Ground-based observations of polar cap arcs using REGO and RISR-N

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2015 CEDAR workshop

Seattle, Washington, USA

June 21-25, 2015

Introduction:

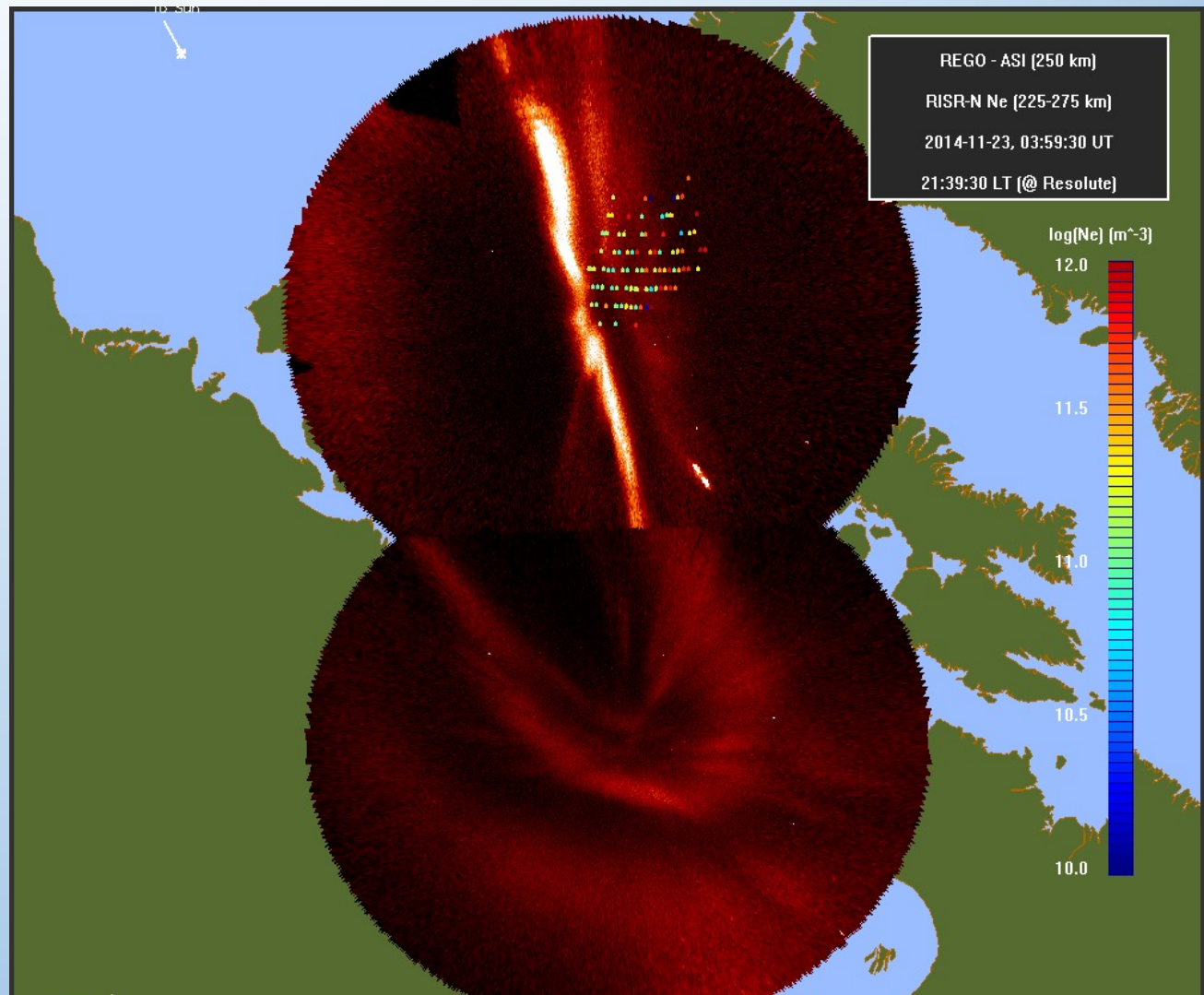
- Preliminary examination of Resolute Bay Incoherent Scatter Radar (RISR-N) and co-located Redline Emission Geospace Observatory (REGO) measurements in the presence of polar arcs was performed
- Signatures of arcs are apparent in both radar electron density measurements and optical redline intensities
- Radar measurements can be used to infer appropriate mapping altitude for redline emissions

Instruments:

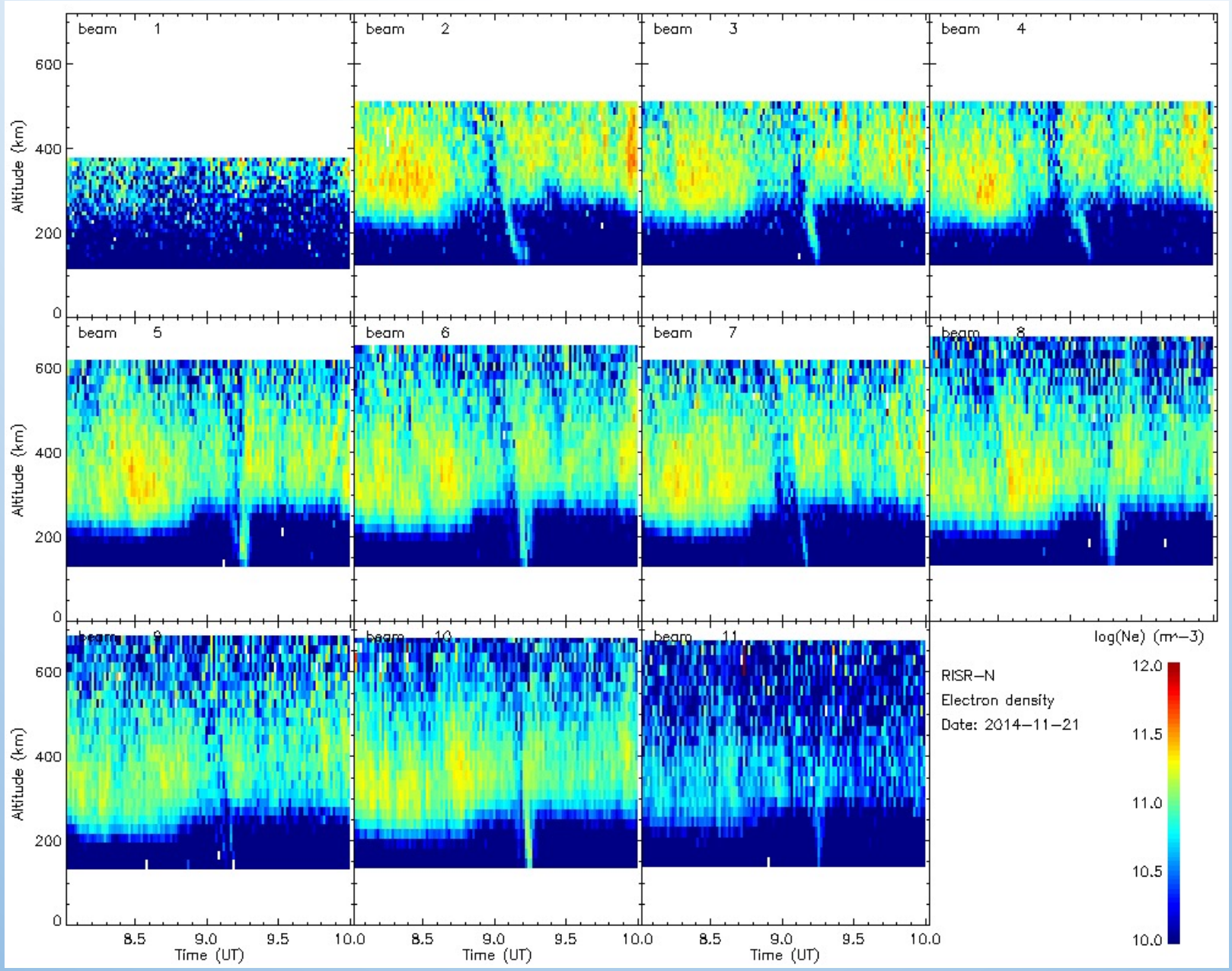
- REGO:
  - Measures redline (630.0 nm) intensity in 512x512 pixels at 3 s resolution
  - 7 cameras operated in northern Canada (Resolute Bay and Rankin Inlet used in this study) +2 more coming in future
- RISR-N:
  - Incoherent scatter radar that measures electron density, line-of-sight velocity, electron and ion temperatures, etc.
  - Phased array allows sampling of up to ~4000 beams effectively simultaneously (in practice, typically only a small fraction of these beams are used in a given experiment)

REGO (250 km) and RISR-N (225-275 km)

