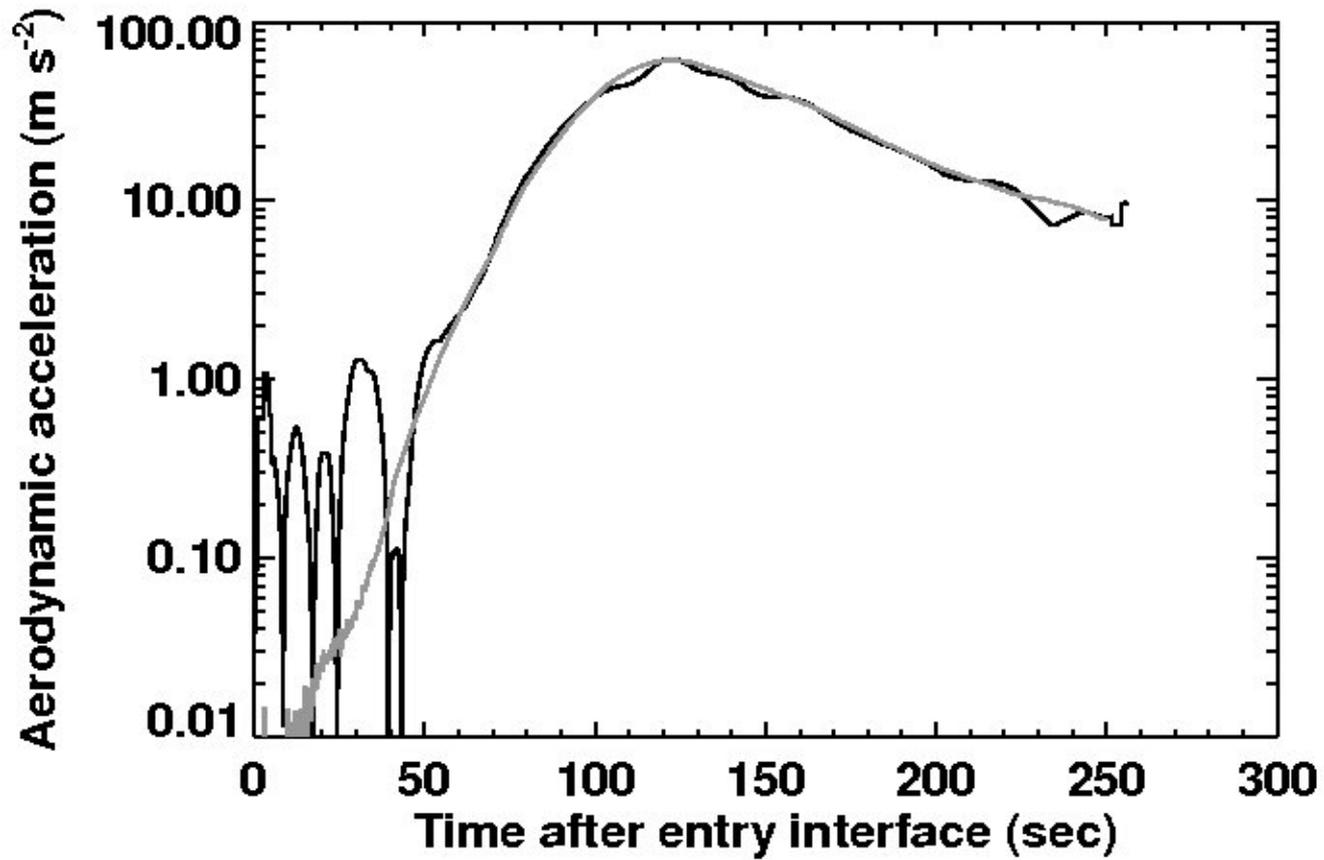
Demonstration on Opportunity

- Actual frequency data not yet located
- Digitized version of published figure used instead
 - This will greatly reduce the accuracy of the technique, but is sufficient for a concept demonstration
- Black lines on figures are derived using this technique
- Grey lines on figures are from a traditional reconstruction using accelerometer data

