

# Statistical comparison of particle precipitation fluxes and the D-region electron density profiles

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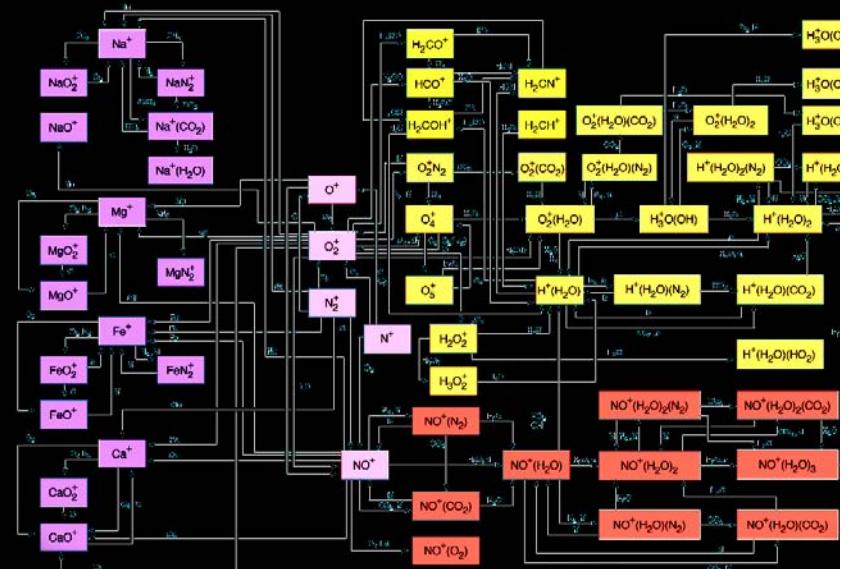
# Sodankylä Ion Chemistry model (SIC)

## Detailed 1-D time dependend chemistry

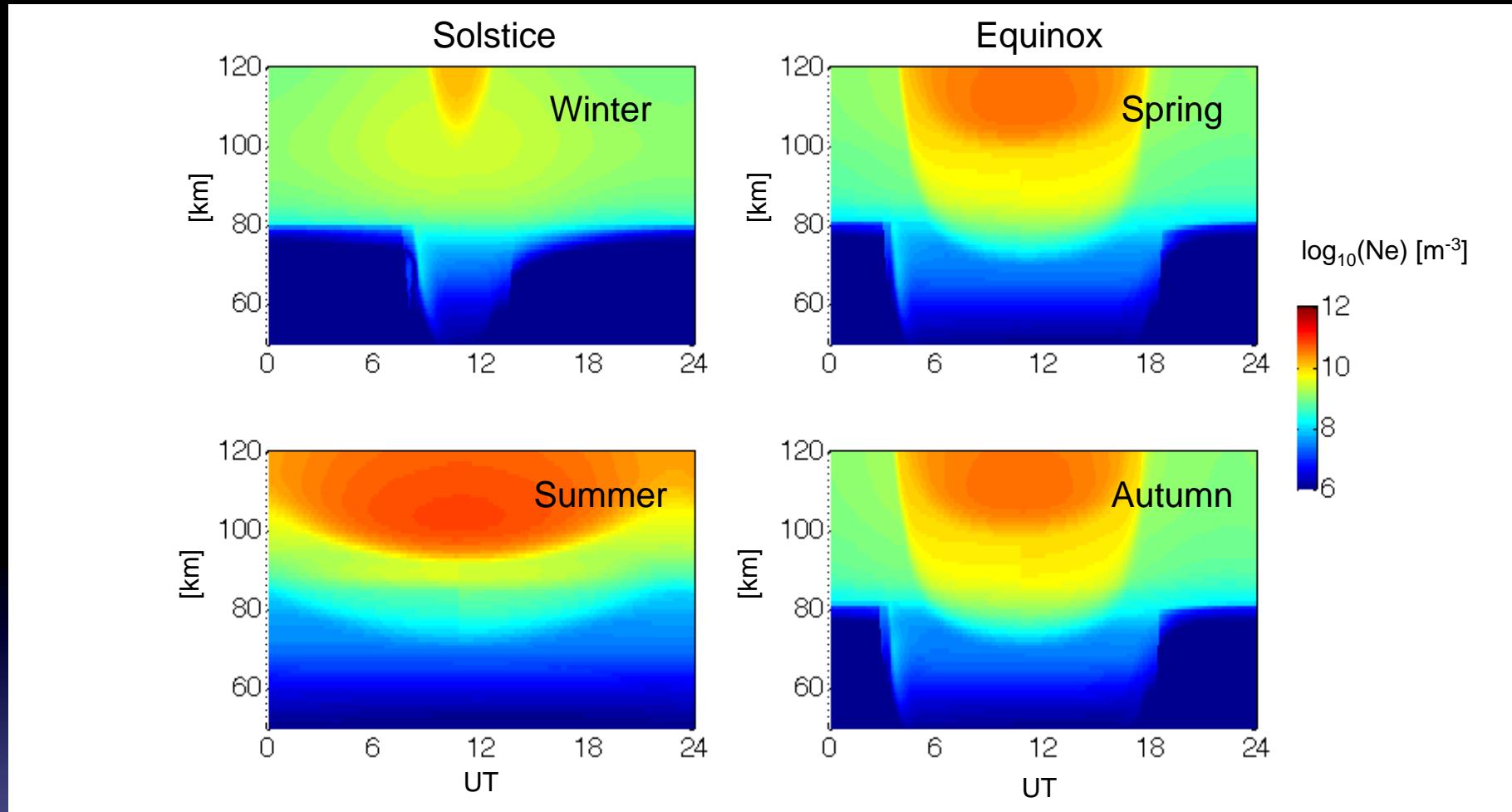
- 63 ions (27 negative) & 13 neutrals
- 20-150 km in 1 km resolution
- several hundred reactions
- vertical transport

