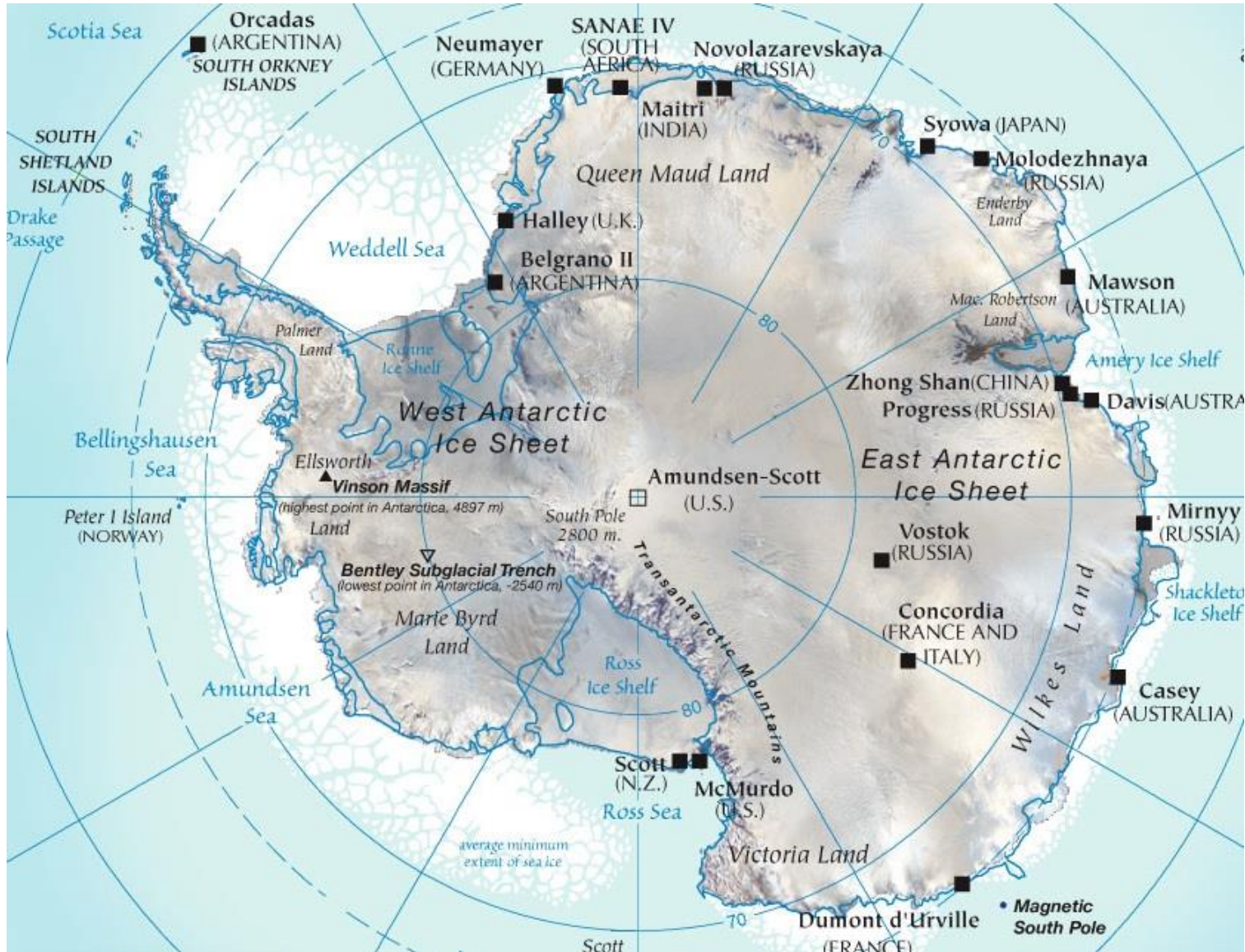


DOMECair Campaign in Antarctica January 2013

**N. Skou
DTU Space
Technical University of Denmark
ns@space.dtu.dk**

Antarctica



EMIRAD-2 Specifications

- **Fully polarimetric (i.e. 4 Stokes)**
- **$\Delta T = 0.1$ K for 1 sec. integration**
- **RFI flagging by kurtosis and polarimetry**
- **2 antennas - one nadir pointing, one pointing at 45° incidence**
- **Antennas are Potter horns (no sidelobes) with 38° and 31° HPBW**
- **Footprints around 500 m from 2000 ft flight altitude**