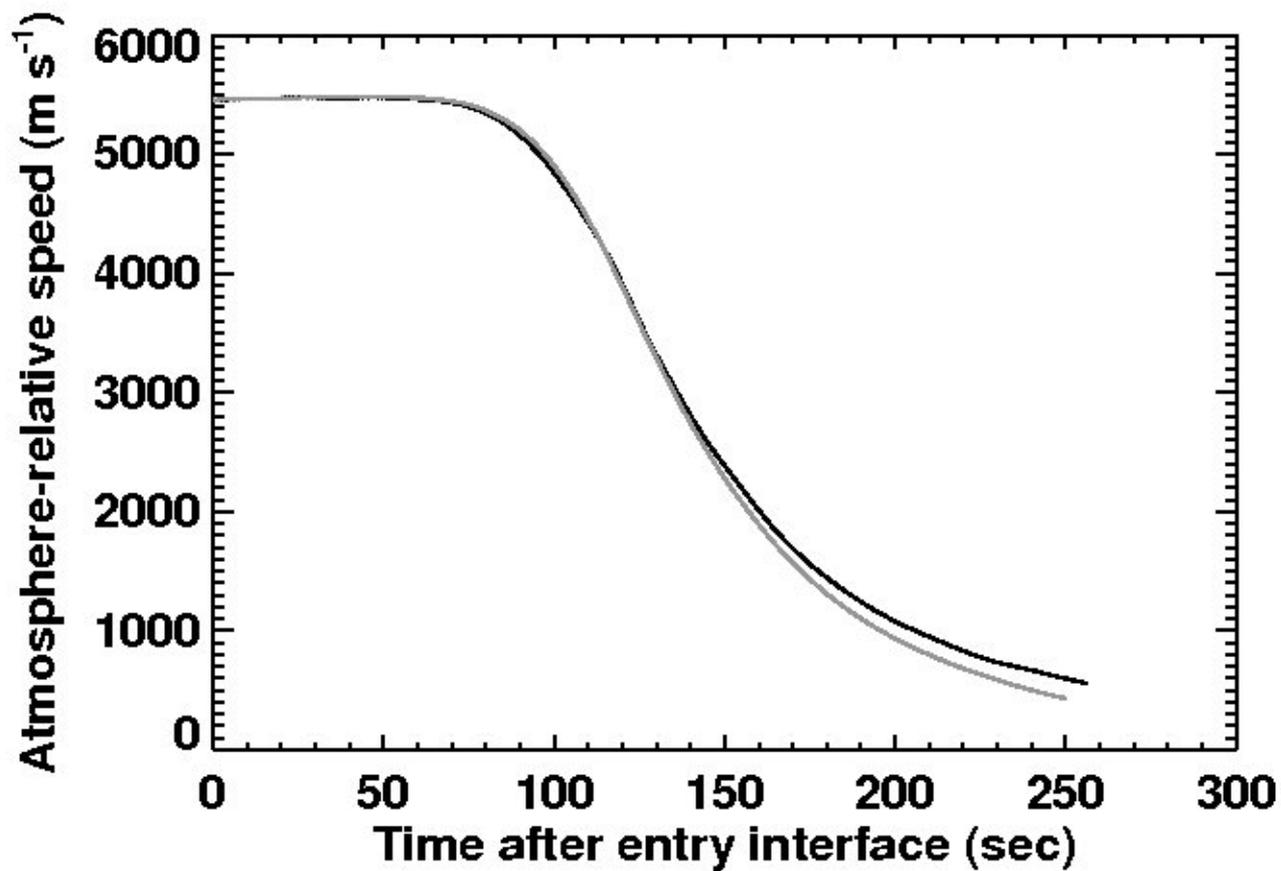


Modified from Figure 6 of Johnston et al. (2004)