## Input

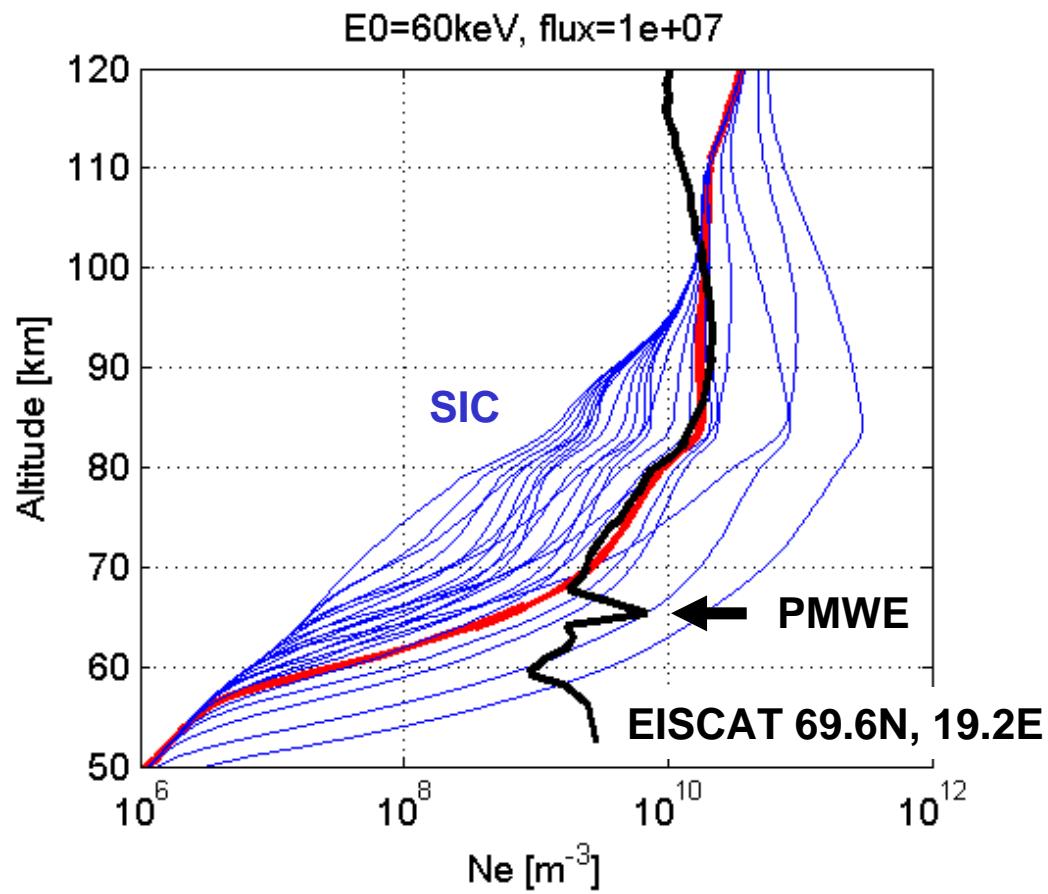
- MSIS
- solar EM flux
- proton and electron precipitation
- cosmic rays