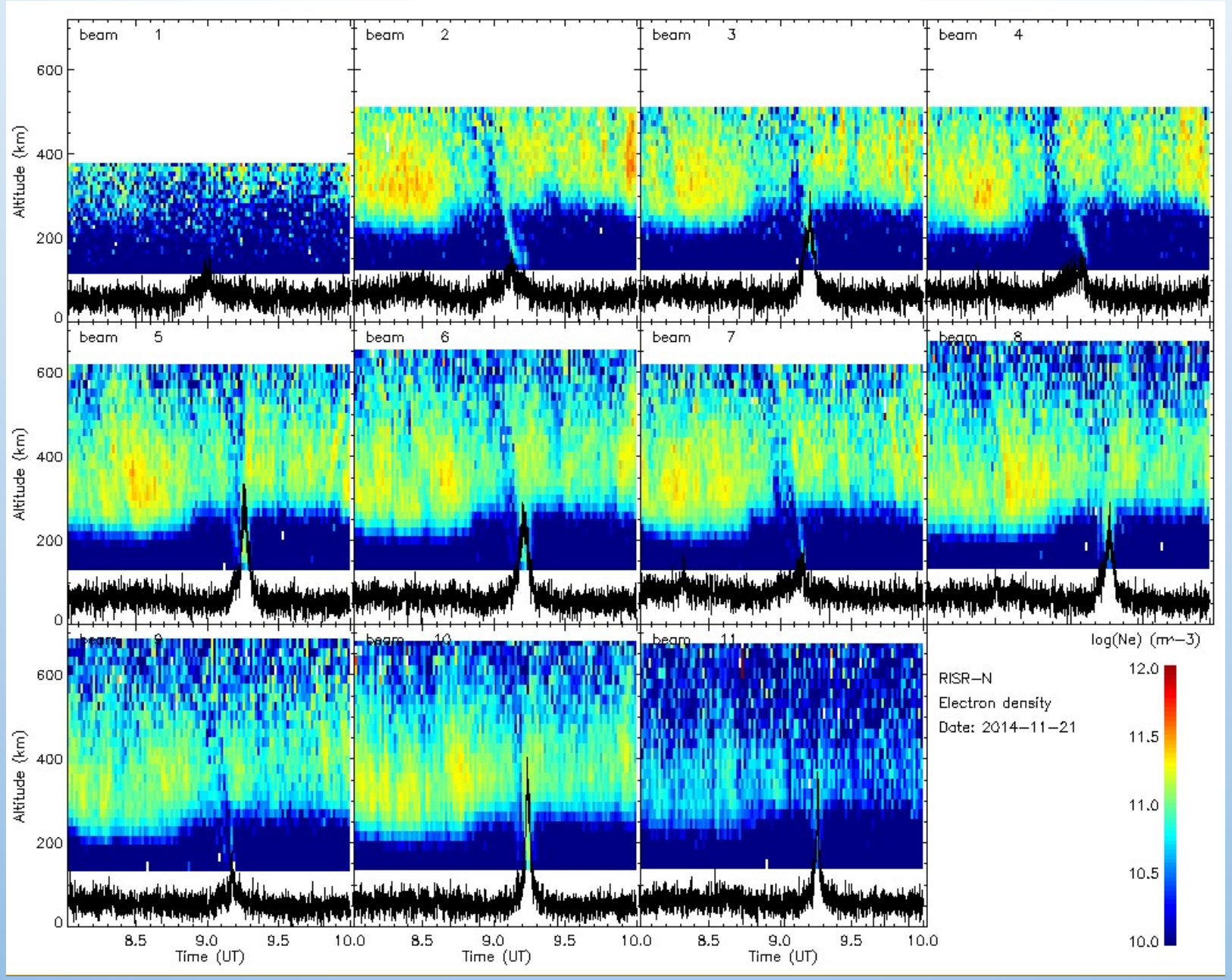
- Mapping REGO Resolute Bay and Rankin Inlet mosaics to 250 km reveals mismatch at edges of images
- Also, RISR-N Ne measurements from 225-275 km do not show polar arc signature