AWI Basler BT-67



Side Looking Horn



Radiometer System in Basler

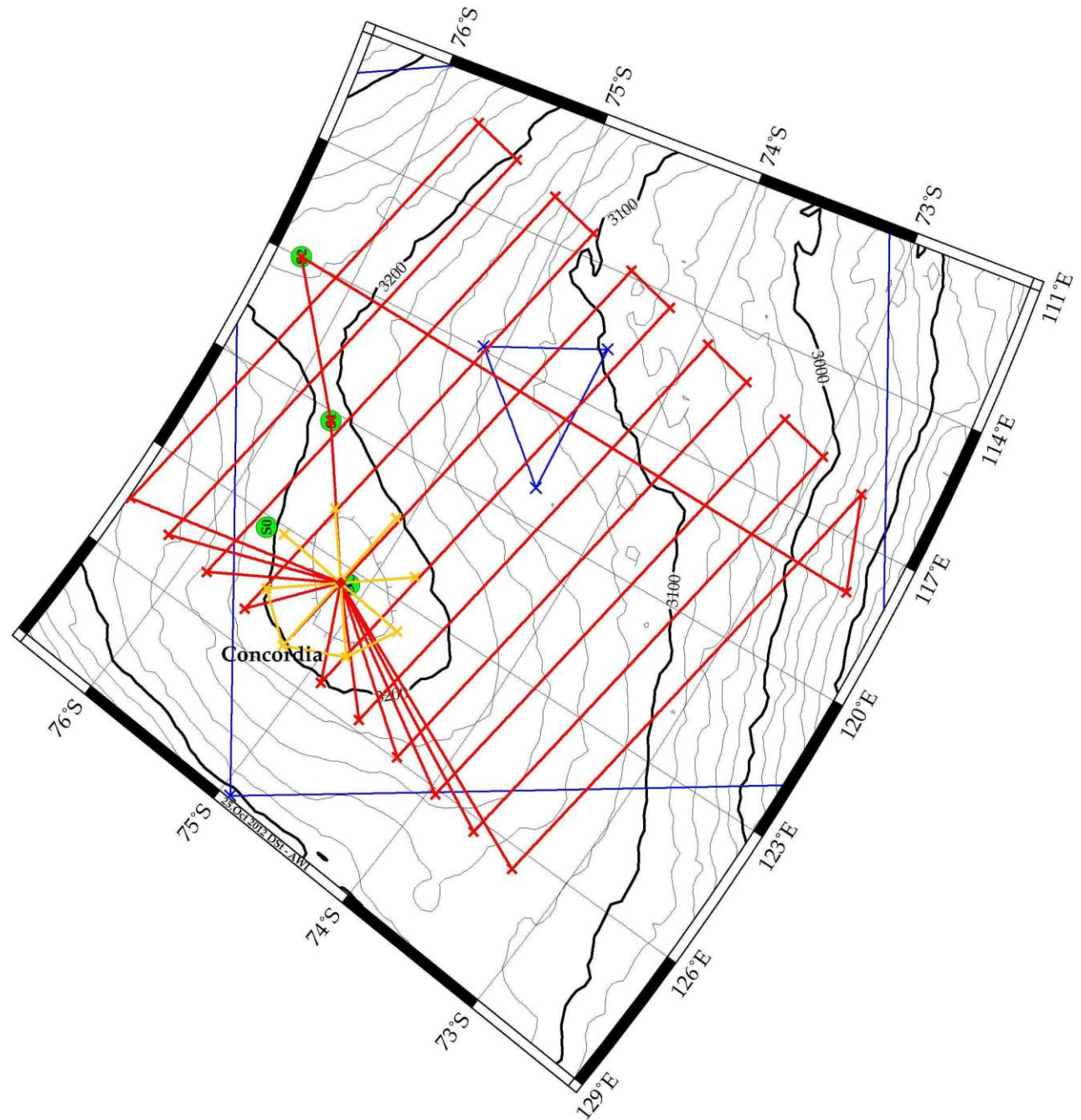


Raster + Star Pattern

- 350 x 350 km area covered
- 11 lines each 350 km
- separation 35 km
- 24 hours of flight
- Altitude ≈ 2000 ft above terrain, constant flight level

- Sun must be avoided: never $100^\circ \pm 45^\circ$ compared to track
- No flight 7:20 to 13:20 (raster pattern)

- More intense coverage near Concordia: star pattern
- Also used for azimuth analysis



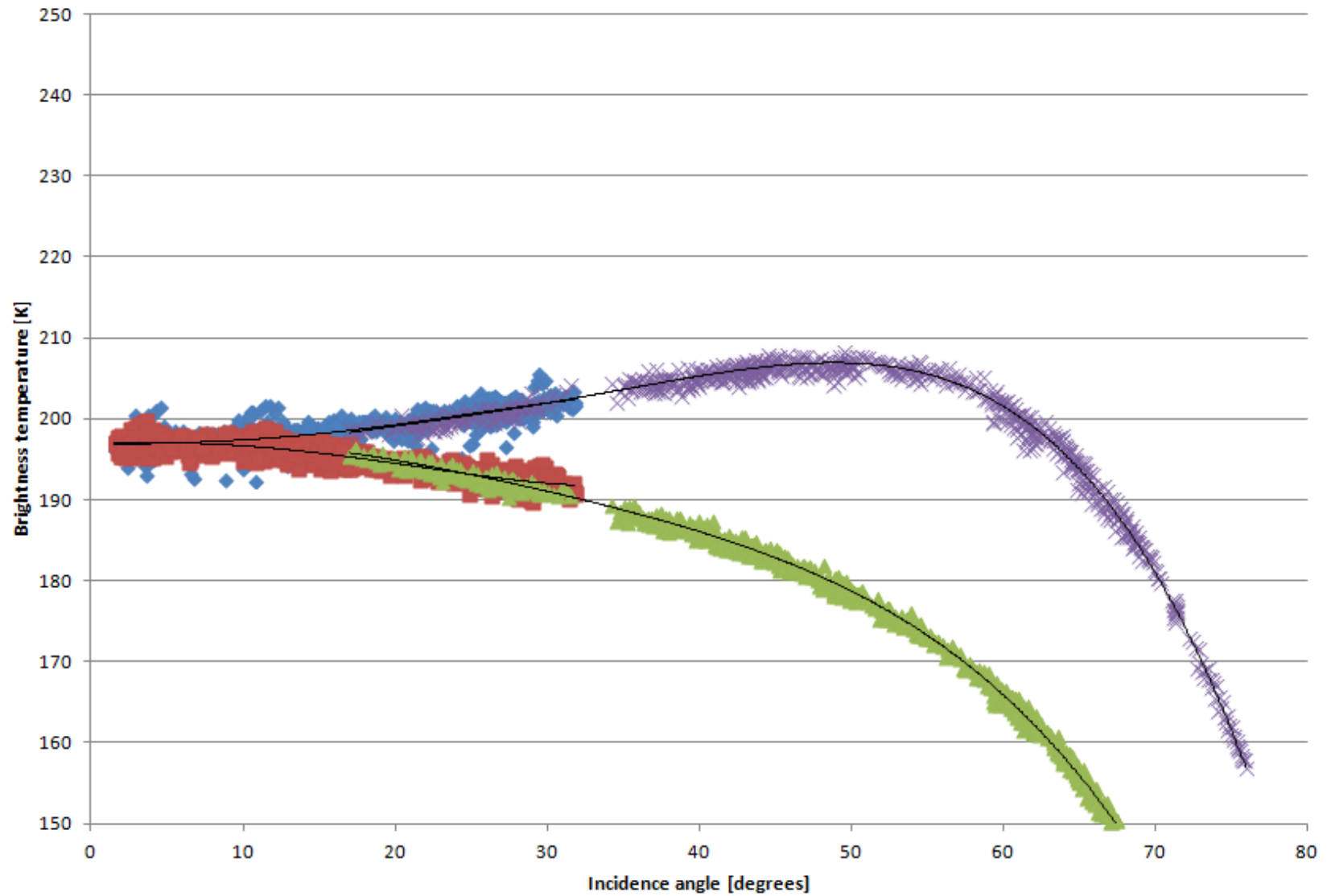
RFI Statistics

- **Method: > 320 K / Kurtosis / Polarimetry**
- **Global statistics:**
 - Nadir horn: ≈ 3 % flagged
 - Side looking horn: ≈ 1.5 % flagged
- **Track example:**
 - ≈ 3.8 % flagged