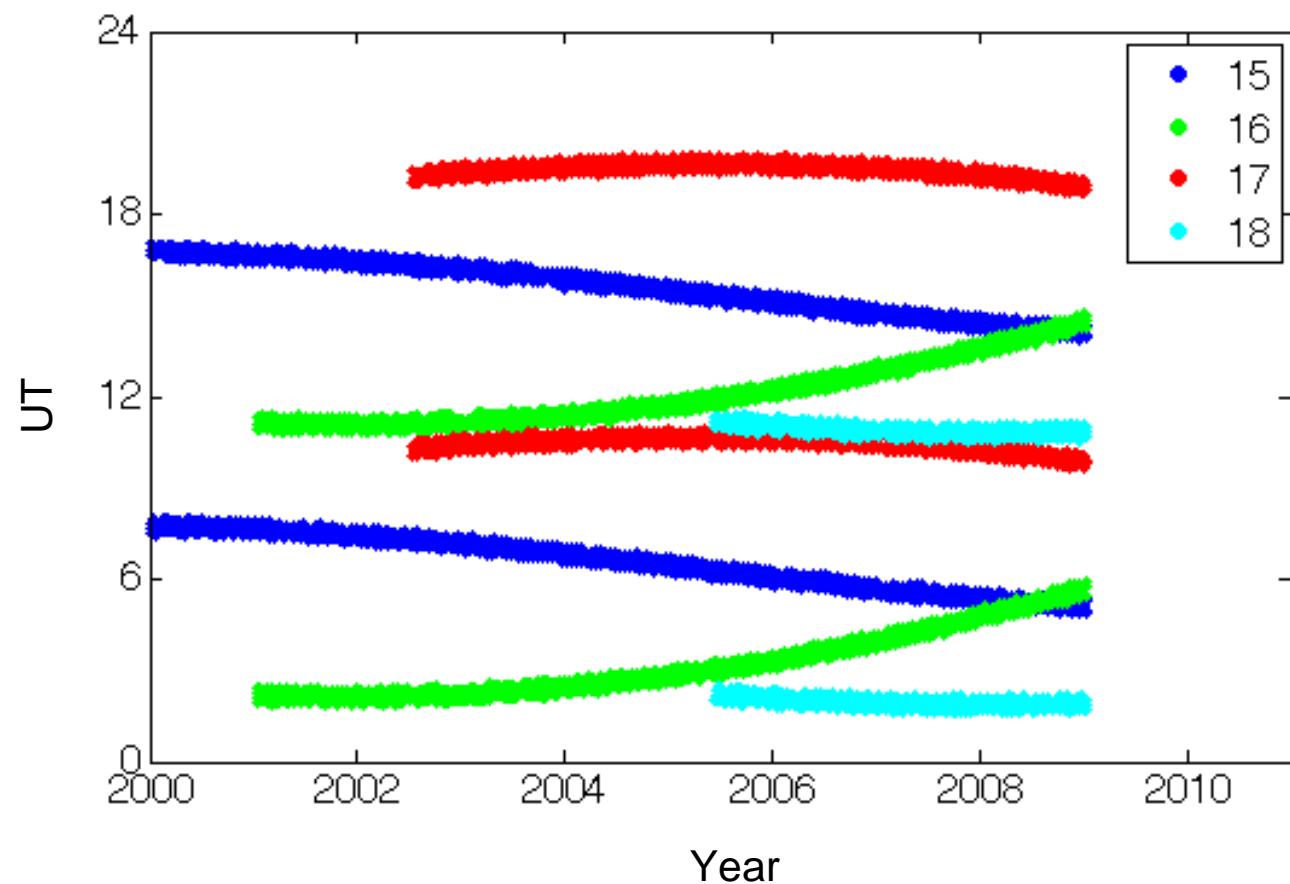
## Background Ne (solar EM radiation only) for the EISCAT site at 69.6N, 19.2E



