

Ionospheric Activity

- Work/Study Group goals
 - Some new results

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ISG activities

Members: Ger, Bas, Maaijke, Ilse, Jan, Leon, Soobash, Charlotte, Harish,..

Goals:

- screen modeling across FOV, stabilizing images
- absolute TEC & RM for pulsars and wide field polarimetry
- assess day/night differences (ionospheric scintillation, IPS)
- limitations due to amplitude scintillation ?

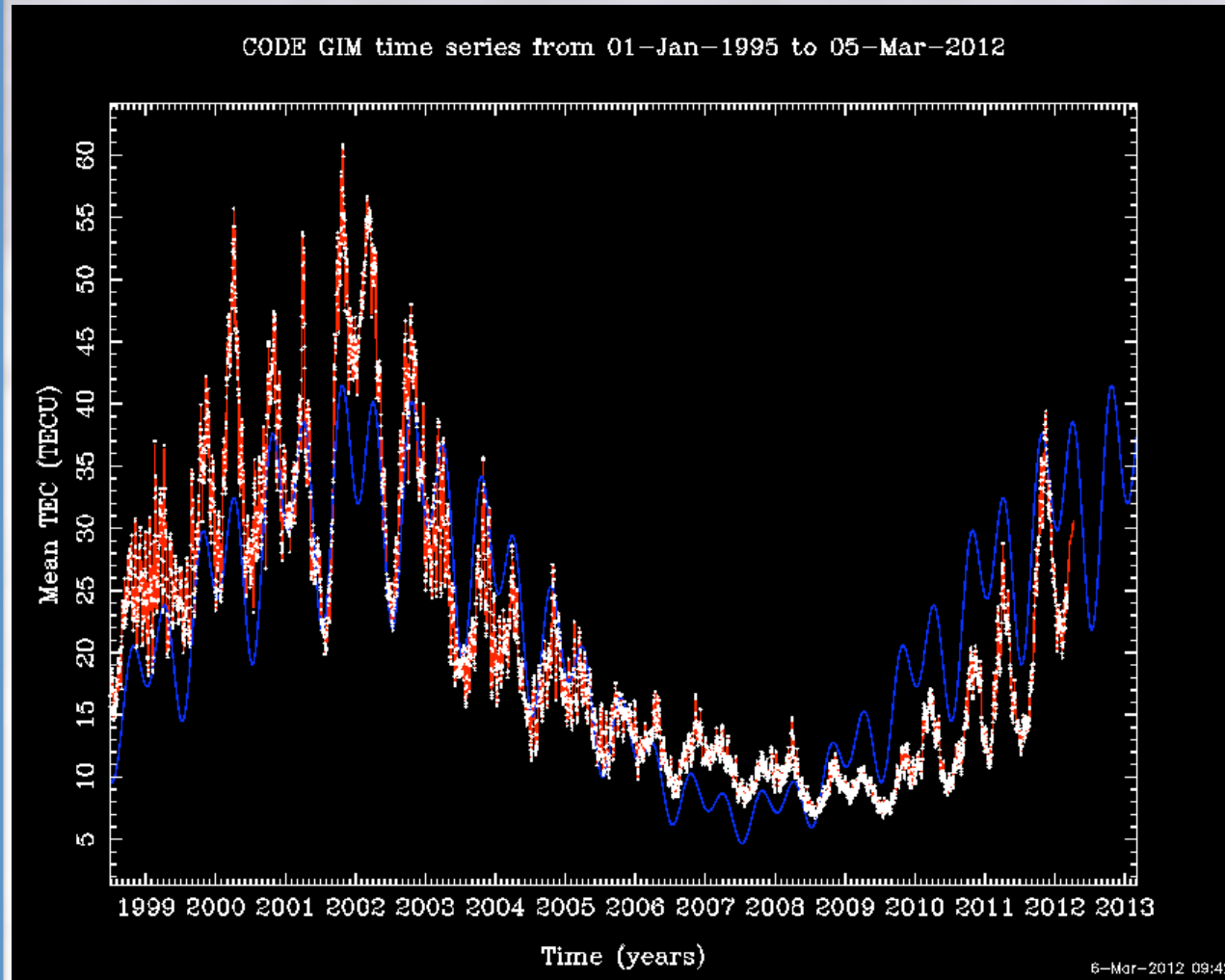
Some new results:

- Solar activity and thickening TEC layer
- using pulsars → ionospheric RM (Charlotte): accuracy $0.1 \rightarrow 0.01 \text{ rad/m}^2$
- using SAGEcal to map out ionospheric DD-effects (Sarod, Soobash)
- using MSSS LBA results to determine ionospheric refraction (Ger)

Critical tasks:

- develop link from data to screen models (2D & 3D) (SAGEcal, multi-beam obs)
- applying screen models in Aimager → Bas van der Tol movie
- procedure to link differential and absolute TEC info and modeling