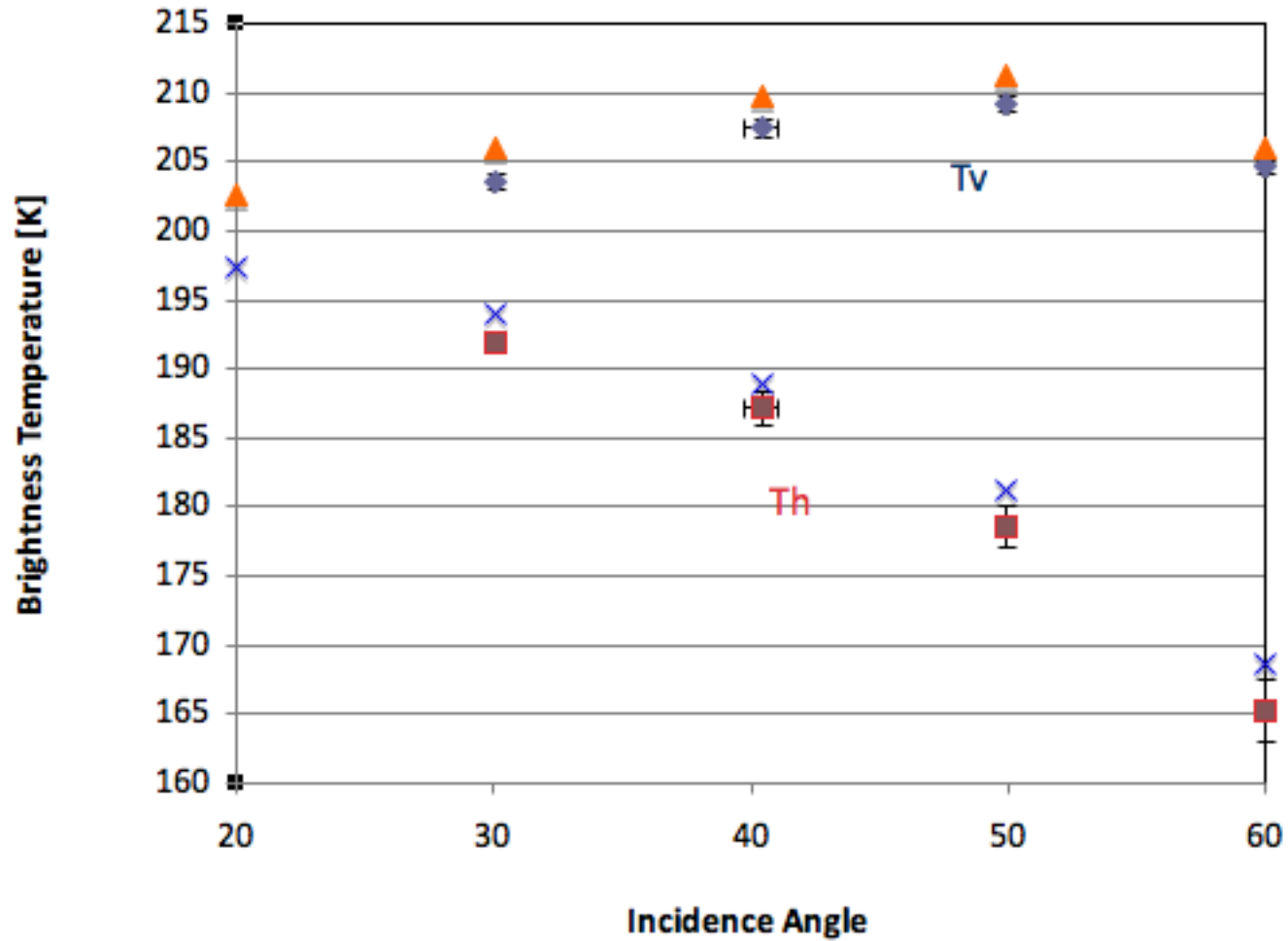
	All	Clean
Mean	207.4 K	204.9 K
StD	18.6	3.2