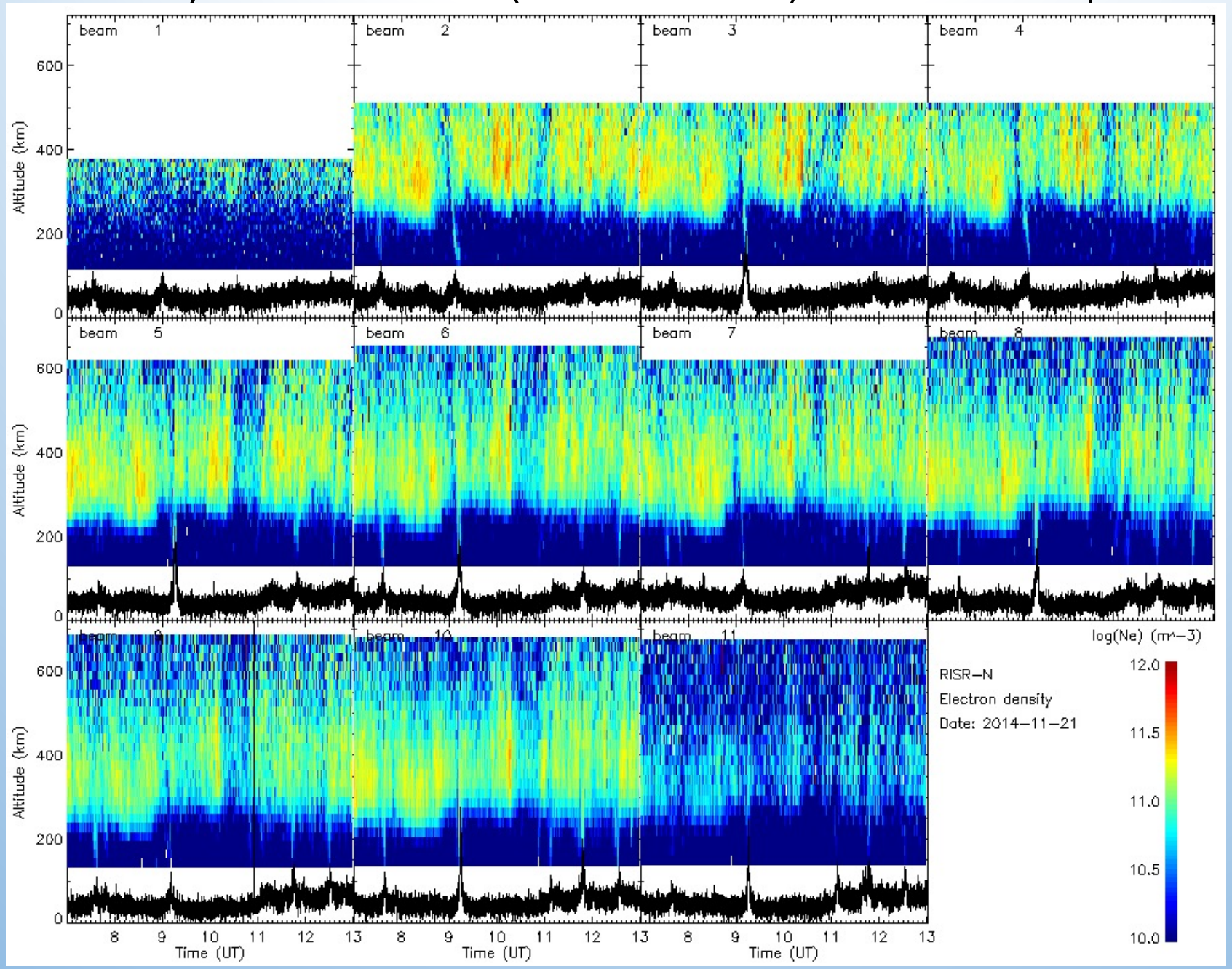
Electron density from RISR-N (2014-11-21)