Average (global) TEC thickness increases rapidly



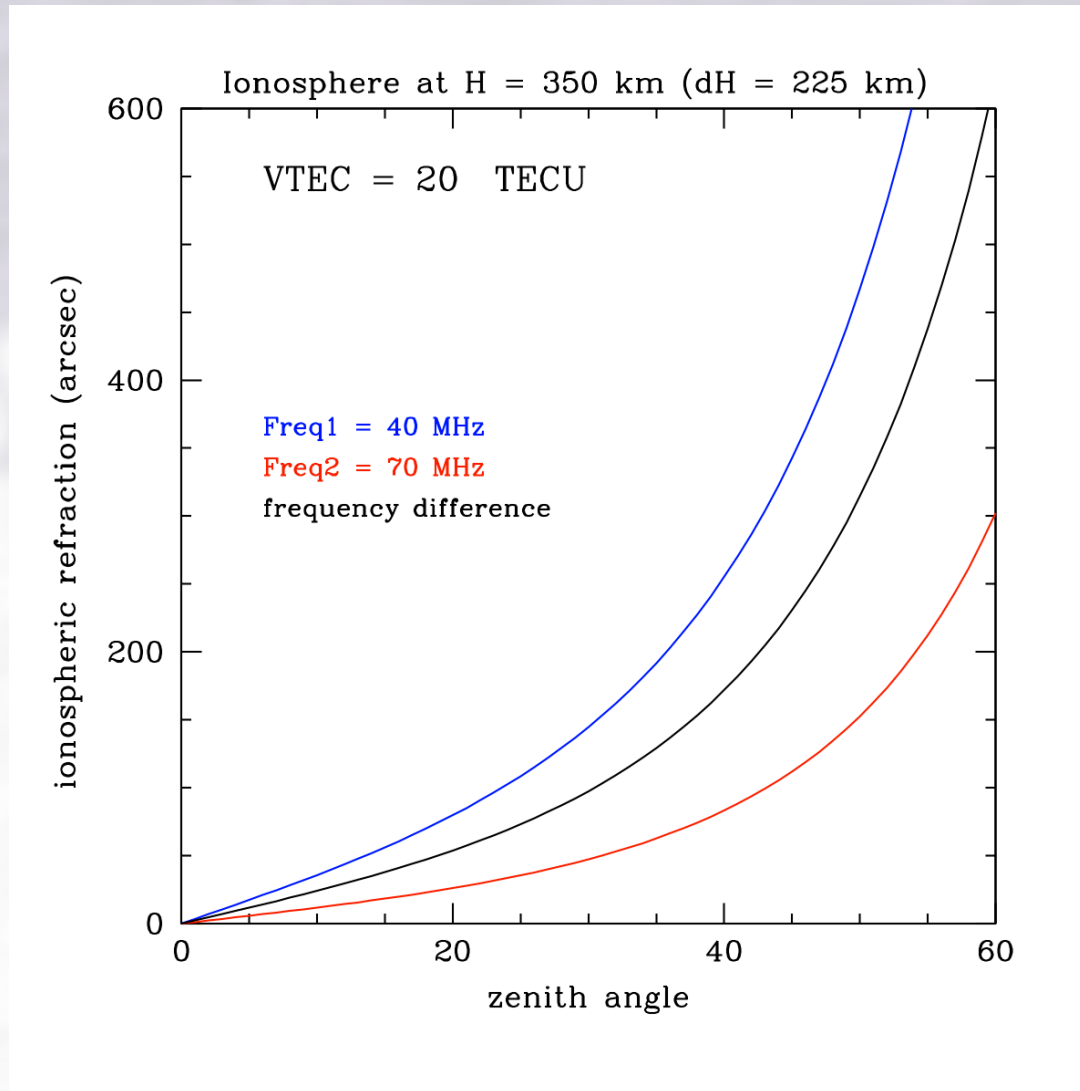
White: data

Red: 30-day prediction

Blue: trend function
(with 11-year, annual
and semi-annual
components)

From: CODE- Bern

..which leads to large refractive effects in the LBA band



Differential effects, varying with frequency, in

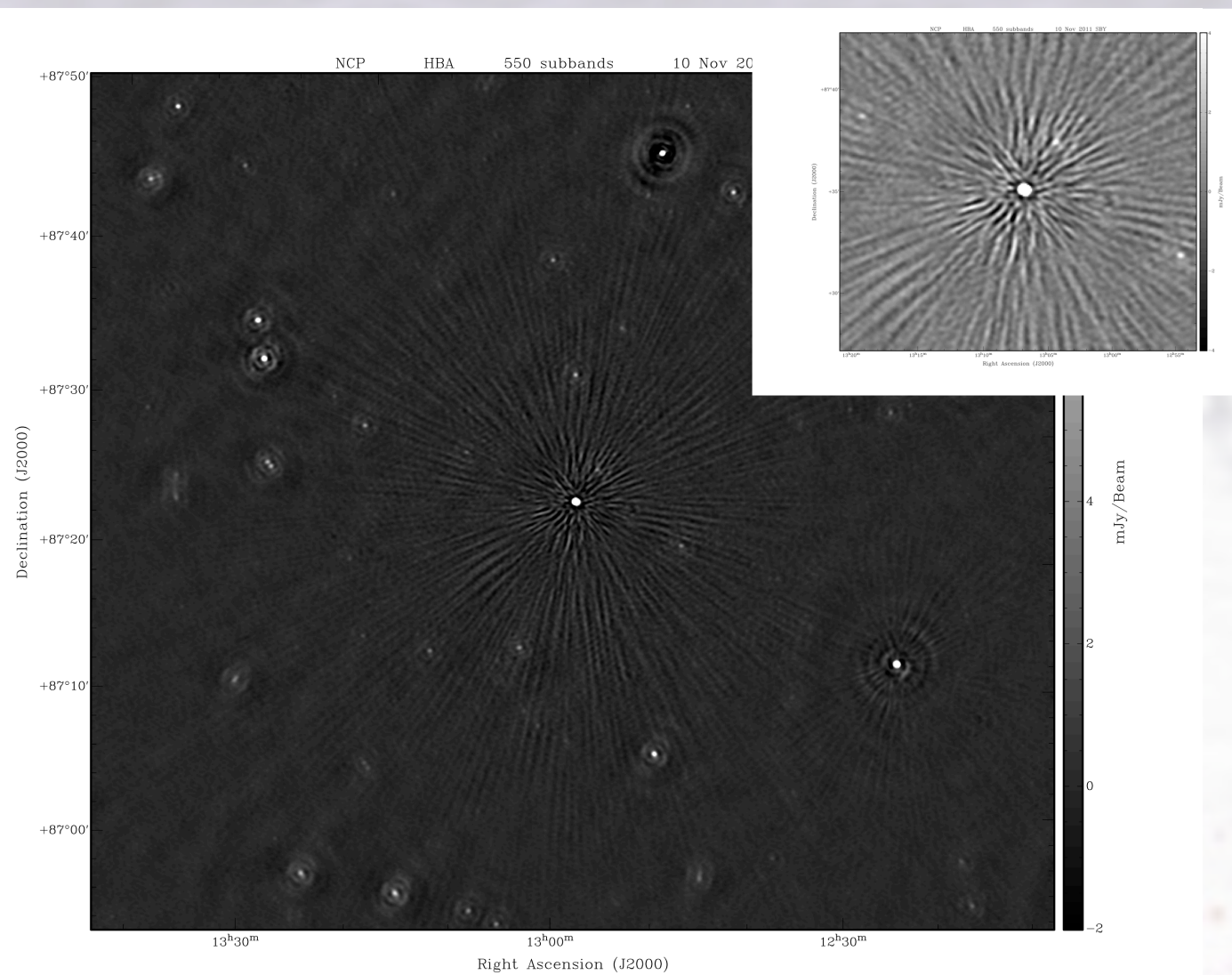
- time → selfcal
- position → effect on model (= DDE) !