- **There is RFI in Antarctica!!**

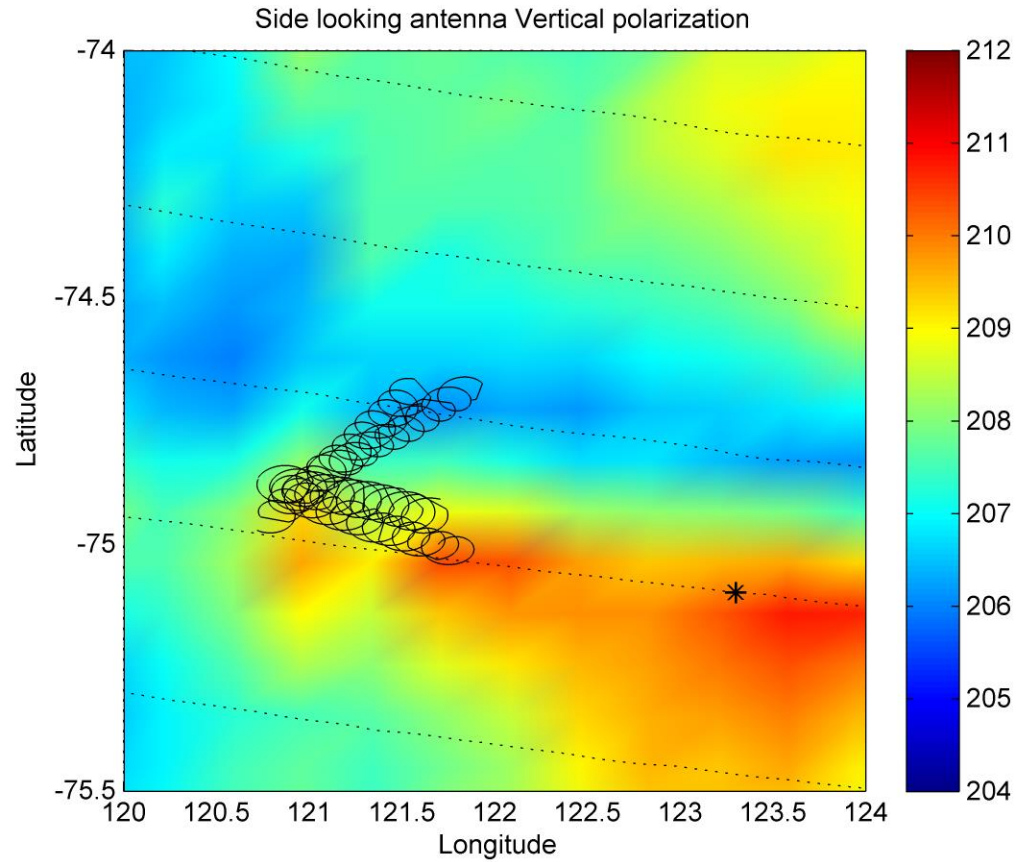
Wing Wags Near Concordia



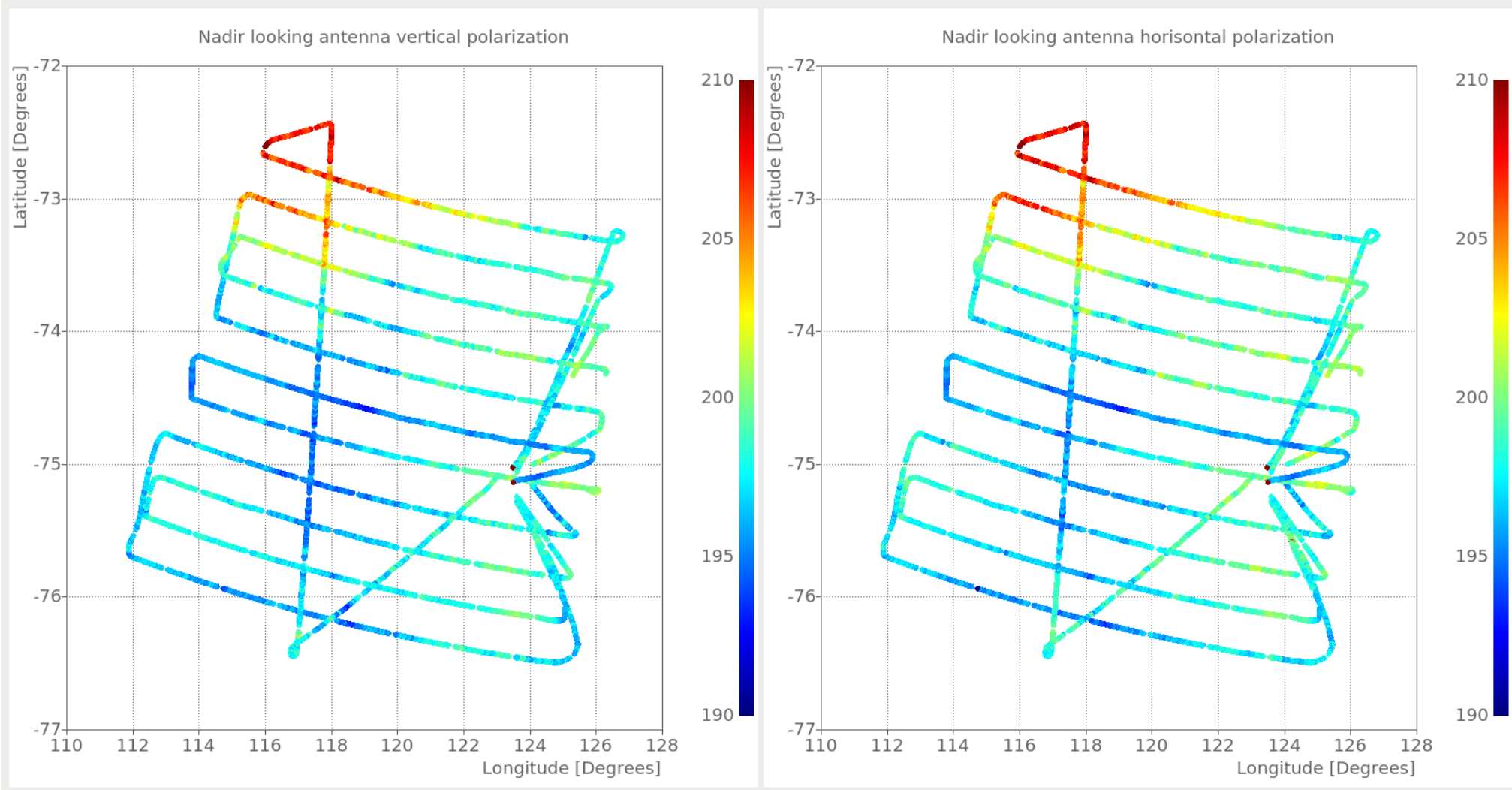
Wag Data on Giovanni



Circle Flights

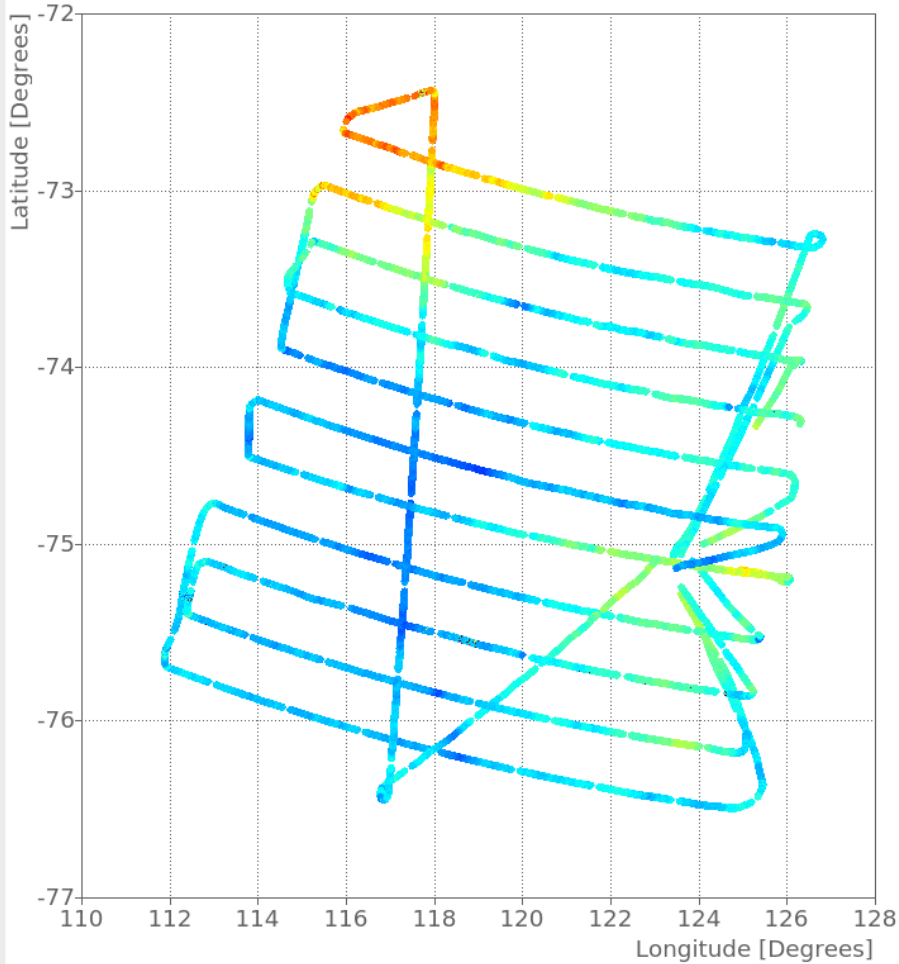