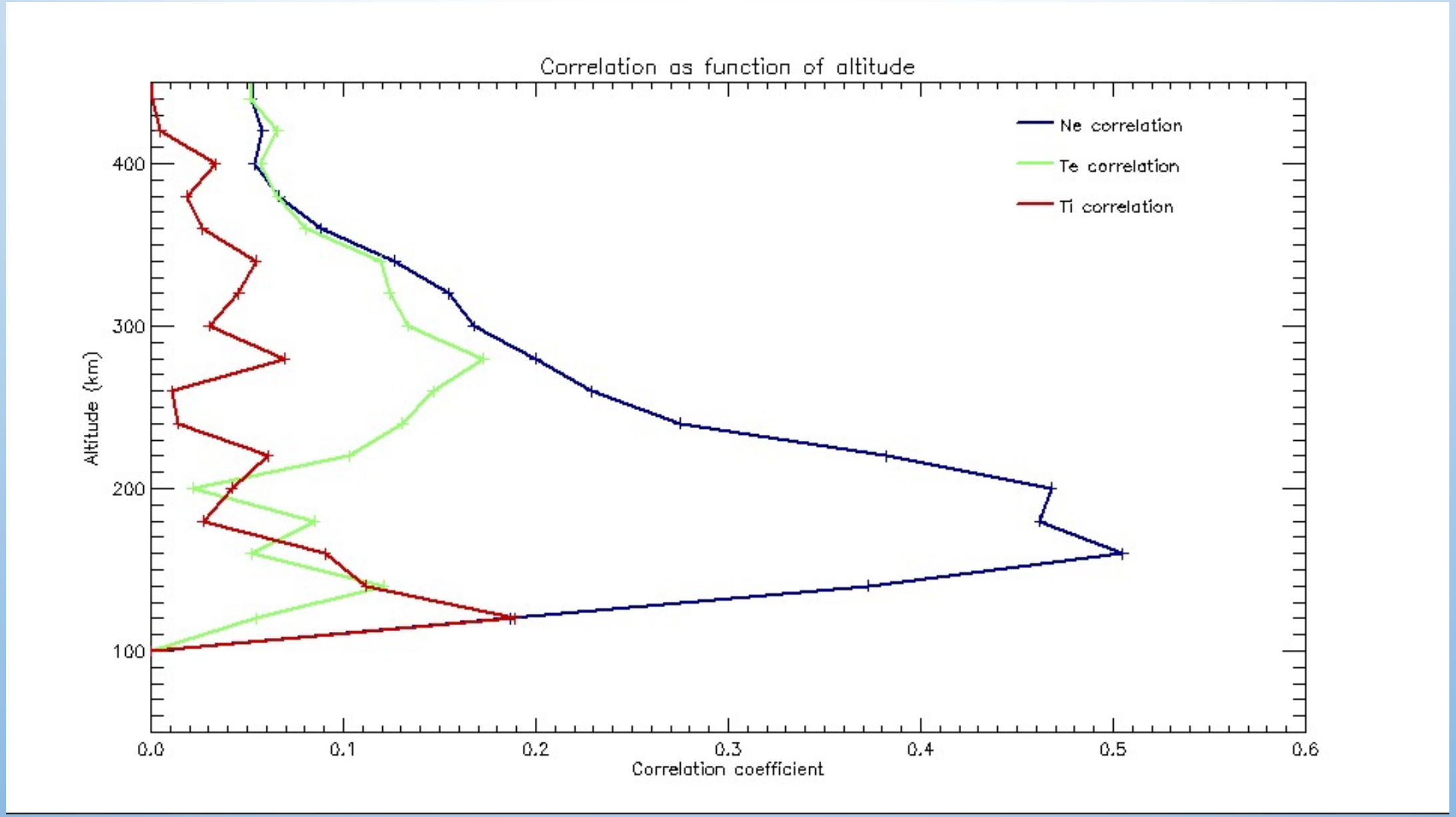
Electron density from RISR-N (2014-11-21) and REGO optical intensity



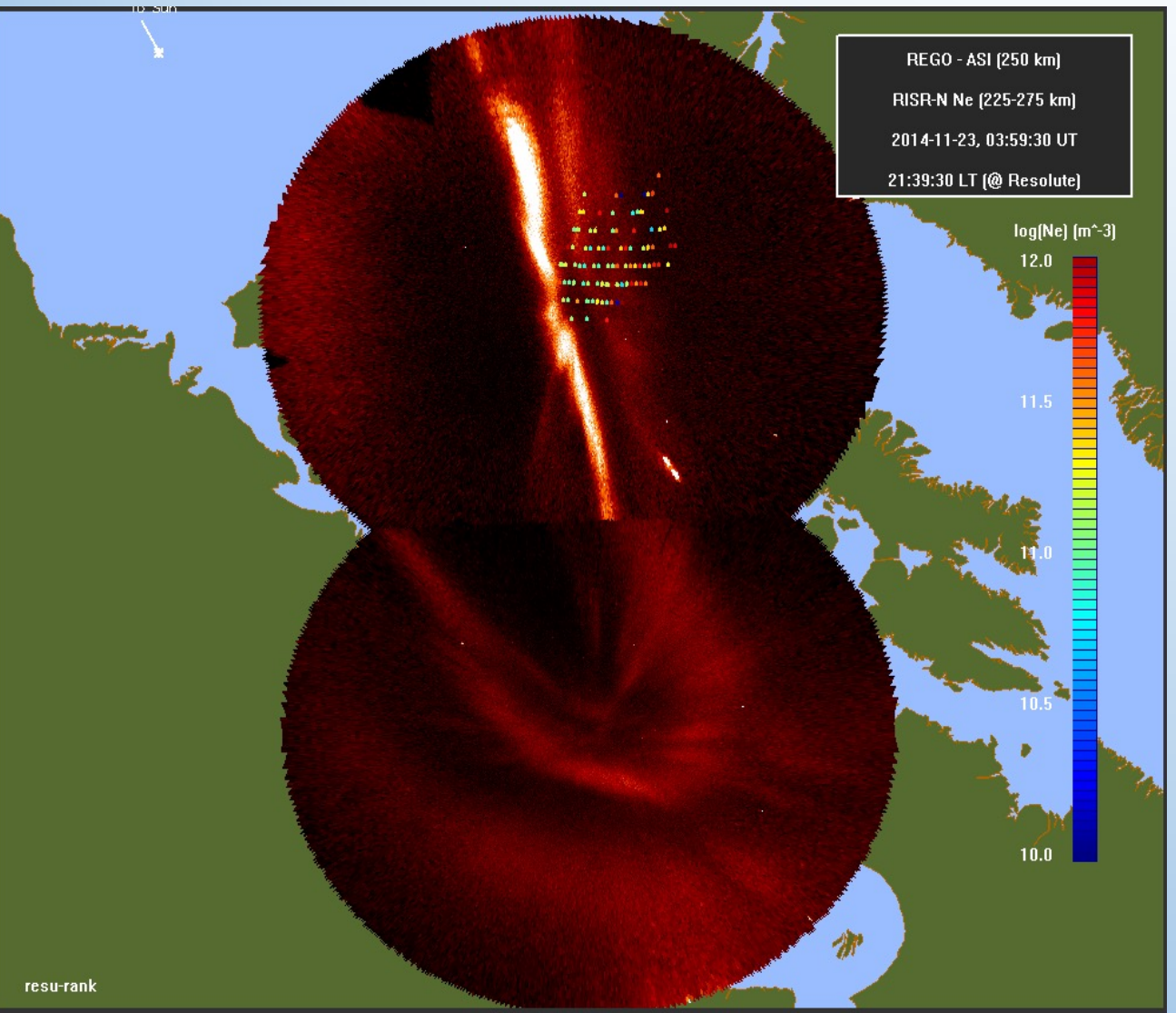
Electron density from RISR-N (2014-11-21) and REGO optical intensity