...and residual effects in images)

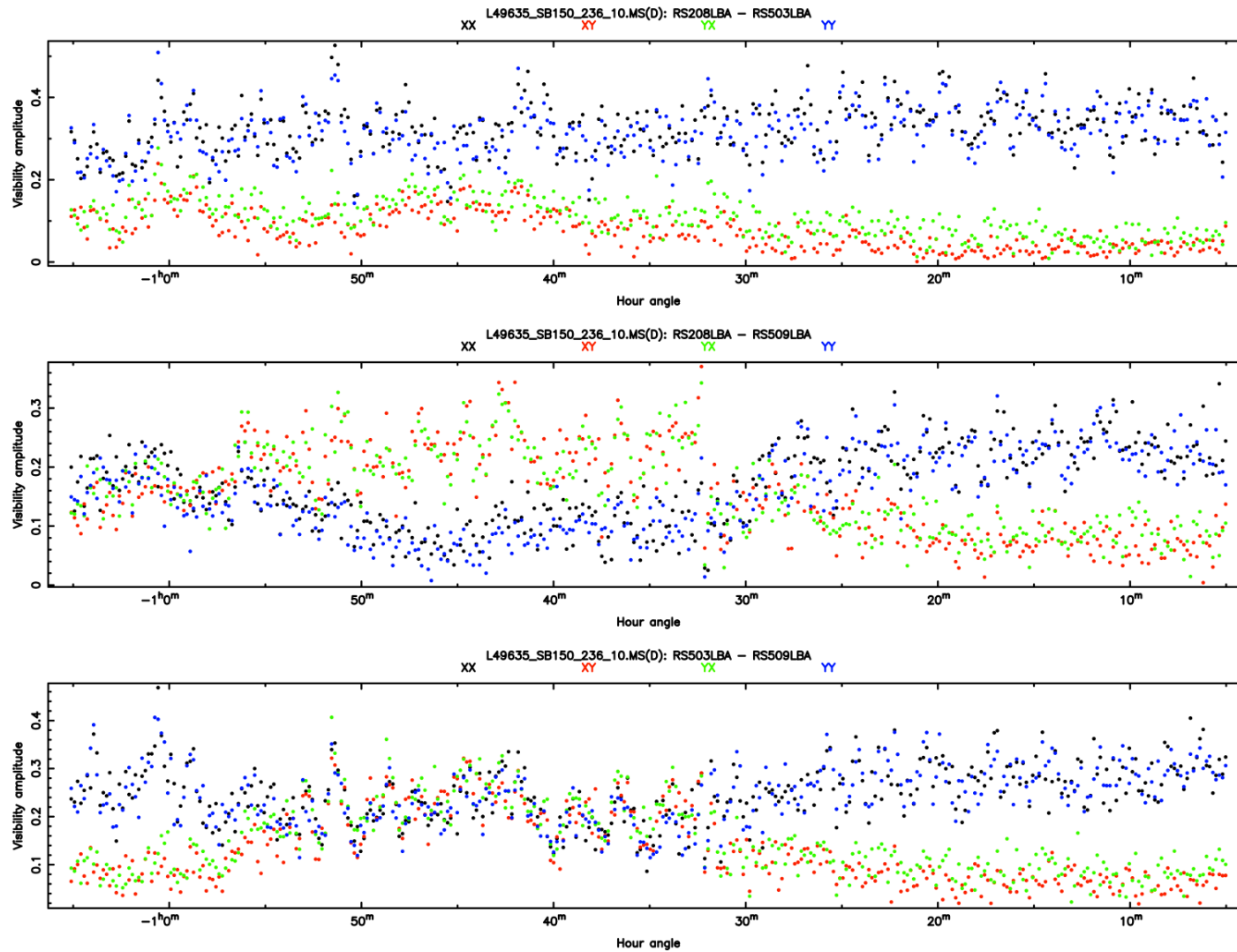
NCP

240 sb
x 2.5 days

Sarod Y.



DFR in night-time data on 3C295 (MSSS-LBA-calibrator)



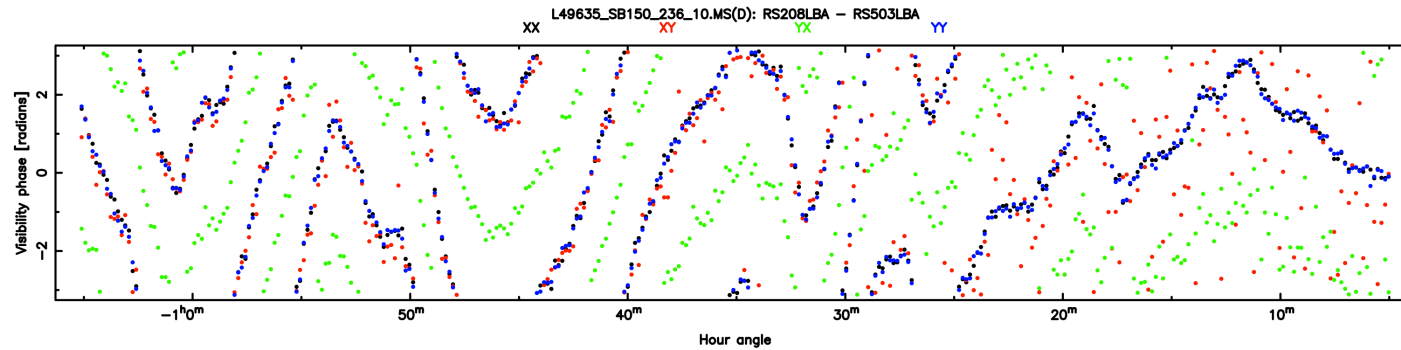
59 MHz

30 km

80 km

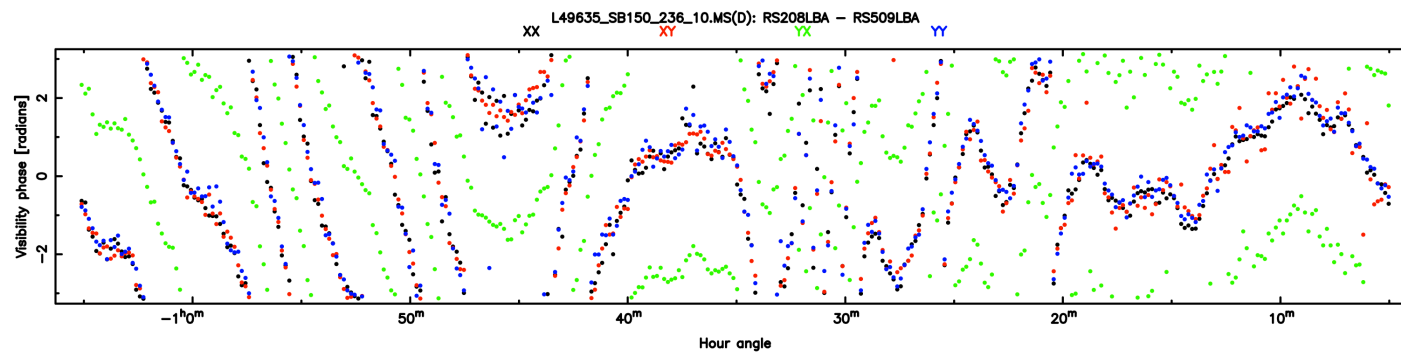
50 km

DFR in night-time data on 3C295 (MSSS-LBA-calibrator)