Nadir TB Plotted on Flight Tracks

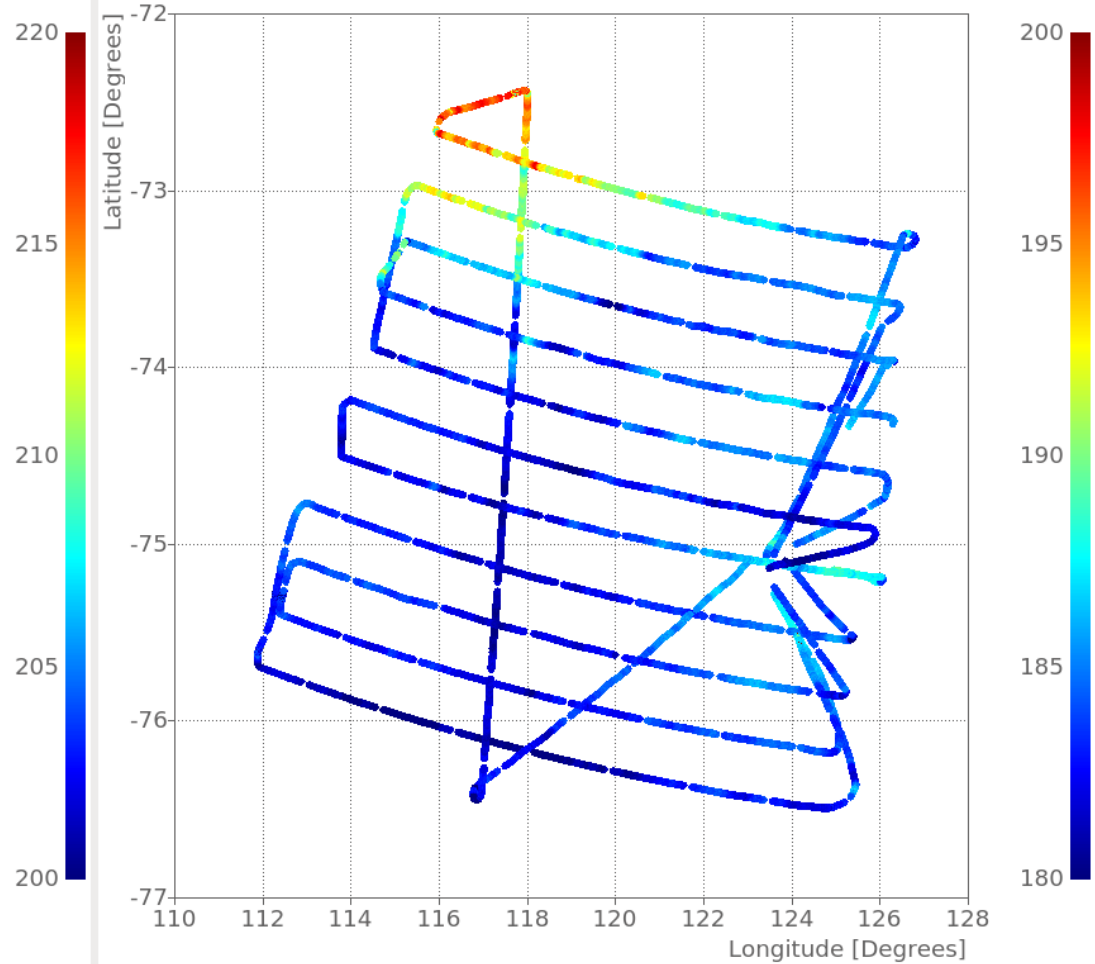


Side Looking TB Plotted on Flight Tracks

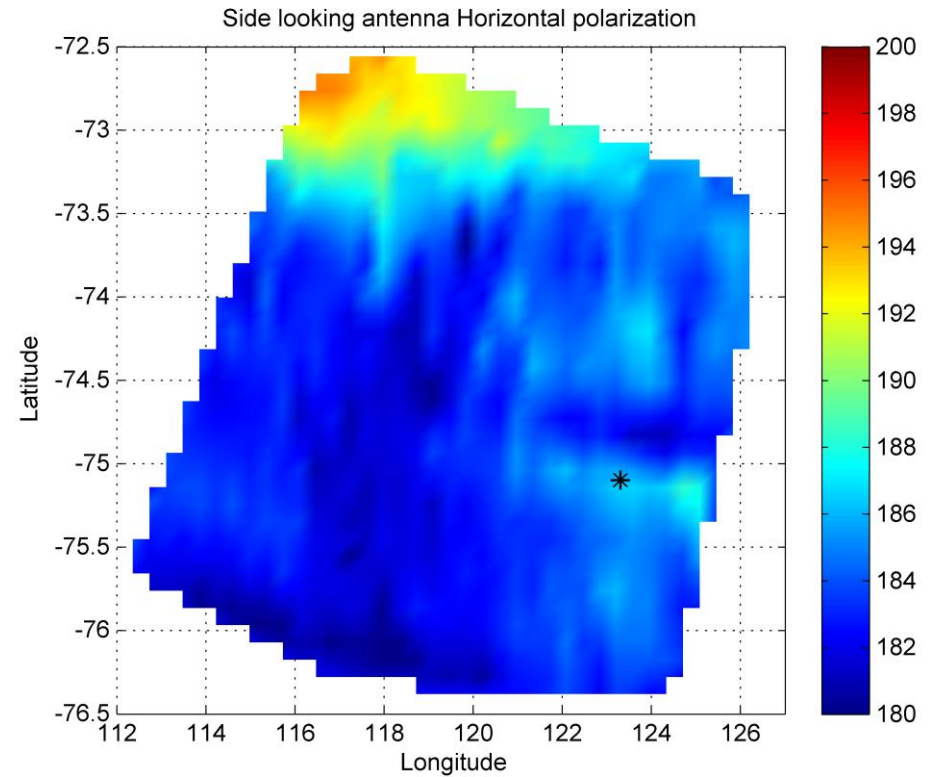
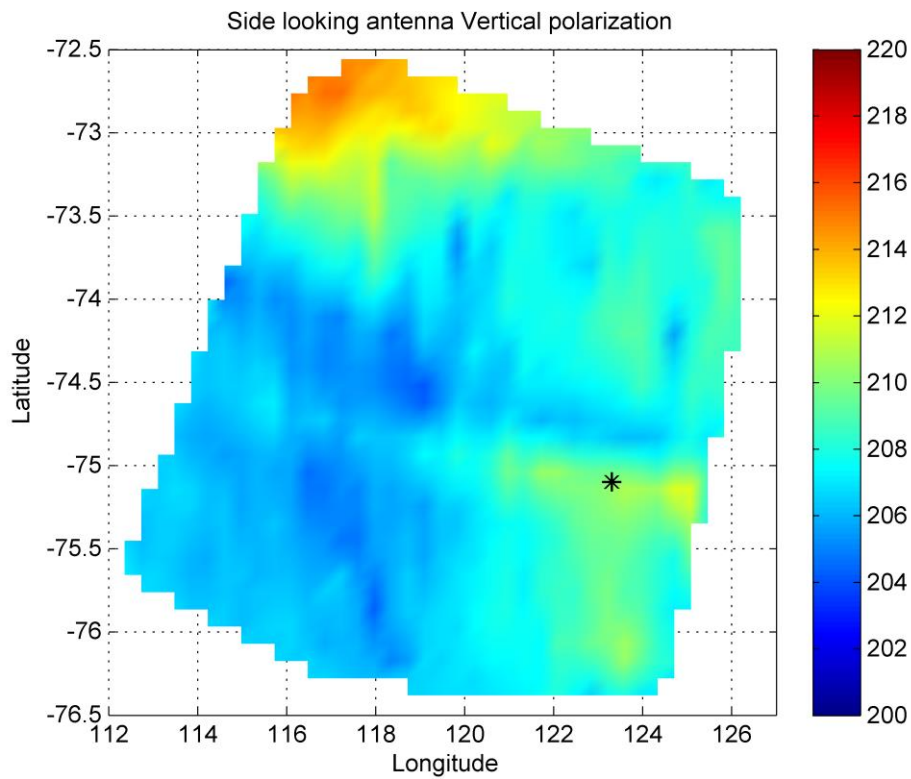
Side looking antenna vertical polarization