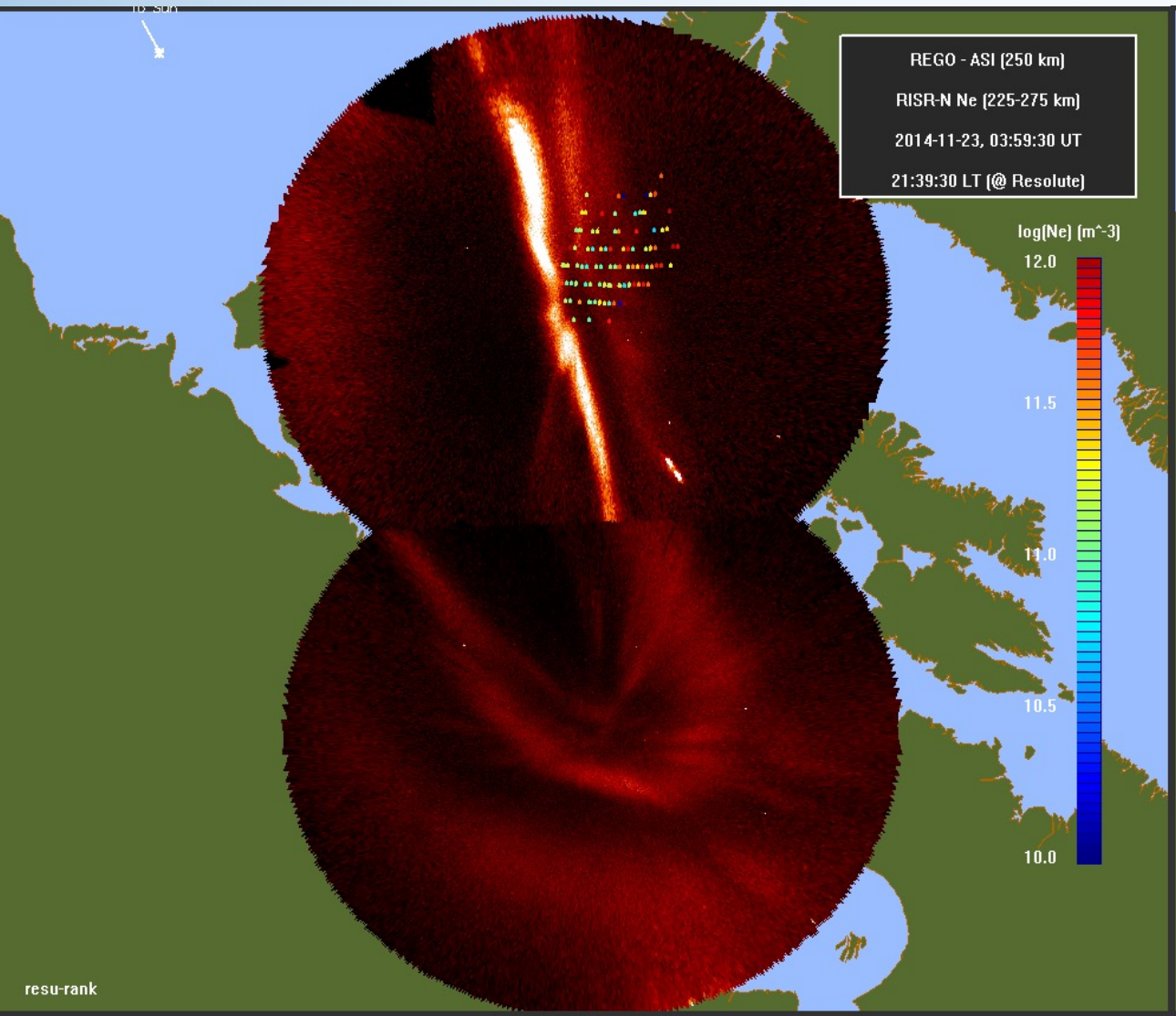
Correlation between optical intensity and ISR parameters at various altitudes