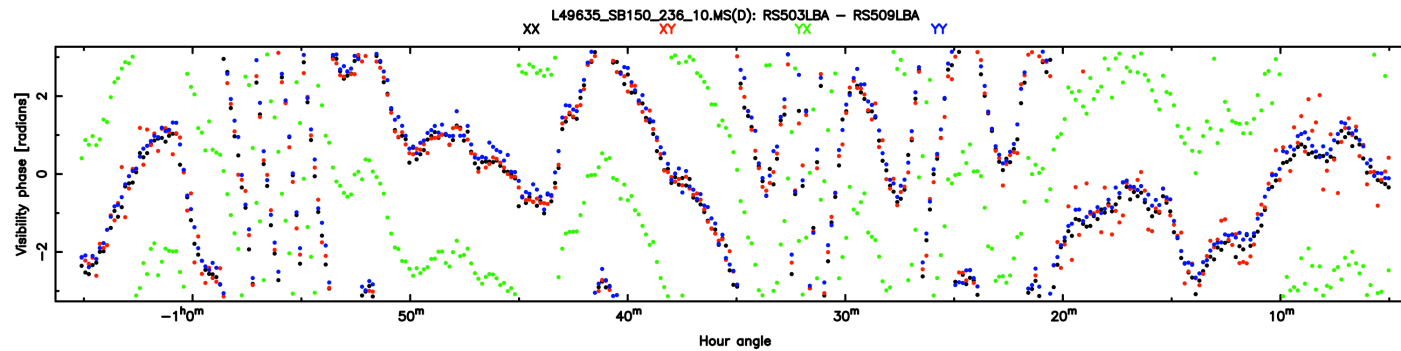


59 MHz

30 km

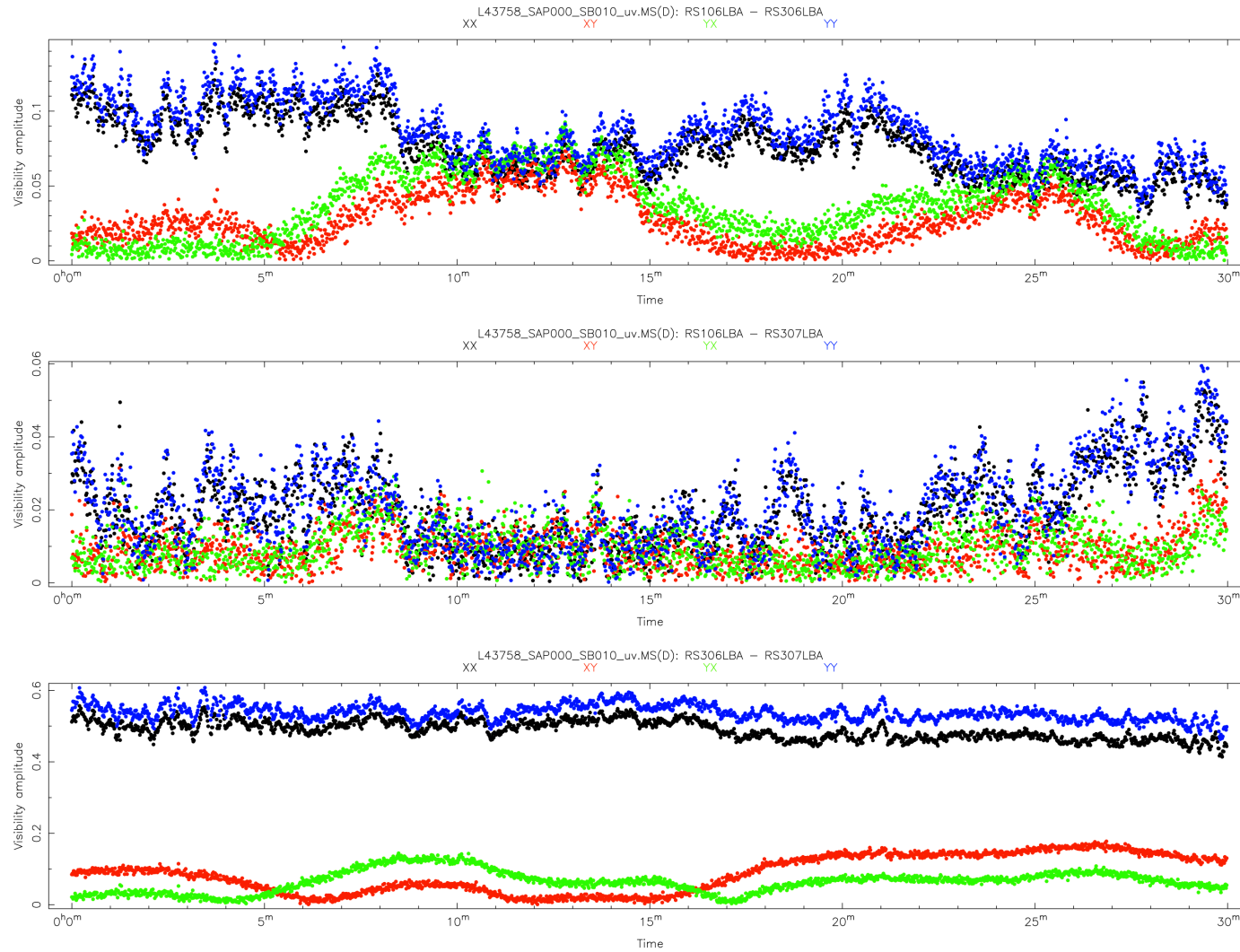


80 km



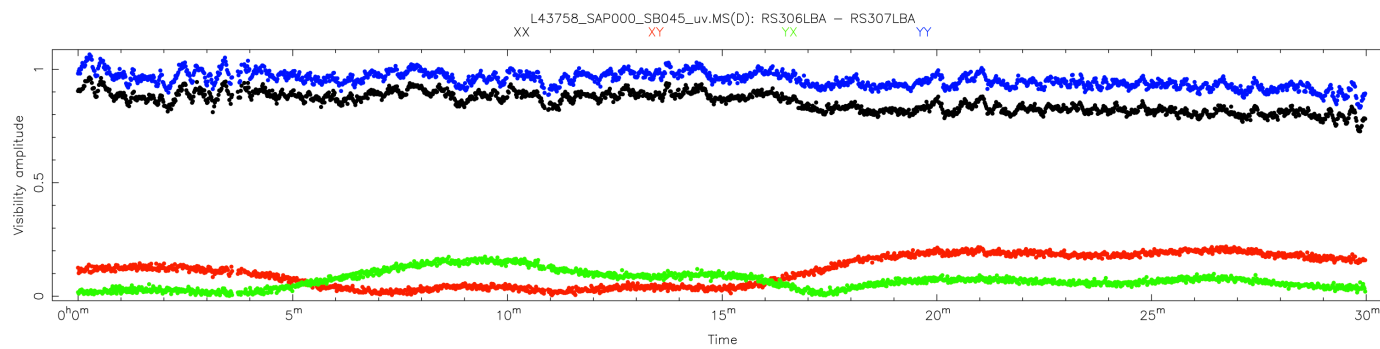