Side looking antenna horizontal polarization

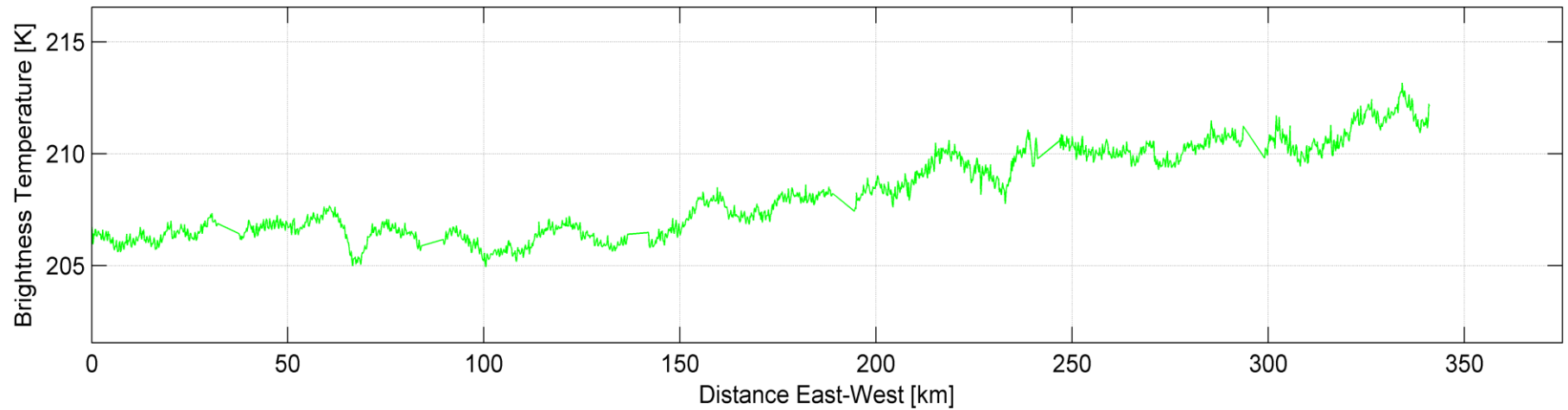


2-D Image. SL Data

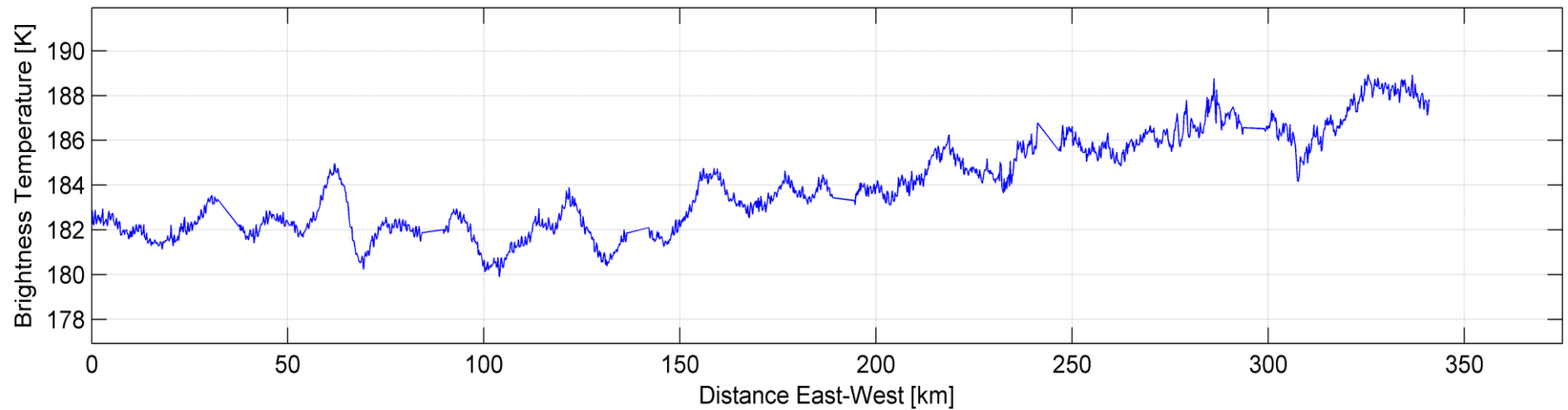


Line 5 SL TBV & TBH. Concordia Near x = 290

Survey line 5, Side looking antenna, Vertical polarization

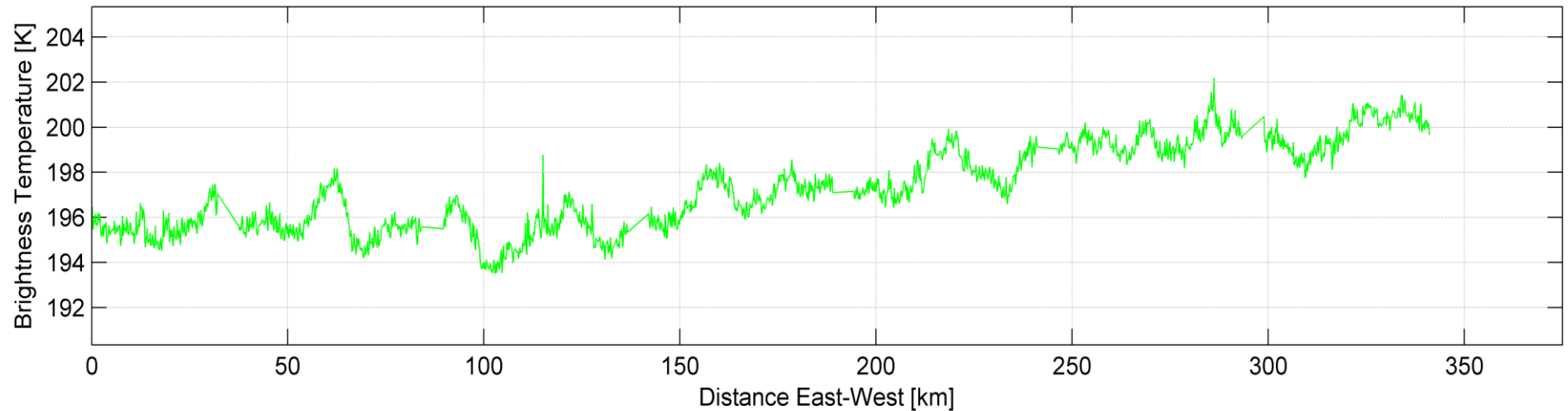


Survey line 5, Side looking antenna, Horizontal polarization

