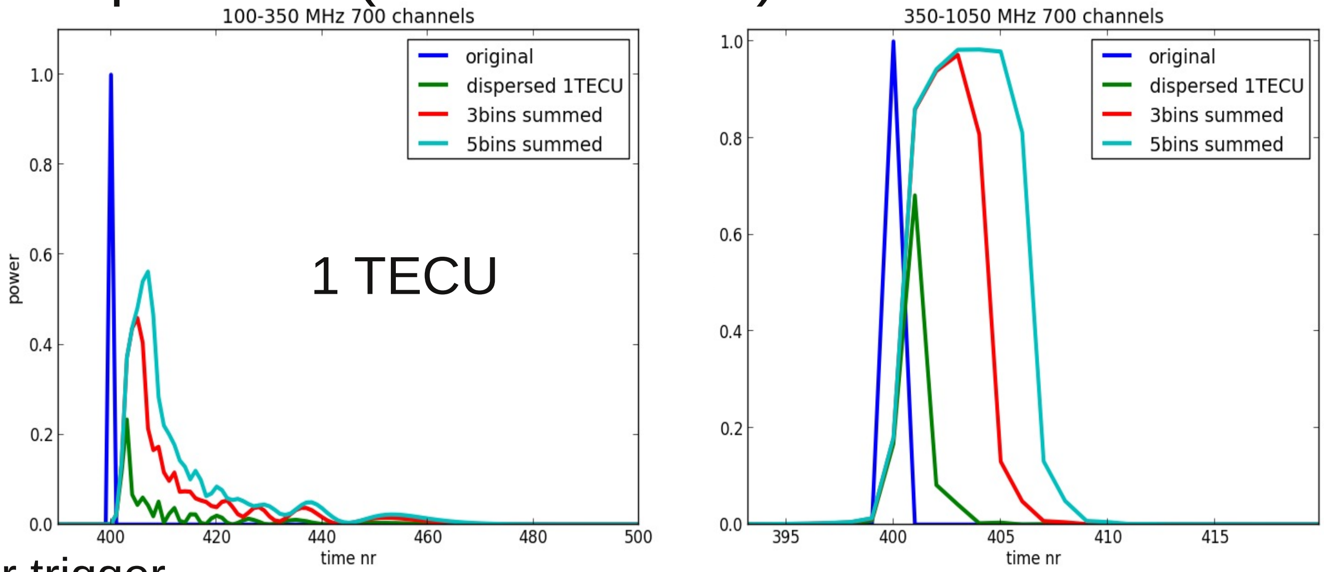
Ionosphere

- 2 main issues:

$$\Delta_{ph,f}^{iono} = -\frac{40.3}{f^2} \int N_e \, dl$$

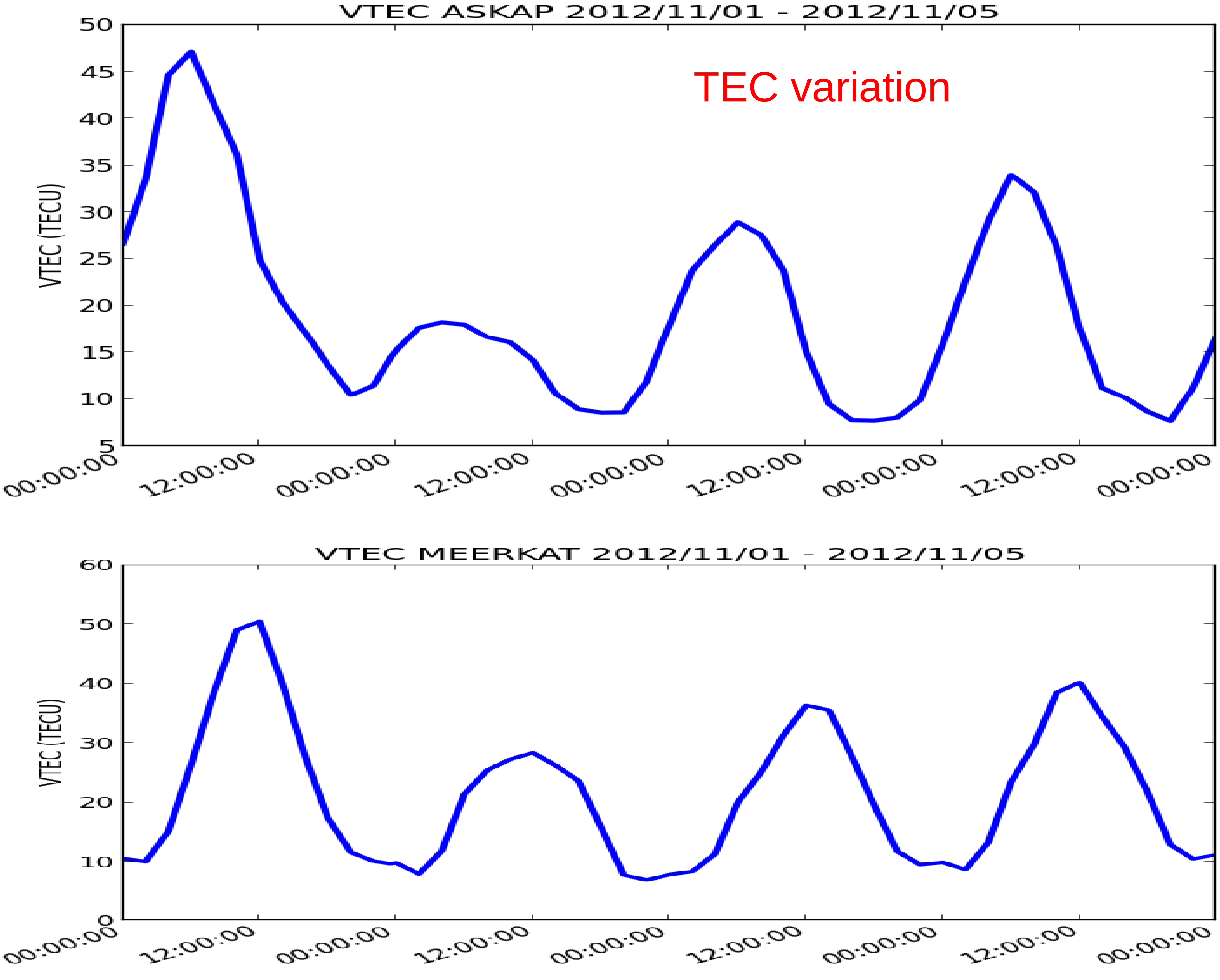
  - dispersion of the signal
  - phase errors → beamforming (longer BL) ->See "signal"
- Major issue @ low frequencies (100-350 MHZ)



- Dedispersion:
  - online:
    - Maximize S/N for trigger
    - separate from Earth-based events (Moon reflected)
      - compare dedispersed signal with original (2 signal paths)
  - offline:
    - better signal reconstruction
    - discriminate between signal and Earth-based/Moon-reflected noise
    - determine trigger efficiency (from error in online applied TEC-values)

Online dedispersion

- Dedisperse phases before trigger:
  - Use range of values for dedispersion (-0.5TECU,mean absolute TEC, +0.5TECU,...)
- Absolute TEC values from:
  - GPS data
    - online available on ftp servers:
      - raw data within 30 min, fitted IONEX data: days
      - limited accuracy: ~ 1TECU on final IONEX products
    - contact SKA Polarization working group about placing GPS stations
    - Useful Software (developed for polarization measurements):
      - ALBUS (fit TECscreen on GPS data)https://github.com/twillis449/ALBUS_ionosphere/
      - RMextract:IONEX data from ftp servers https://github.com/maaijke/RMextract
  - Faraday Rotation Polarized source:
    - Lunar Limb polarization:
      - take into account parallactic angle when imaging
      - Difficult for online TEC estimation (?)
      - Certainly worth investigating for offline dedispersion
    - Other polarized calibrators (within FOV?)
  - Other methods (?):
    - Parametric models: PIM: http://www.cpi.com/products/pim.html
    - Differential Faraday Rotation: $dFR = TEC_1*B||_1-TEC_2*B||_2 = dTEC*B||_1+TEC*dB||$
      - dTEC/dFR from calibration, B|| from Earth Magnetic Field models



VTEC ASKAP 2012/11/01 - 2012/11/05
TEC variation
VTEC (TECU)
50
45
40
35
30
25
20
15
10
5
00:00:00
12:00:00
00:00:00
12:00:00
00:00:00
12:00:00
00:00:00
12:00:00
00:00:00
VTEC MEERKAT 2012/11/01 - 2012/11/05
VTEC (TECU)
60
50
40
30
20
10
0
00:00:00
12:00:00
00:00:00
12:00:00
00:00:00
12:00:00
00:00:00
12:00:00
00:00:00