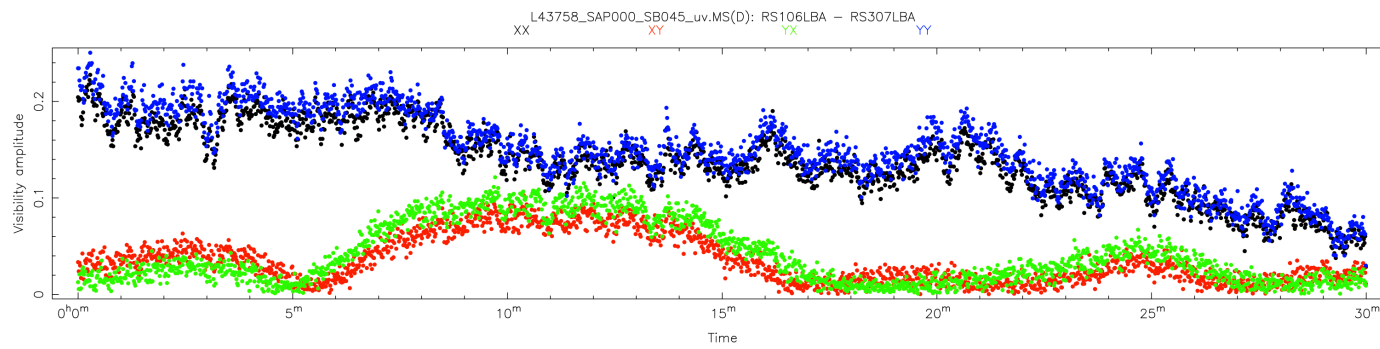
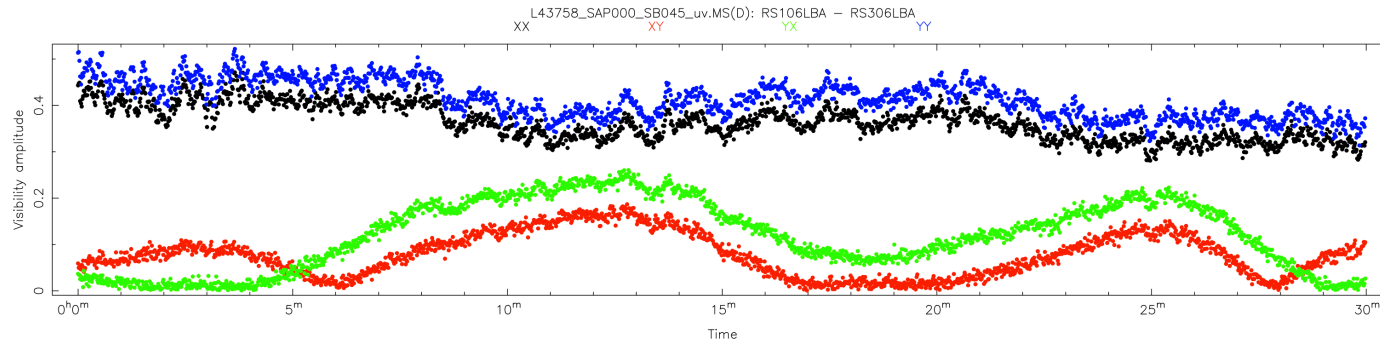
50 km

DFR and scintillation on 15-20-25km baselines:

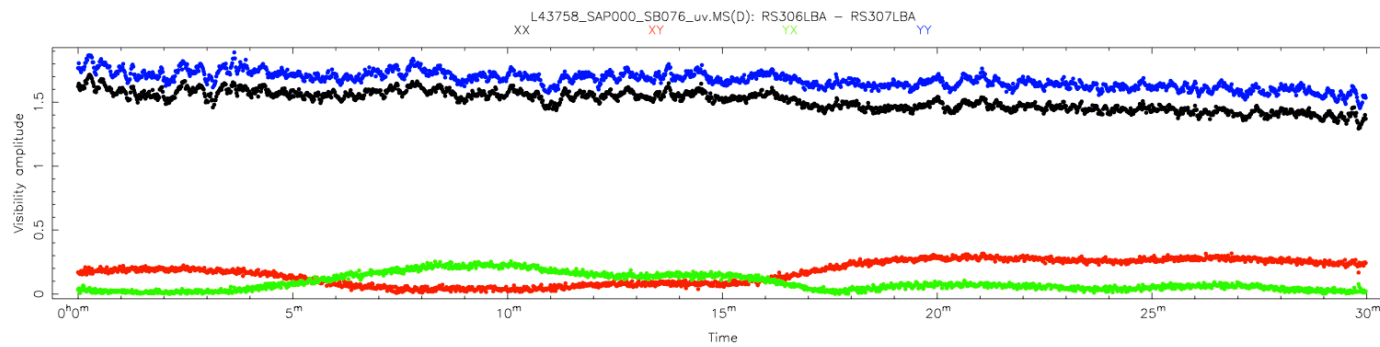
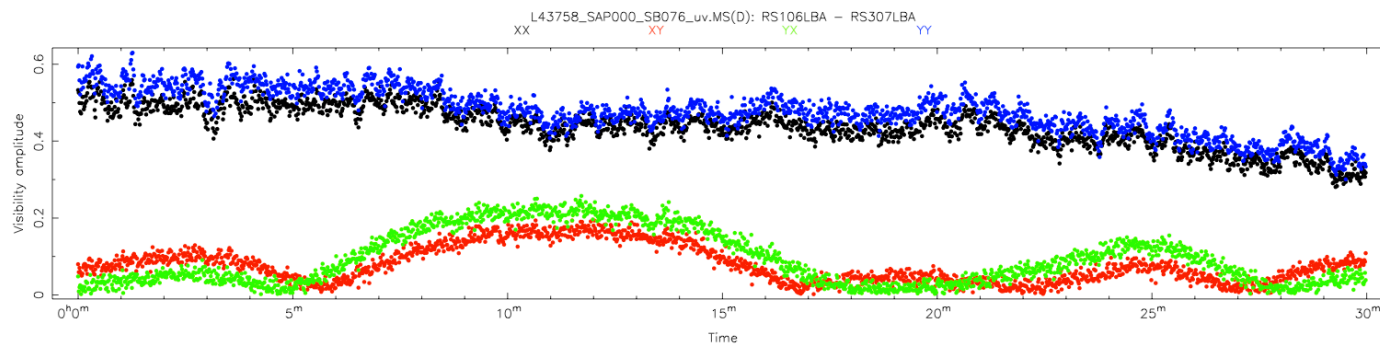
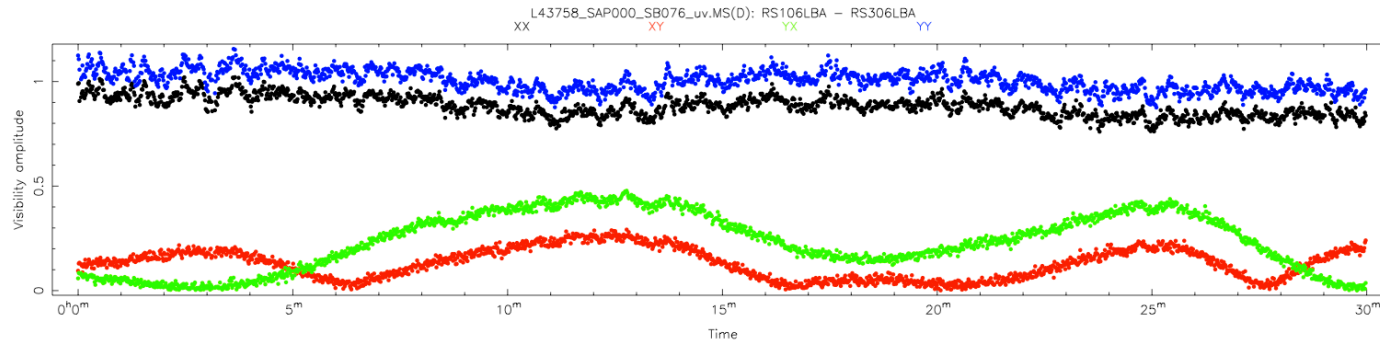


32 MHz

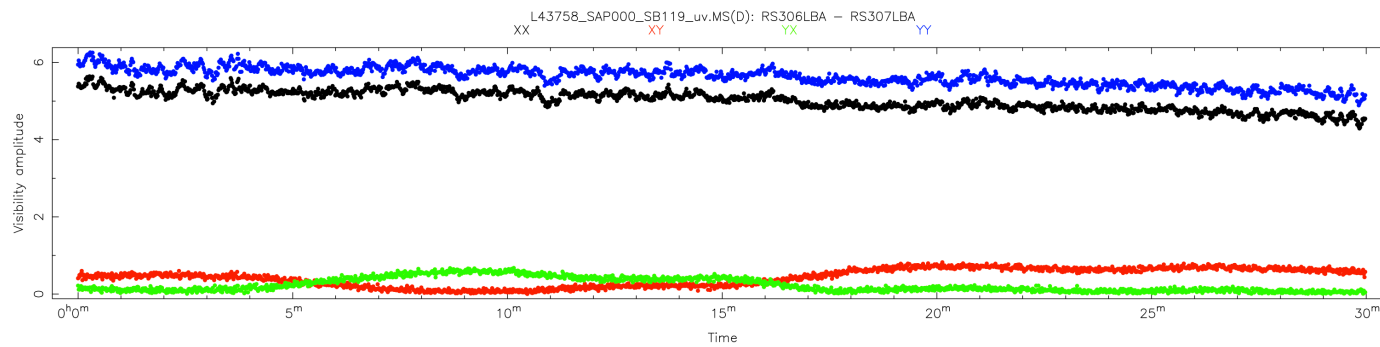
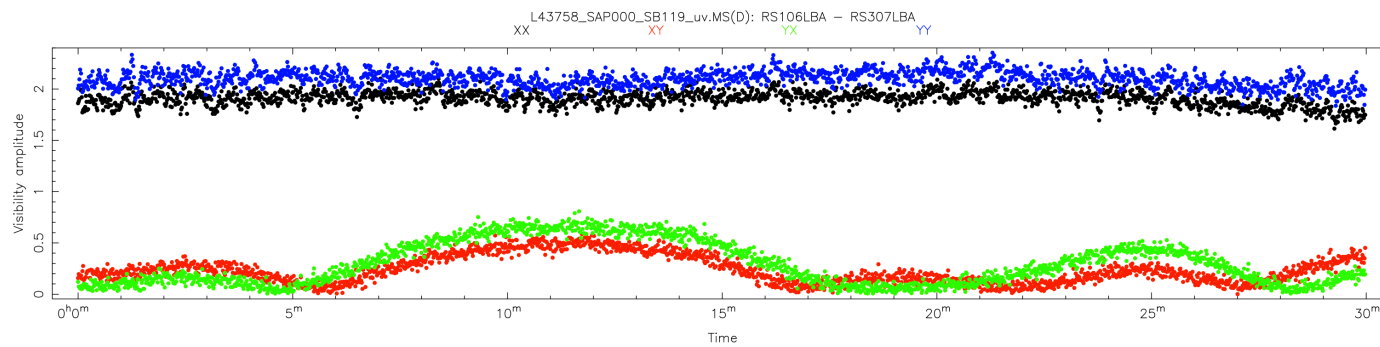
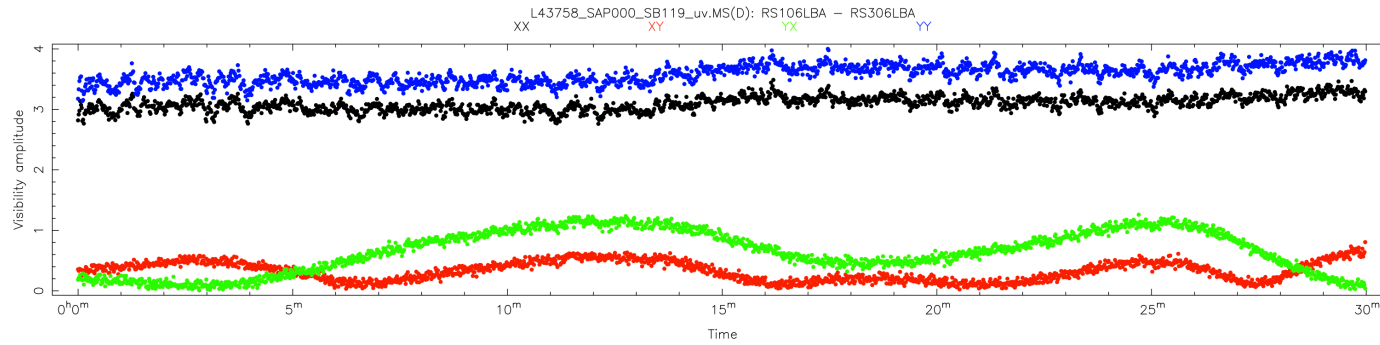
RS106
RS306
RS307