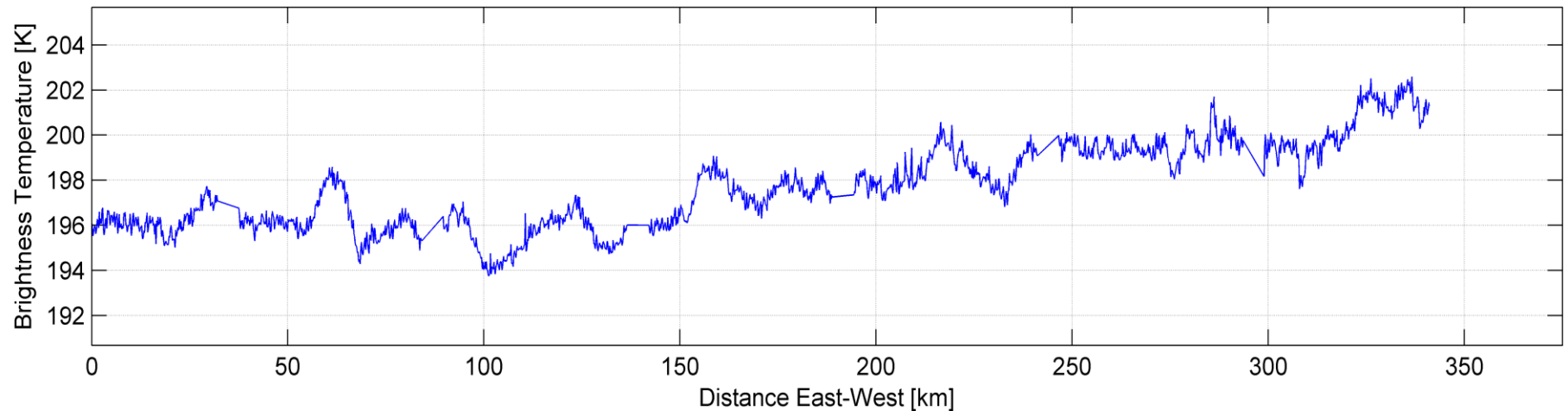


Line 5 Nadir TBV & TBH. Concordia Near x = 290

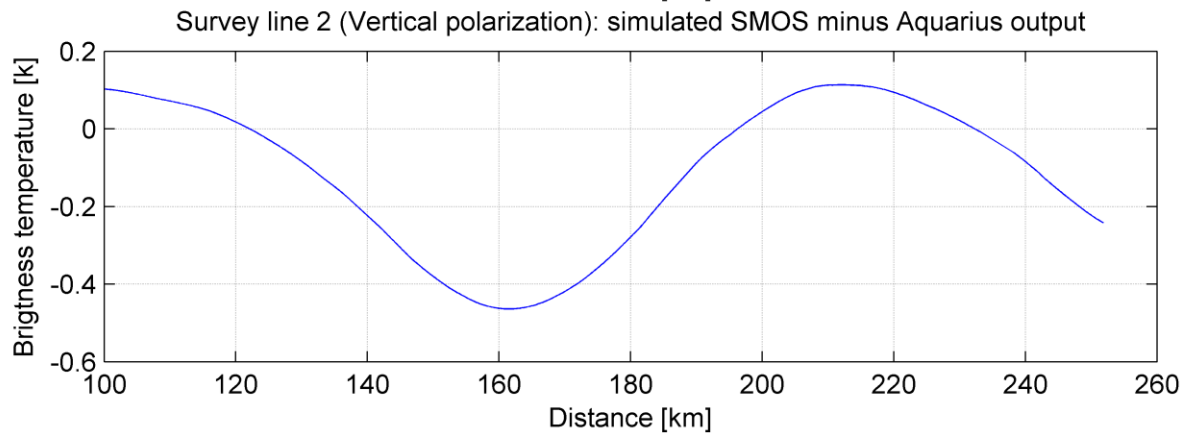
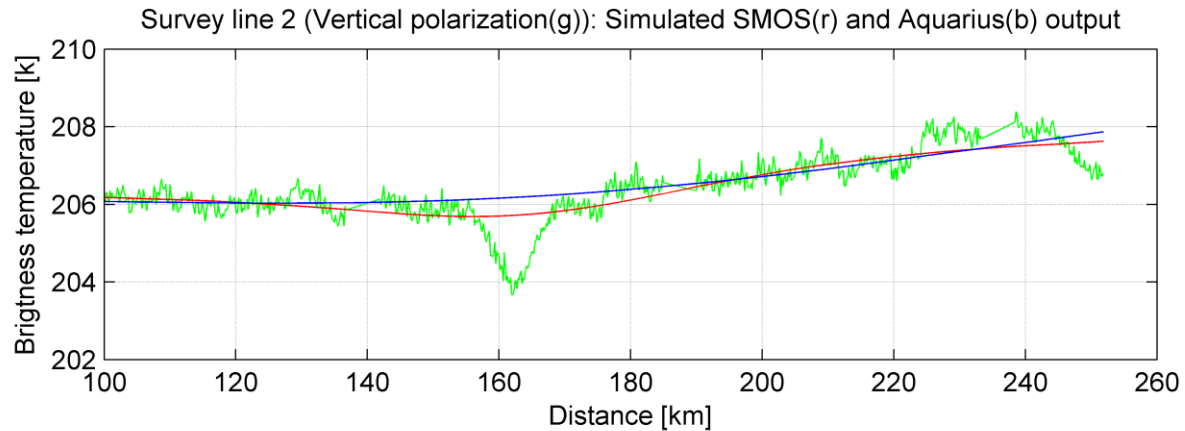
Survey line 5, Nadir looking antenna, Vertical polarization



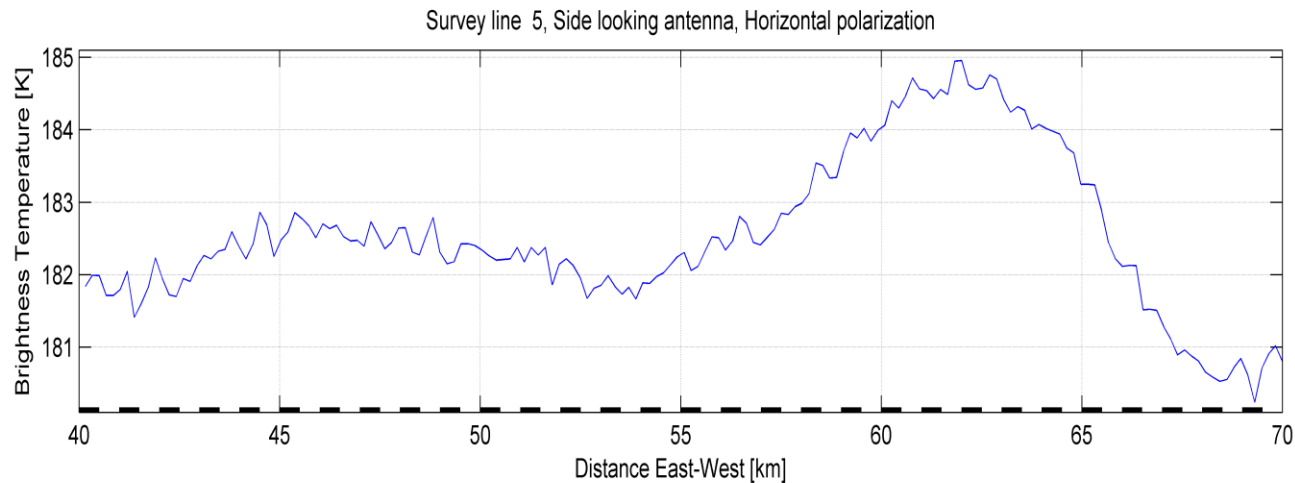
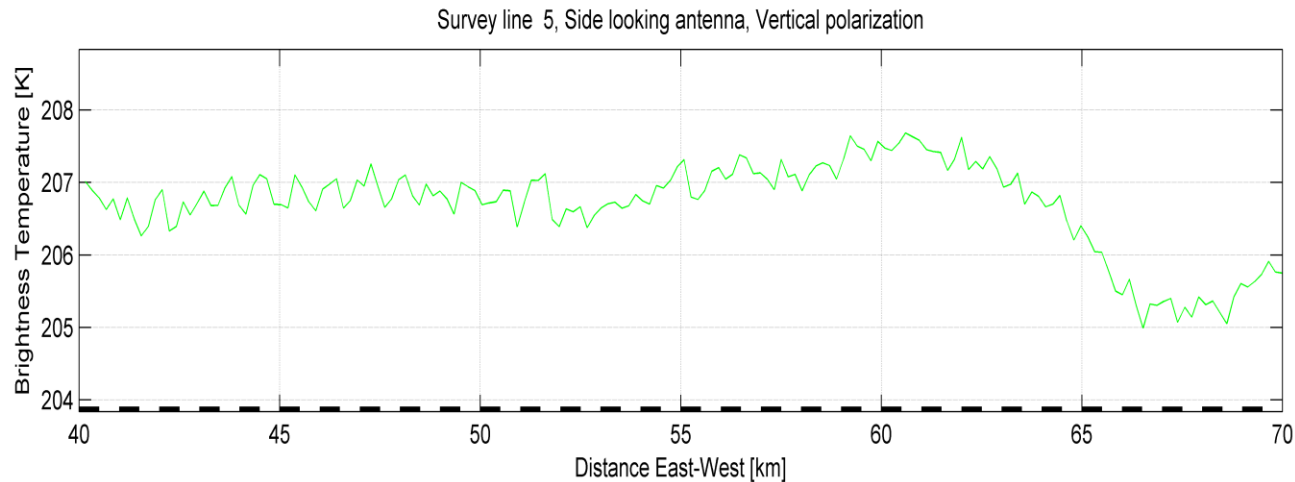
Survey line 5, Nadir looking antenna, Horizontal polarization