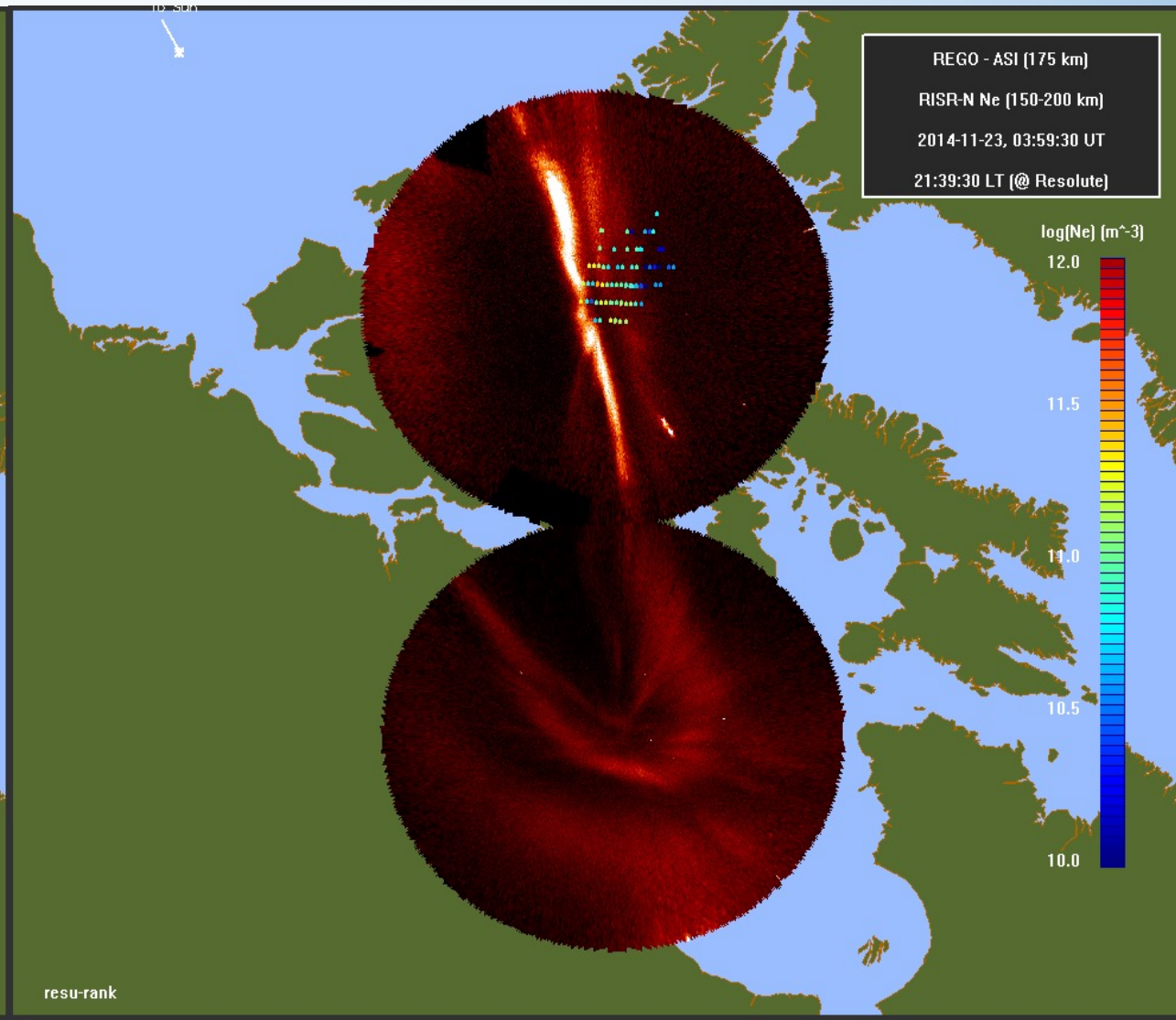
REGO (250 km) and RISR-N (225-275 km)