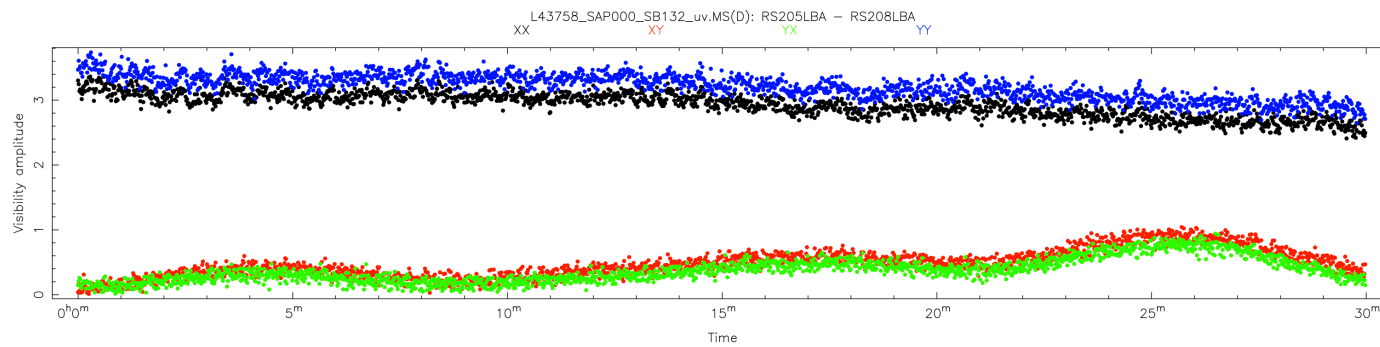
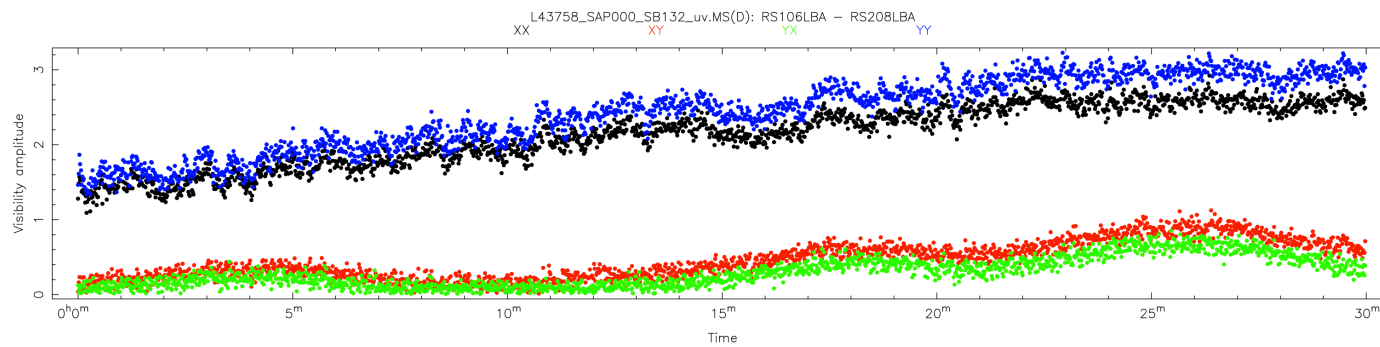
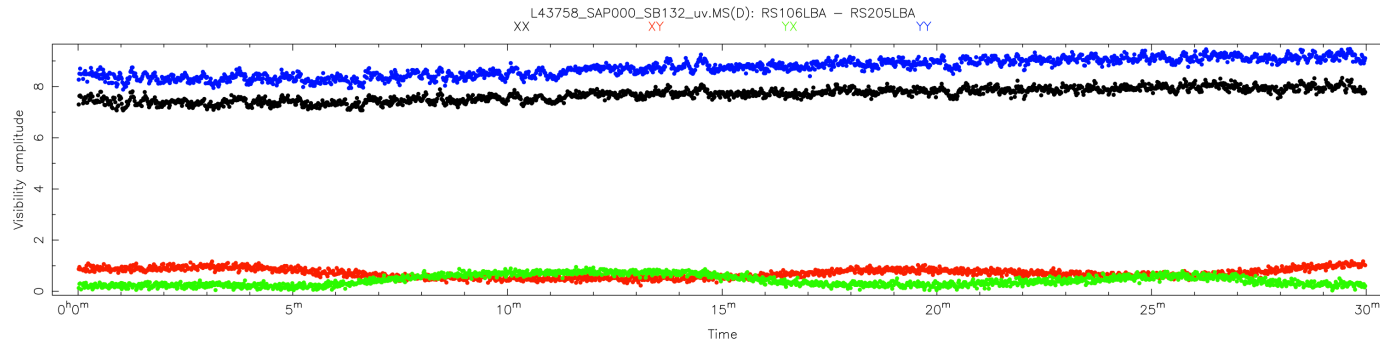
39 MHz