Line 5 SL Integrated to SMOS and Aquarius FP



Line 5 Segment, Full Resolution



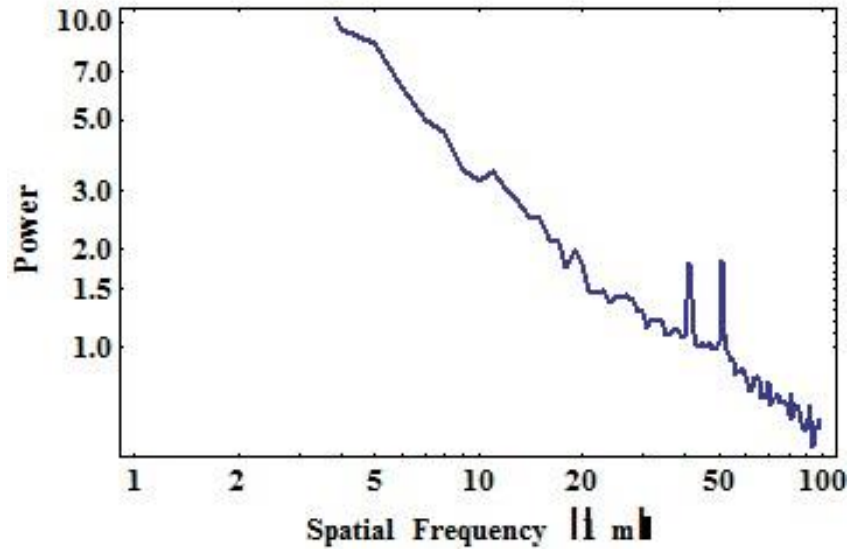
FP is indicated — —

ΔT is 0.1 K

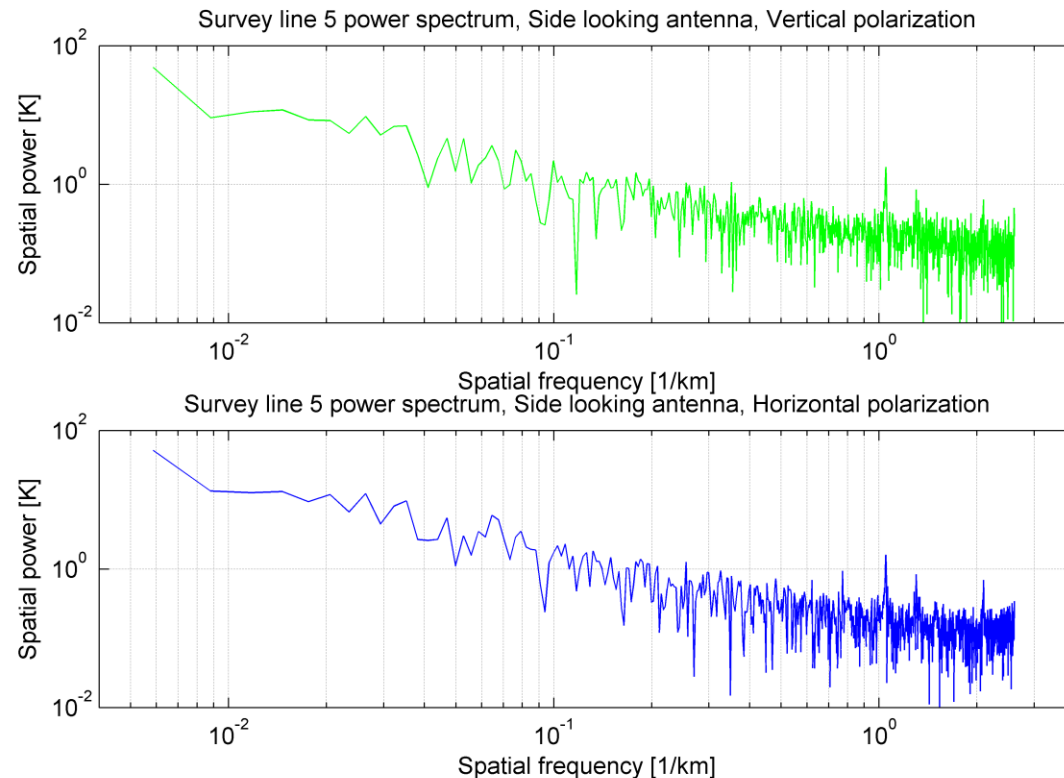
Roughly 0.3 K p-p

We see a mixture of ΔT and small, resolved wiggles

Power Spectrum



Power spectrum fits nicely $1/f$ shape. Indicates fractal or multi-scale process with no intrinsic horizontal correlation length



Discussion & Conclusions

- **350 x 350 km area around Dome-C mapped**
- **Significant TB variations: 10 - 15 K from side to side**
- **Examples of up to almost 1 K / km slope**
- **No specific scale: from few km up to 300 km**
- **SMOS and Aquarius will smooth variations**
- **Longer variations and tendencies result in up to 0.5 K difference due to different spatial resolution**
- **No azimuth signature could be identified**
- **Wing wag signatures compare well with tower measurements**
- **RFI was experienced, but easily detected and mitigated**

- **Dome-C can be used for calibration reference and instrument comparison - but be careful!**

Big Surprise: TB Map and Bedmap - Explain Please!

Bedmap2 bed