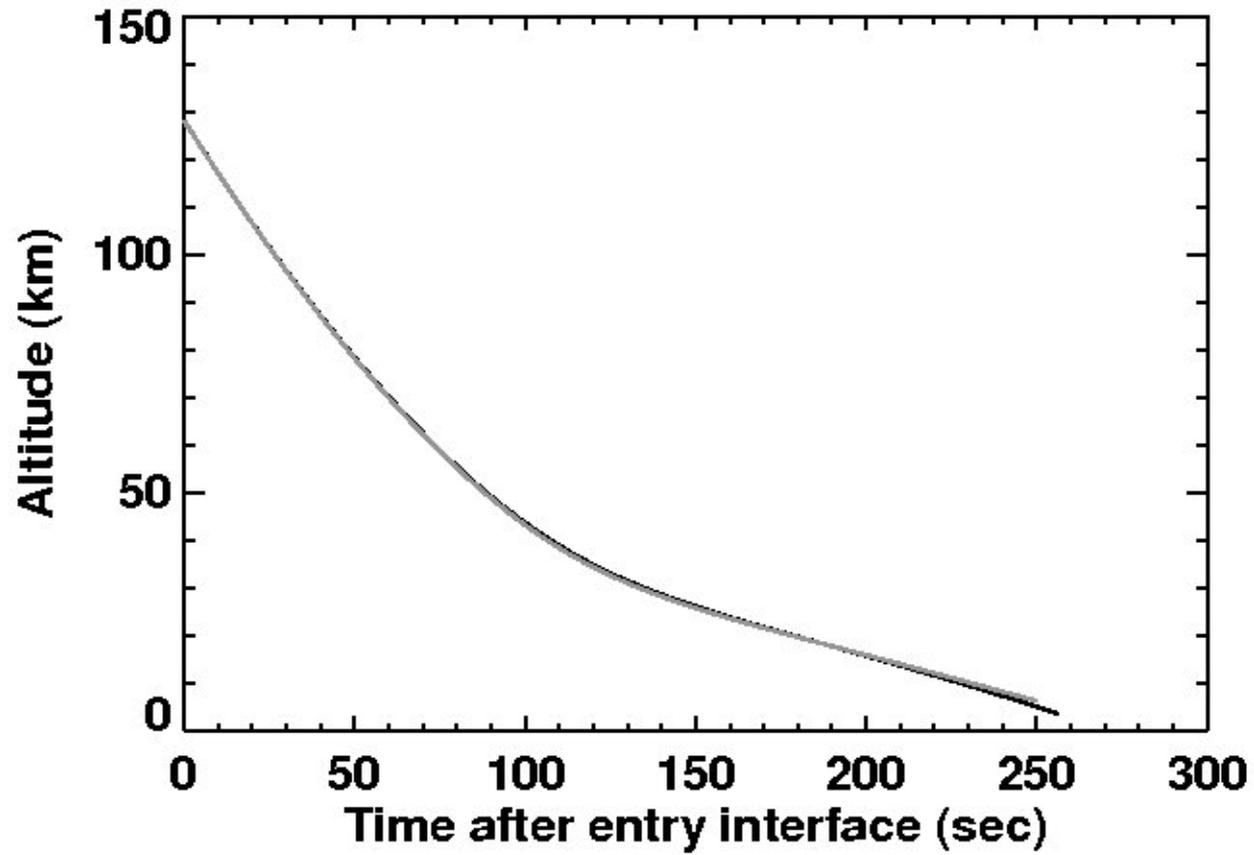
Aerodynamic acceleration



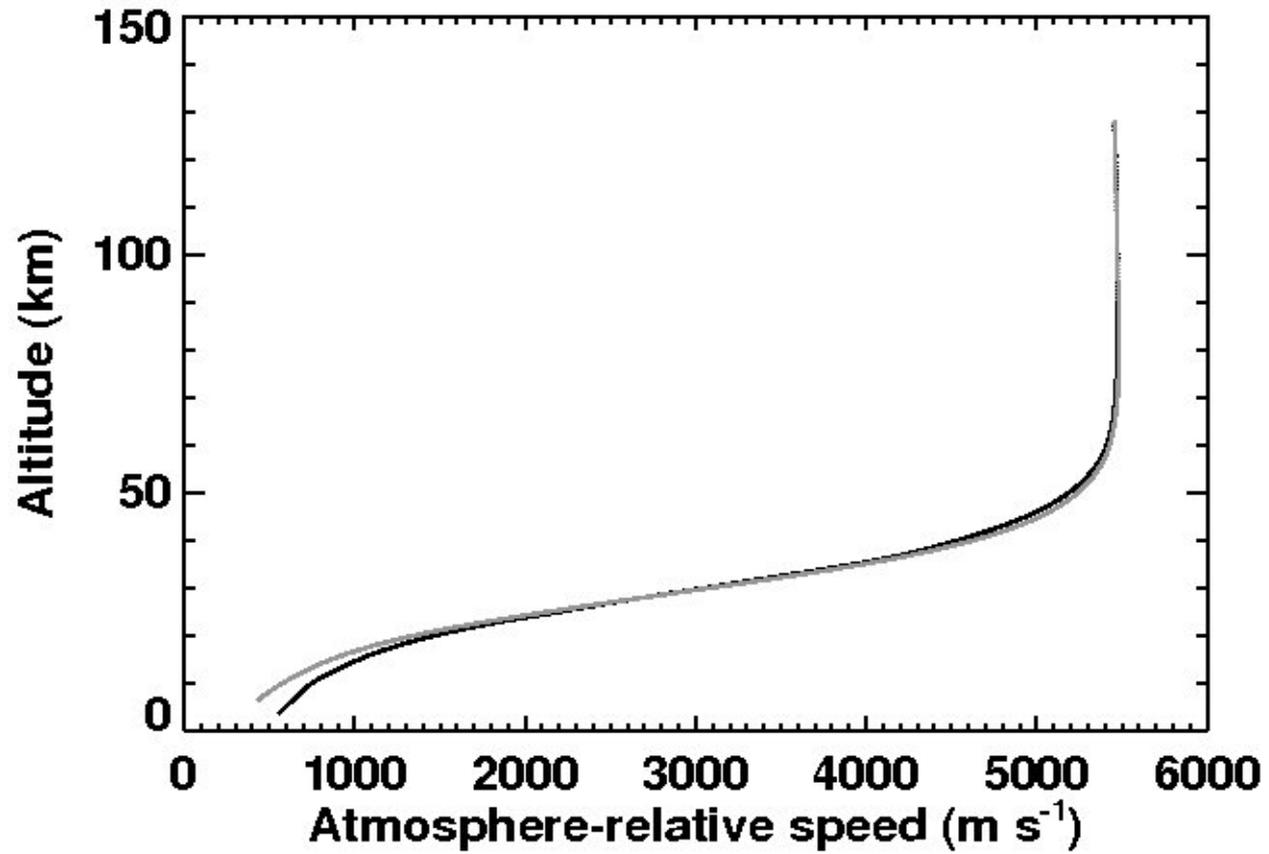
Reconstructed speed



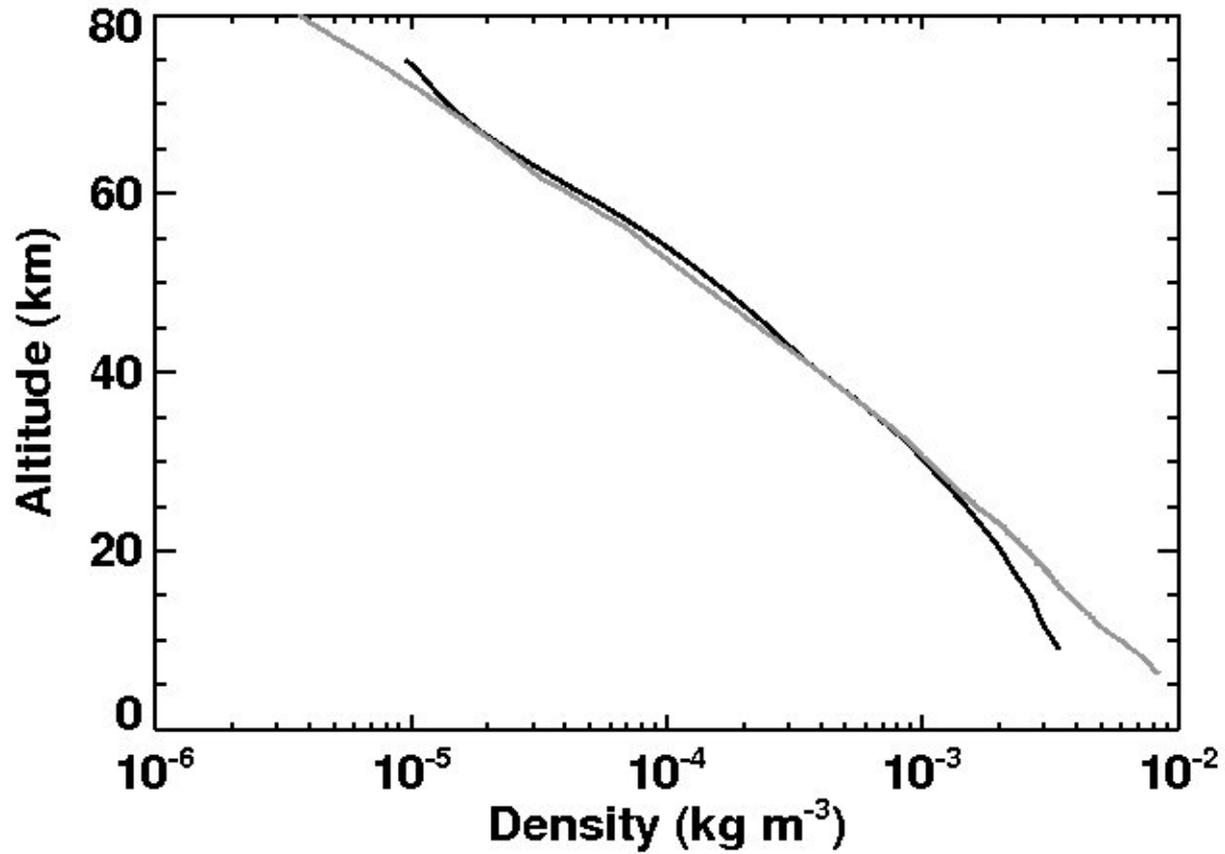