## Preconditioning the SIC model



## POES footprint above EISCAT VHF [ $\pm 2^\circ$ ]



## Medium Energy Proton and Electron Detector (MEPED)

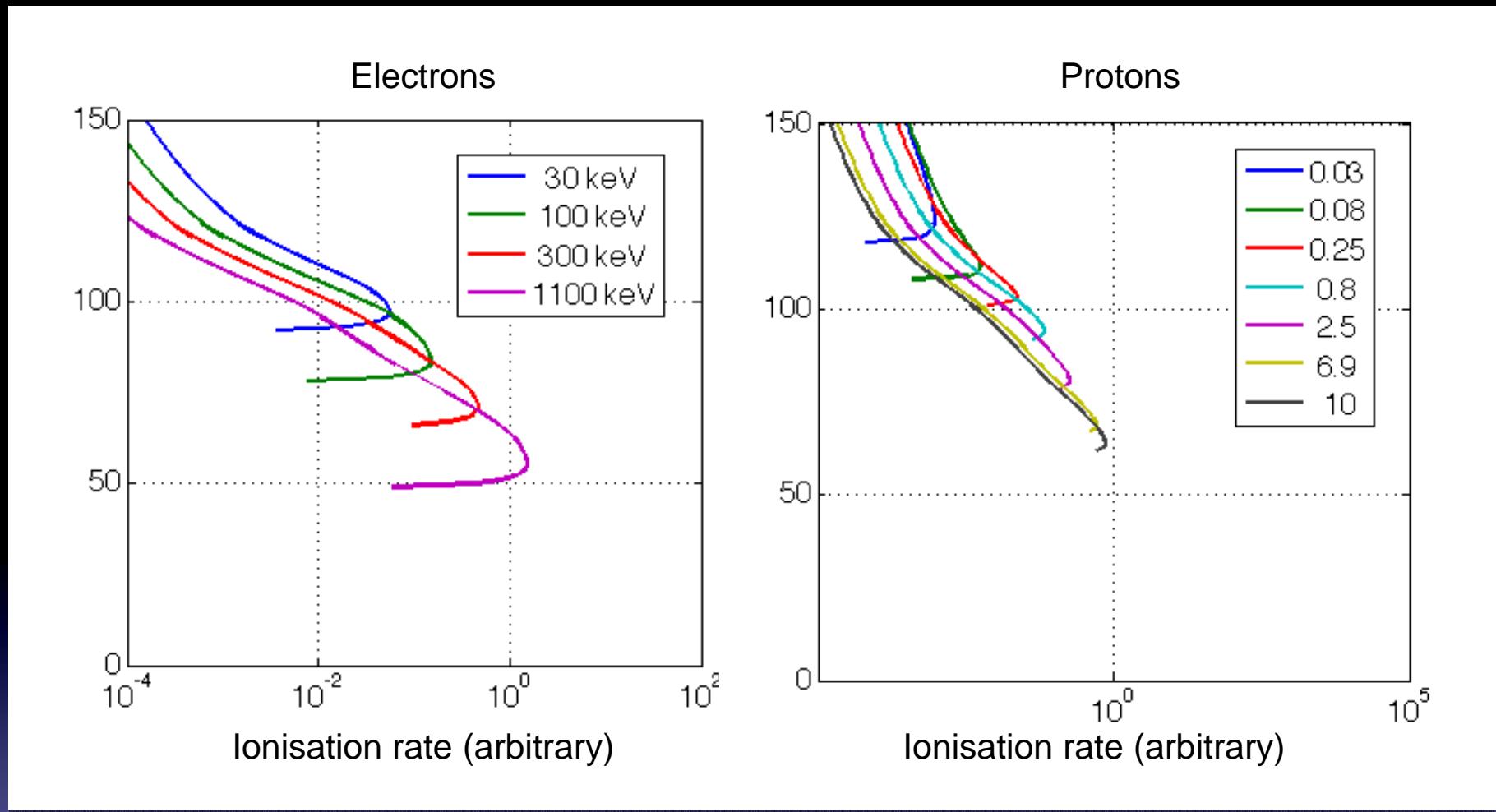
### Electrons (0° and 90°)