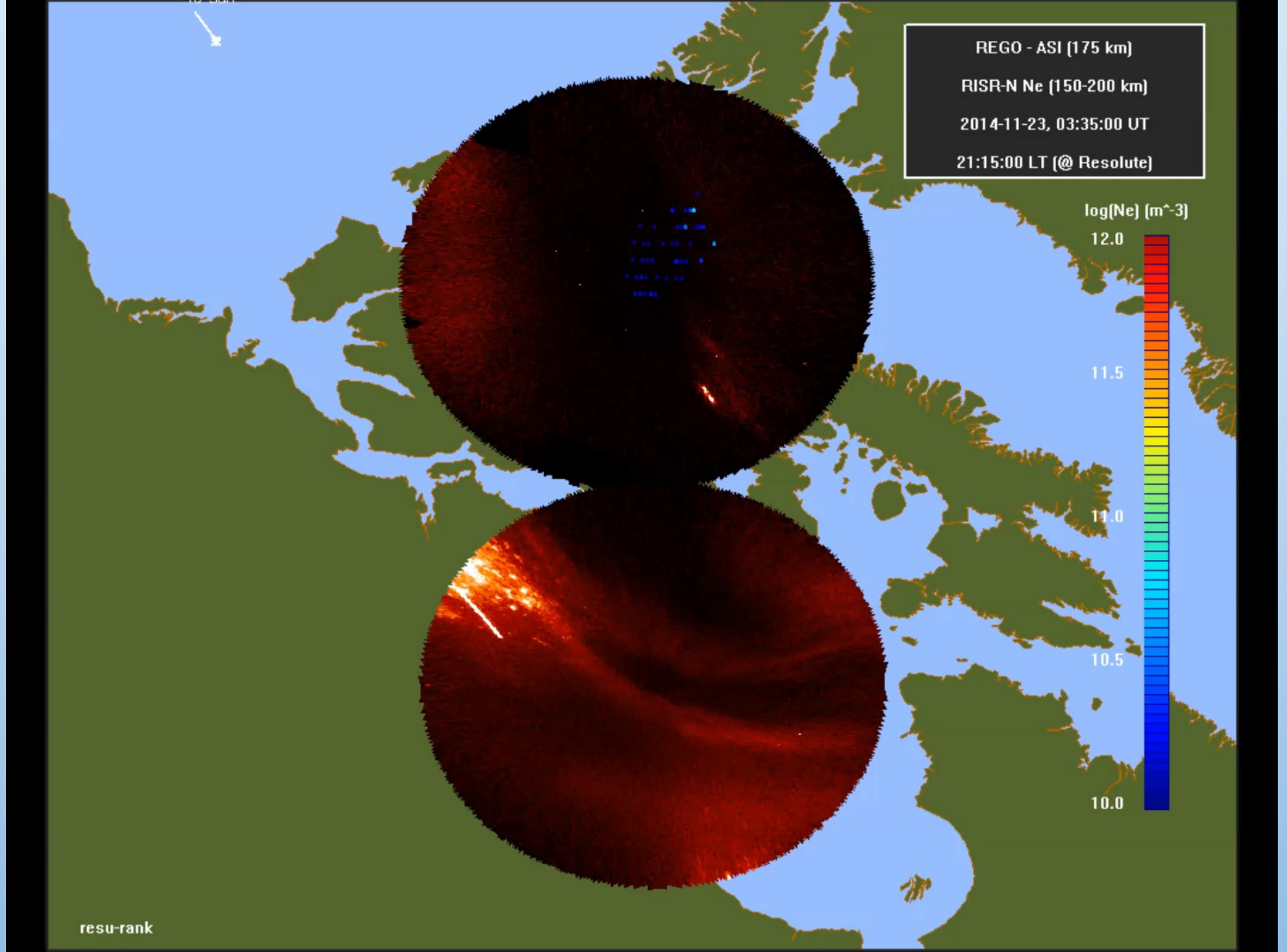


REGO (250 km) and RISR-N (225-275 km)



REGO (175 km) and RISR-N (150-200 km)




REGO - ASI (175 km)
RISR-N Ne (150-200 km)
2014-11-23, 03:35:00 UT
21:15:00 LT (@ Resolute)
log(Ne) (m^-3)
12.0
11.5
11.0
10.5
10.0
resu-rank