Reconstructed altitude



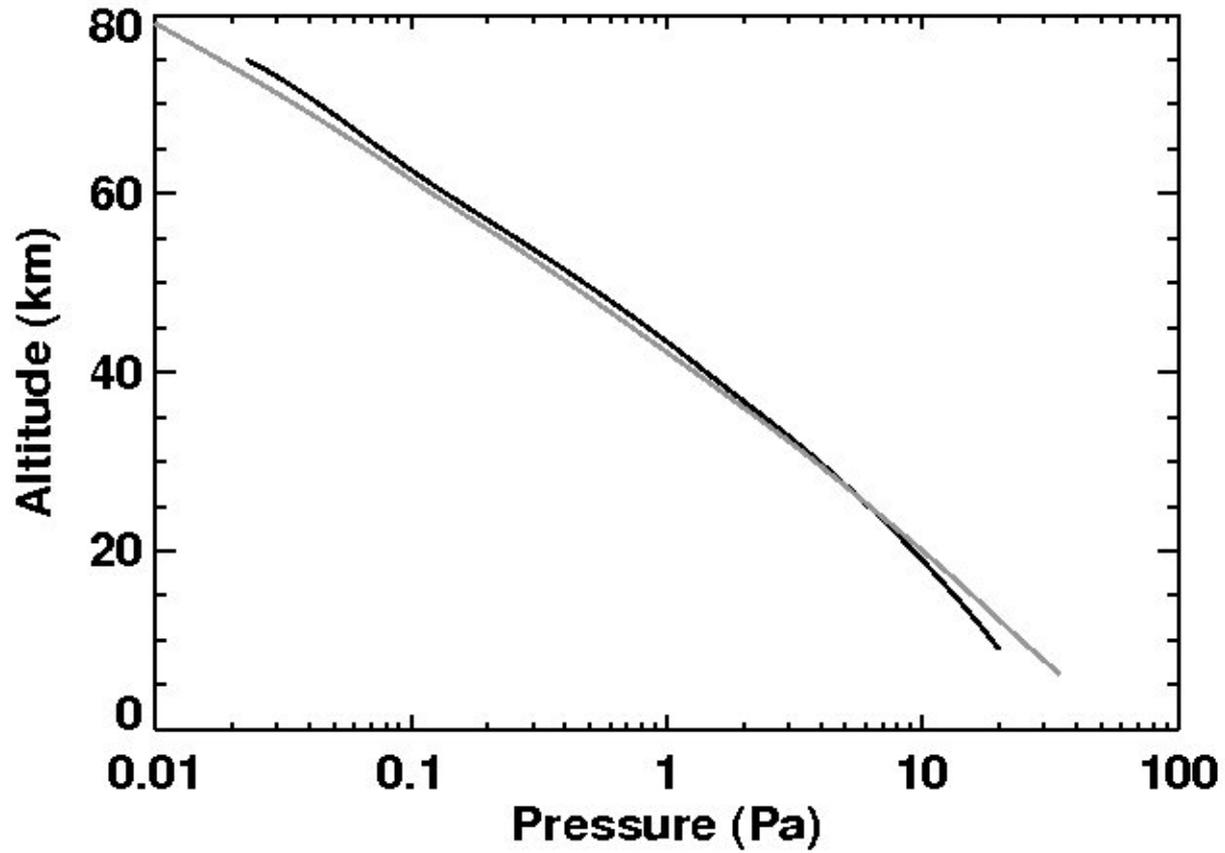
Reconstructed speed



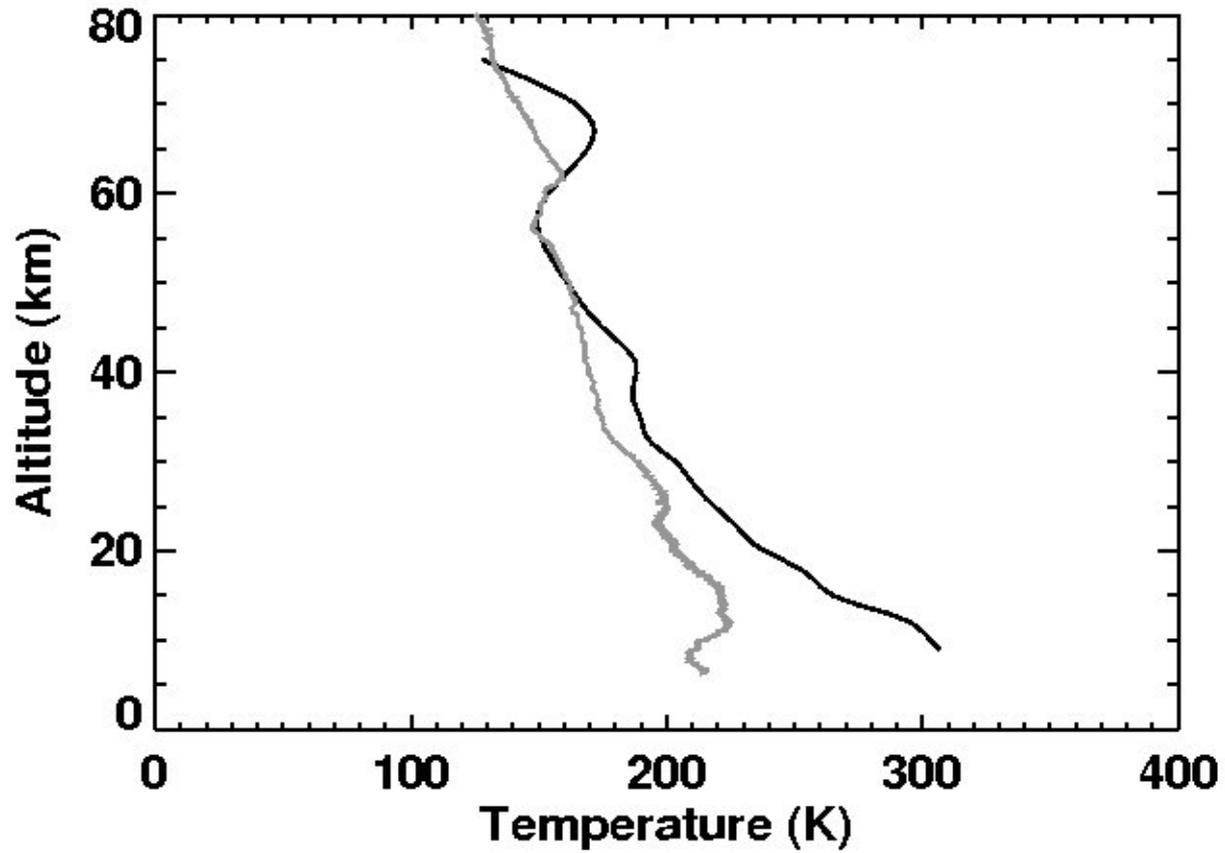
Reconstructed density



Reconstructed pressure



Reconstructed temperature



Discussion

- The technique works successfully
- Determination of its intrinsic accuracy requires a case study using actual data, not data extracted from a digitized figure
- Potential application to MSL, ESA's 2016 EDL demonstrator, other future missions