- 30 – 1100 keV
- 100 – 1100 keV
- 300 – 1100 keV

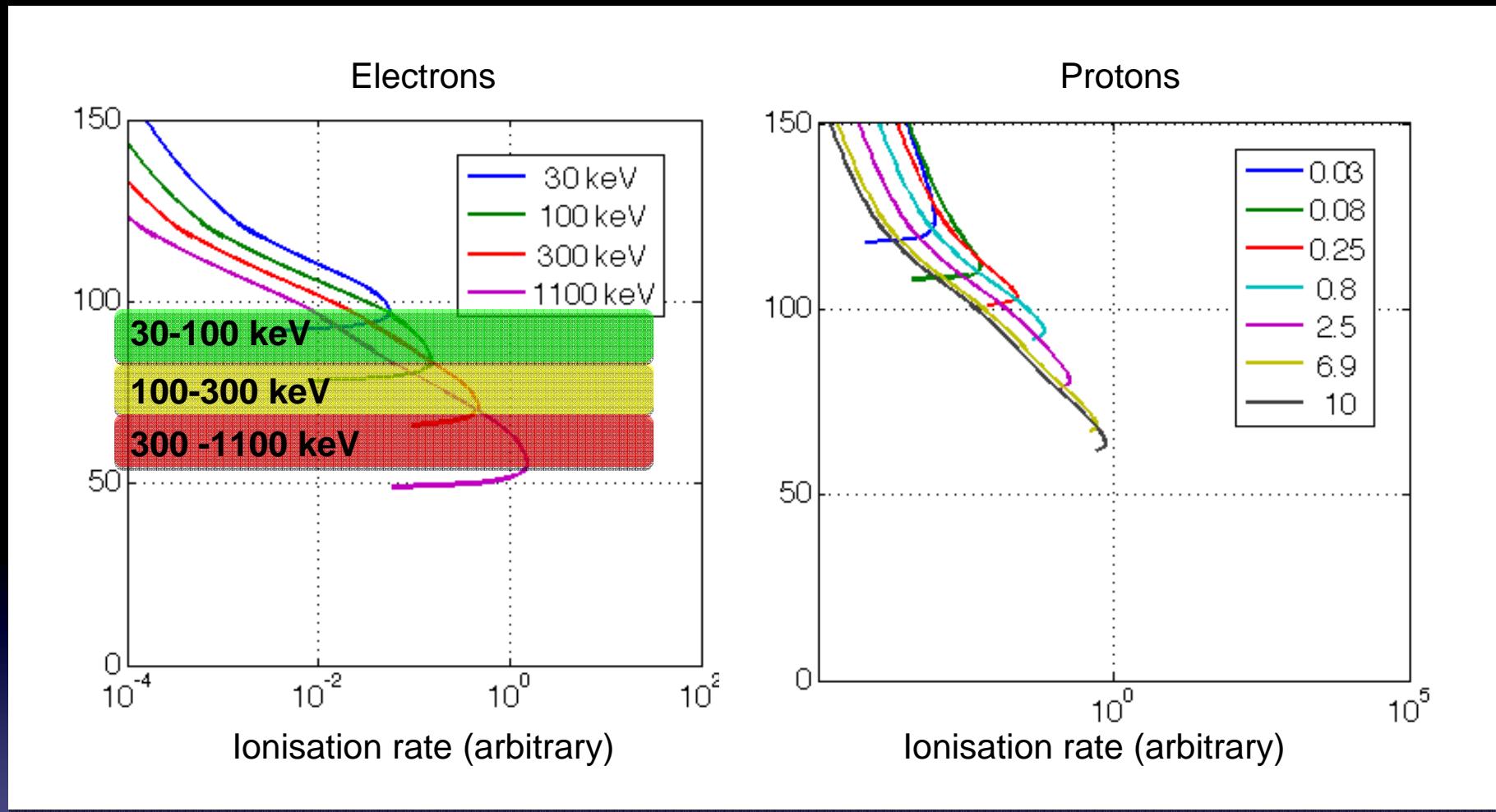
### Protons (0° and 90°)

- 30 – 80 keV
- 80 – 250 keV
- 250 – 800 keV
