**Tropospheric Profiling**

Zenith observation at 14 channels to retrieve:
- Vertical profiles of:
  - Temperature
  - Humidity
  - Cloud water (approximation)

- 1 s time resolution, 0-10 km height
- Significantly enhanced performance with new instrument Generation 5 (G5)

**Boundary Layer Profiling**

Boundary layer temperature profile:
- 50 m vertical resolution, 0.25 K RMS
- 2 minutes time resolution
- Better than radio-sounding in lower 200 m

Retrieved from elevation scans:
- Limited range of high opacity channels
- 6 angles between 90° and 5°
- Multi-frequency retrieval
- Change in TB with elevation: 4 K maximum at 58 GHz

> Resolving BL-inversions

Based on technological advantage:
- Broad band-passes at saturated channels (> 56 GHz) to reduce noise
- Large optics for narrow beam

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**Atmospheric Attenuation**

Precise estimates of **Total Attenuation** by atmospheric molecules (H2O, O2, N2):
- Large spectral range: 1-100 GHz
- Real-time observations!
- Retrieved from direct multi-channel ANN (Artificial Neural Network) retrievals

**Integrated Water Vapor & Cloud Liquid**

Line-of-sight observations of integrated values:
- LWP, IWV, attenuation, and path delay at 1s resolution

**Thermodynamics**

Thermodynamic diagrams and stability indexes for Now-casting applications (severe weather etc.)

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**Full Sky Scanning**

- Observe homogeneous IWV/LWP fields
- Investigate advection, cloud fraction...
- Rapid full sky scanning:
  - 300 samples in less than 5 minutes (equals 10×10 degree resolution)
  - 0.4s integration time for 14 channels.
- Conical scans (constant elevation):
  - Hovmöller plots (azimuth vs time)

**Deployment Examples**

- Zugspitze, Germany, 2962 asl
- Lampedusa, Italy (hot, wet, salty)
- Bangalore, India
- RV Polarstern, Atlantic Ocean
- Atacama Desert, Chile, 5500m asl
- Dome C, Antarctica, -25 to -80°C