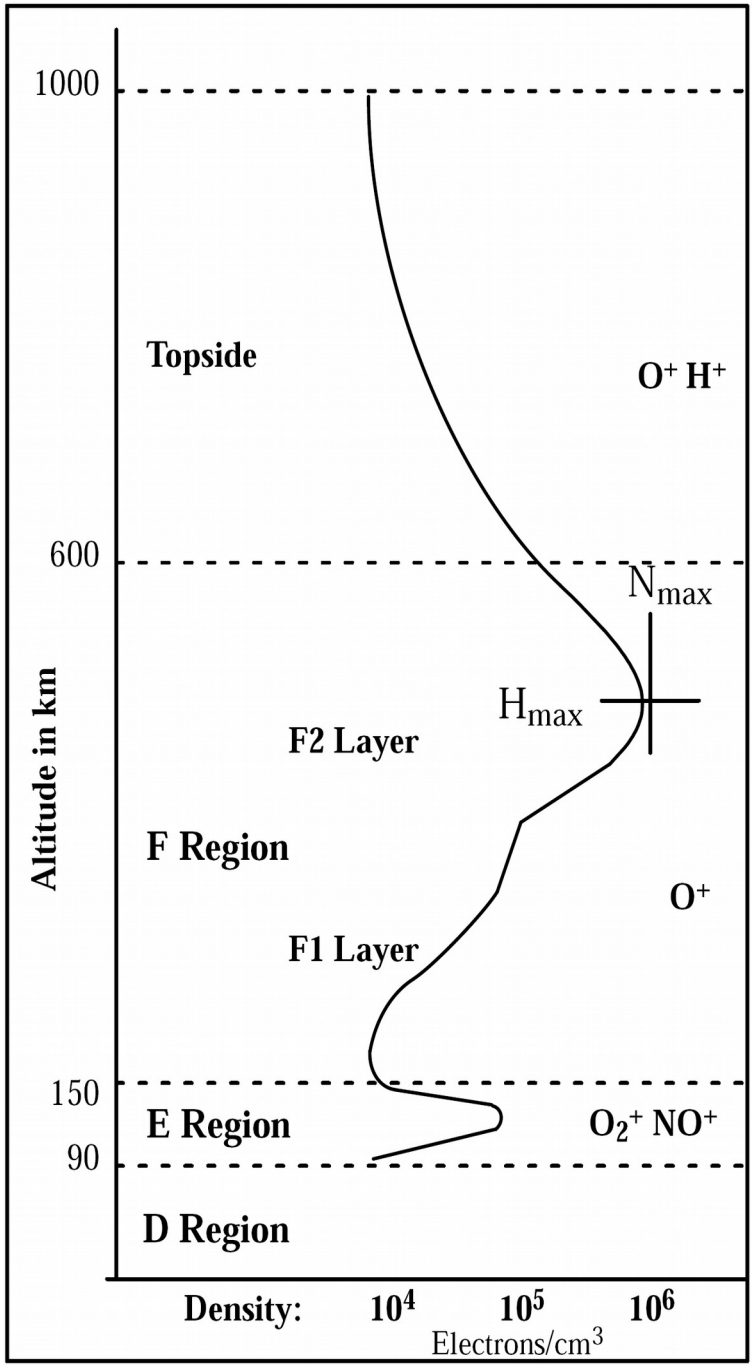
Introduction

Setting the Scene

Ionosphere



- Appleton 1924:
  - existence of reflecting layer (long wavelengths) in atmosphere (~125 km)
  - ionized
  - shorter wavelengths reflected @ 300-400 km
    - ionospheric structure, density changes with altitude
  - height of layer changes during sunset/sunrise
  - ionization due to solar radiation
  - recombination @ night
- ionized layer in atmosphere
- structures varying in space and time
- 3D: ranging from 90 km – 1000 km

Methods to characterize the ionosphere

- dispersive phase delay
  - LOFAR
  - GPS
    - IONEX files
- absorption
  - riometer
- reflection
  - ionosondes
- scintillation
- ...

Goals of this meeting

- Define common factors between methods/goals of the different communities
- What can we learn from each other
- Where can we contribute to each others data/goals
- Define working groups to further expand on the ideas of this meeting
  - practical

Examples

- RMextract: Use GPS data (+ magnetic field models) to precorrect polarized data of a LOFAR observation.
  - Time variation of RM “washes” out the signal:
    - Can we improve on the time and spatial resolution of IONEX data (generally 1-2 hr)?
  - Absolute RM for physics:
    - How accurate is the absolute TEC of IONEX? What is the bias?
- Accurate absolute/differential TEC for other projects:
  - cosmic rays from the moon
    - real time absolute TEC for triggering

Diagnostics

- Can we define a method to characterize the ionospheric quality, before, during or after an observation?
  - advantages:
    - Stop observing during bad scintillation
    - Do not attempt to calibrate the data
      - a deep calibration might take weeks or more
    - Save manpower, compute power, data storage
  - Needs information about small scale structures
    - e.g. Structure function from differential GPS

Calibration

- Can we define a method to simplify the calibration?
  - providing an initial model to start self calibration
  - advantage:
    - save computing time
    - improves calibration low source count/low S/N
    - time/bandwidth averaging
  - phase screen modeling:
    - combine calibration phases with GPS TEC data?
  - VLBI (very long baselines):
    - initial correction of differential TEC on >100 km scales

Examples using LOFAR data

- Can LOFAR data be used to improve ionospheric monitoring?
- LOFAR can contribute very accurate 1st and 2nd order differential corrections
- small spatial scales
- short times scales
- scintillation
- measure speed and altitude

Final point:
We need a Astron/Jive daily image from this meeting!!

Enjoy your meeting!