- 800 – 2500 keV
- 2500 – 6900 keV
- > 6900 keV

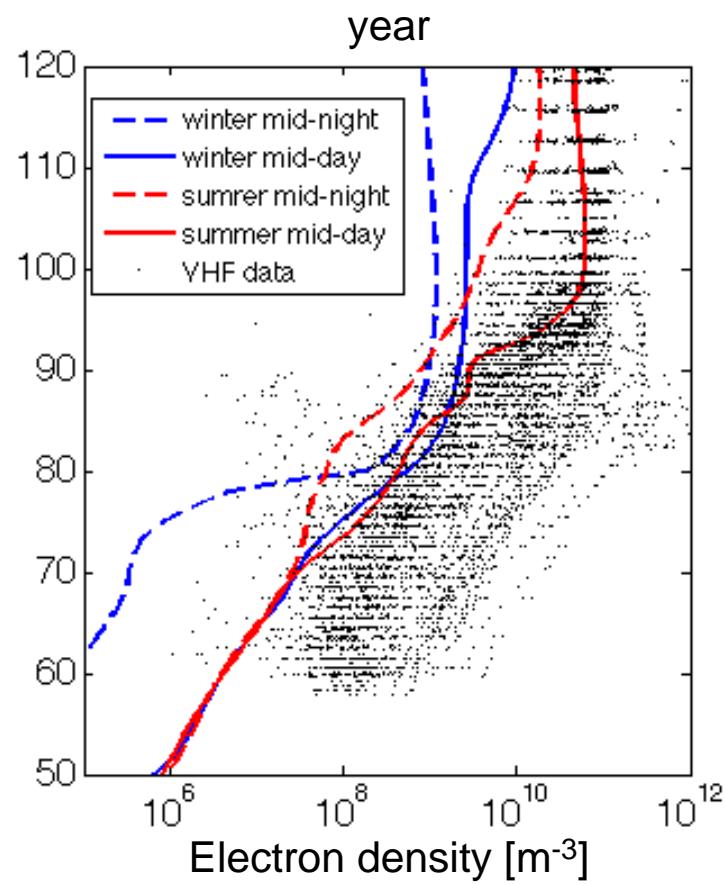
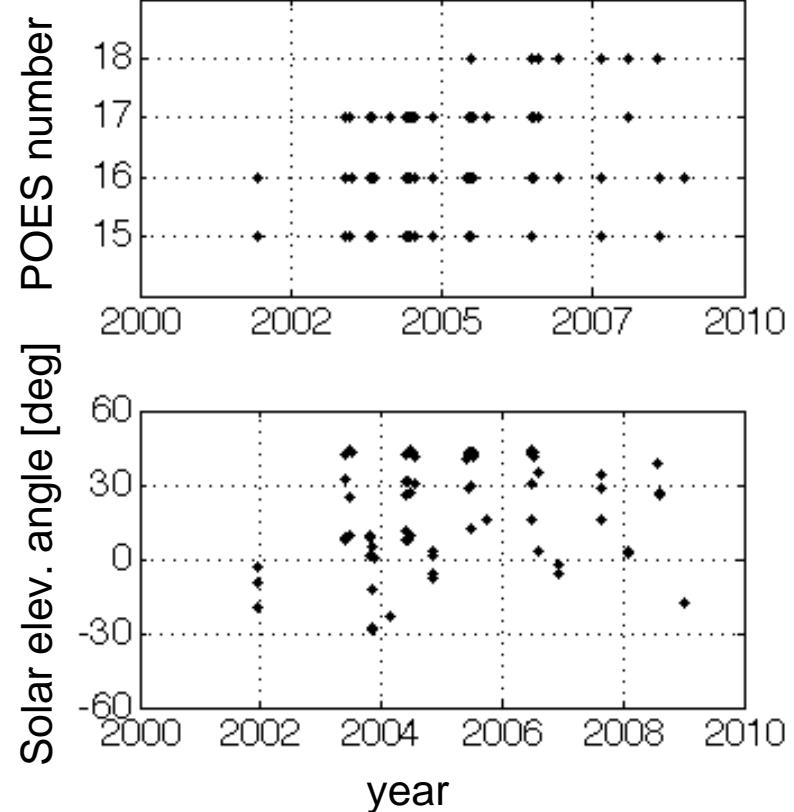
## Ionisation profiles



## Ionisation profiles

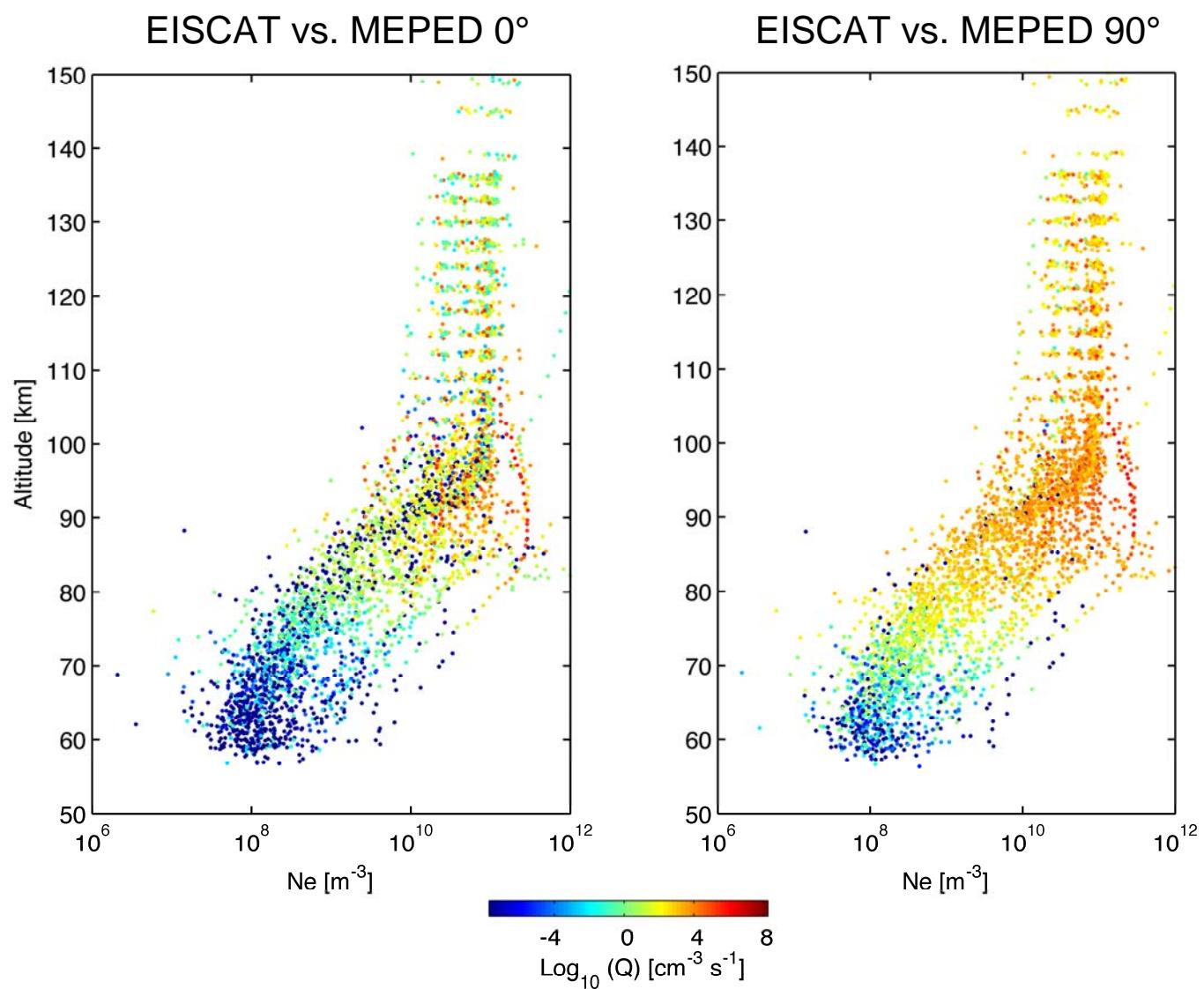


## Overview of the datasets (N=90)



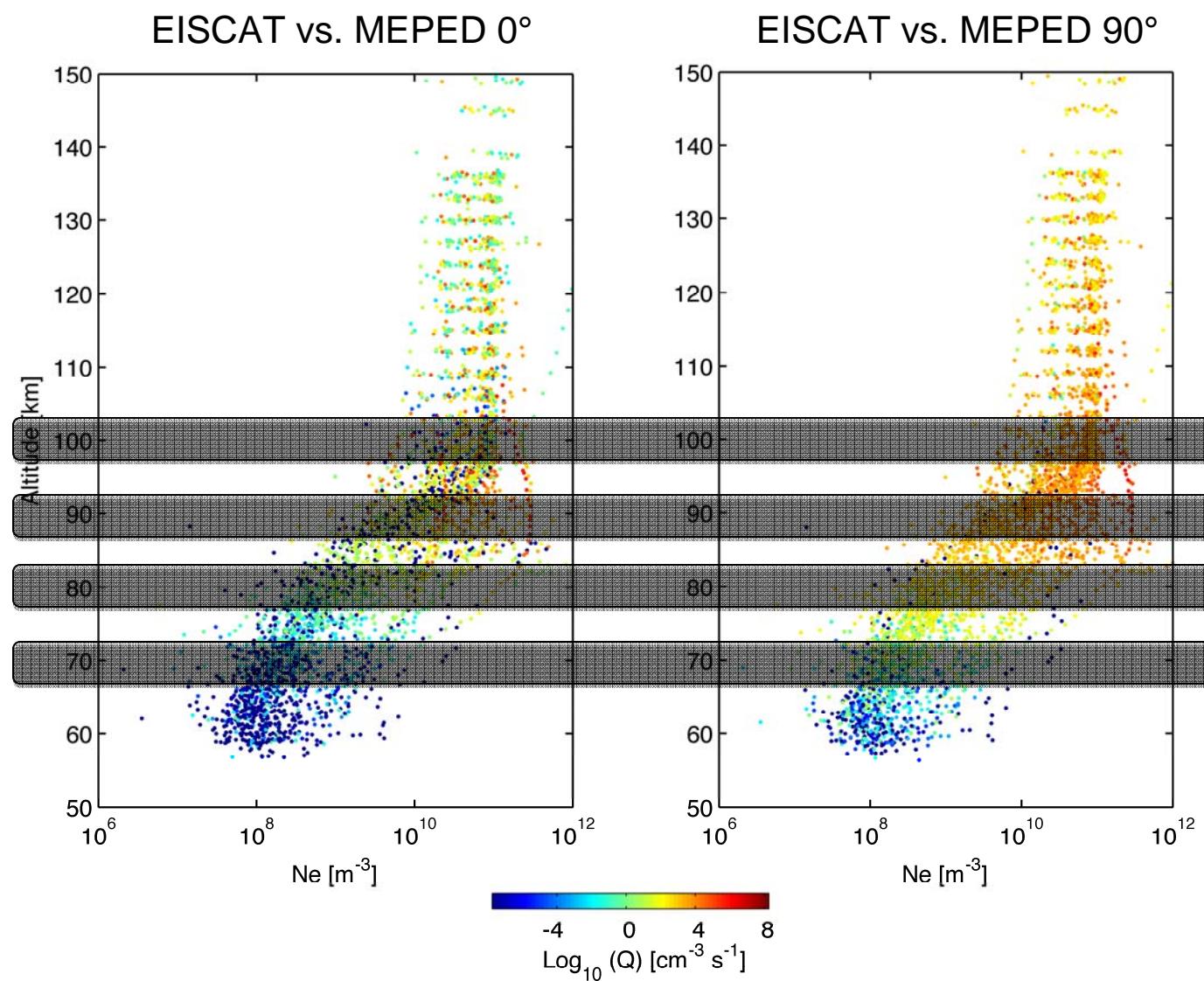
# Production rate vs. electron density

8



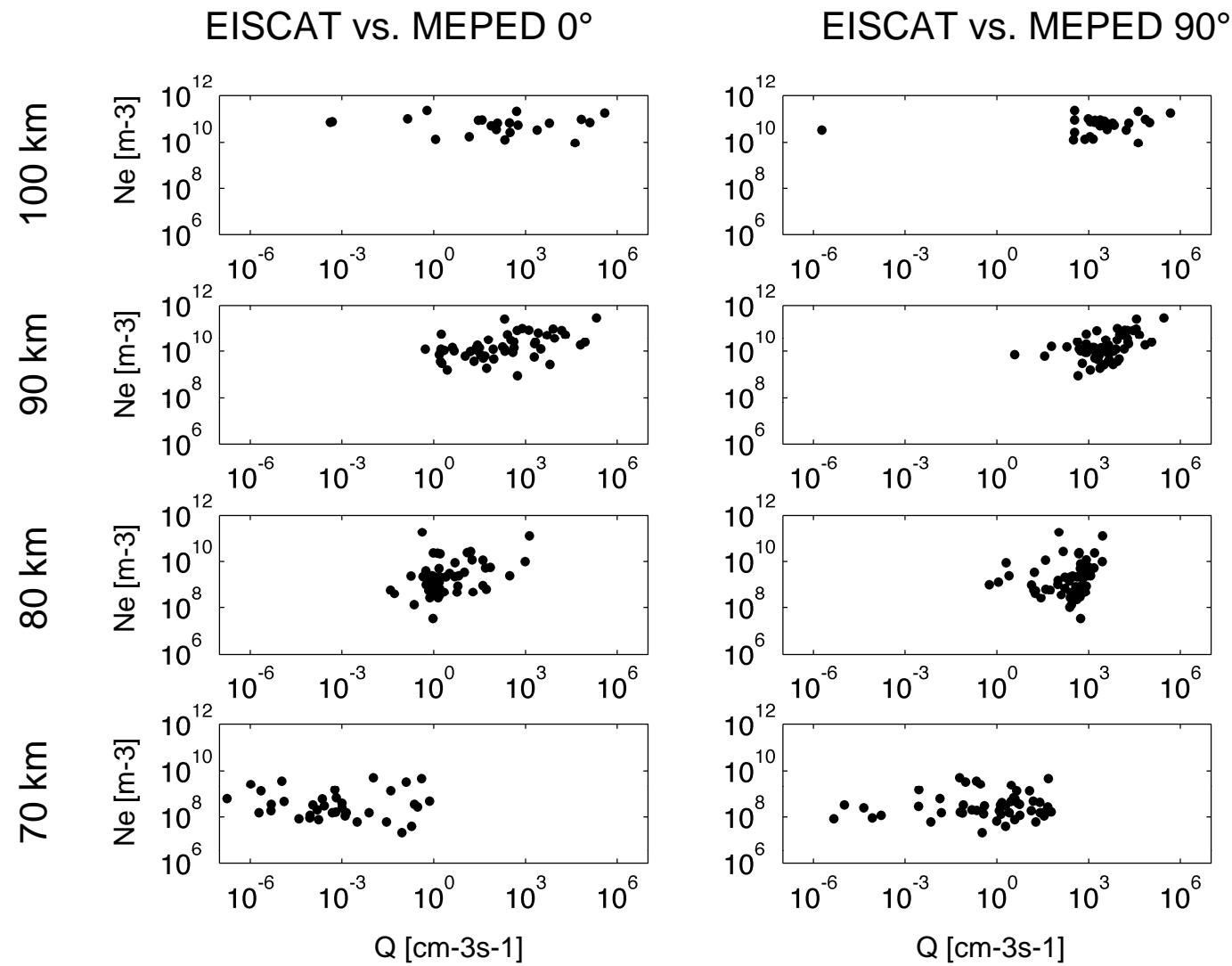
# Production rate vs. electron density

8



# Production rate vs. electron density

9



## Conclusions

- Electron densities measured by the VHF correlate with MEPED electron fluxes at 80-90km
- Below and above the correlation is poor or absent. This can be caused by uncertainties in the spatial and temporal match of the two datasets + general uncertainties of the data.

## Next steps ...

- Reanalysis of the POES and EISCAT datasets
- Inversion of precipitation parameters from the electron density behavior
- More satellites: DMSP, DEMETER etc.



## In contrast: SZA vs. Ne