45 MHz



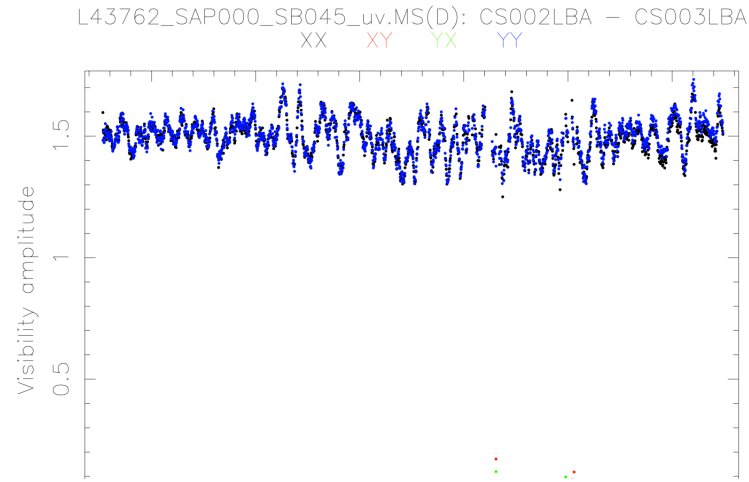
53 MHz



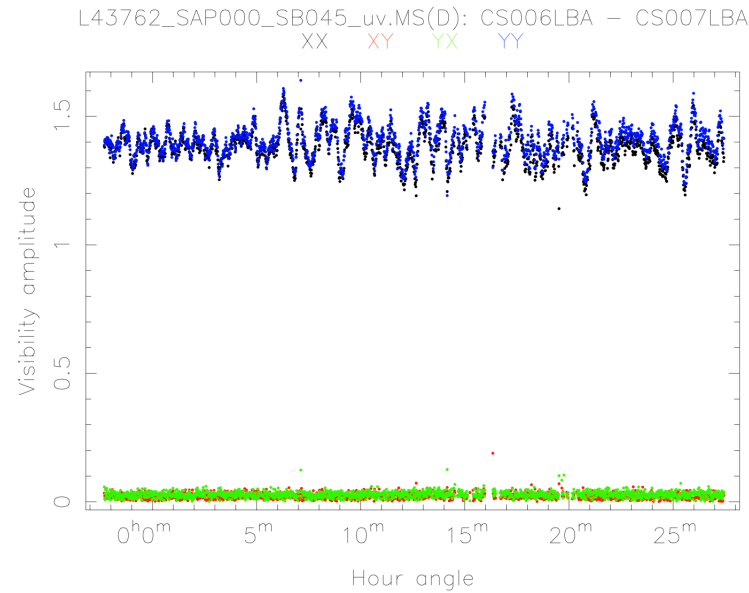
56 MHz

Correlated amplitude scintillation on Superterp (CygA)

CS002-CS003

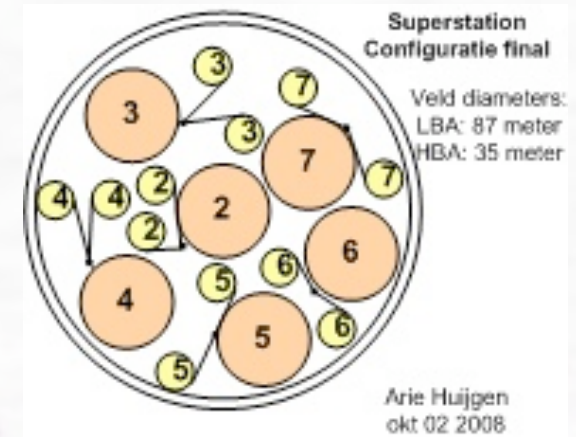


CS006-CS007



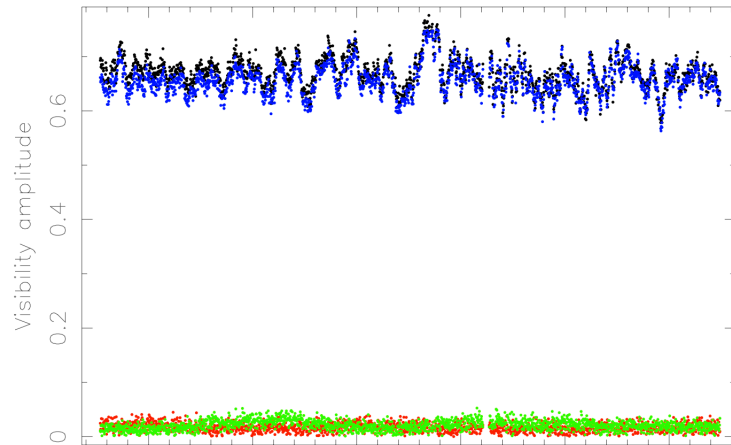
LBA-inner 39 MHz

24 Jan 2012

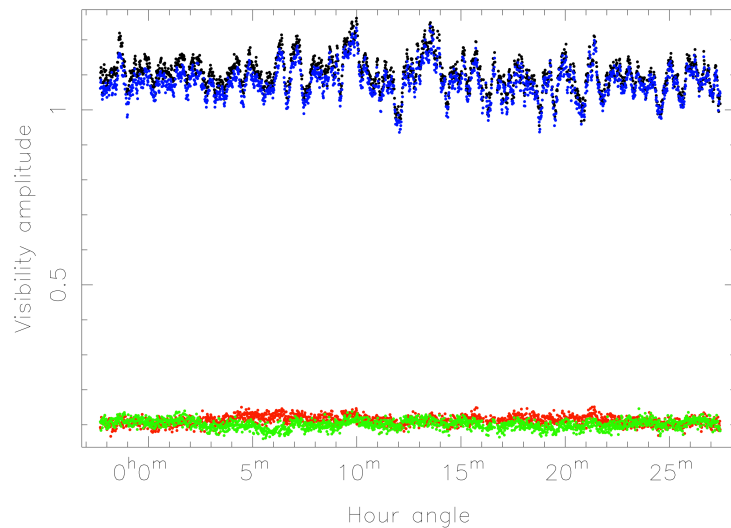


Decreased correlation amplitude on 1-2 km scales

L43762_SAP000_SB045_uv.MS(D): CS030LBA - CS101LBA
 XX XY YX YY



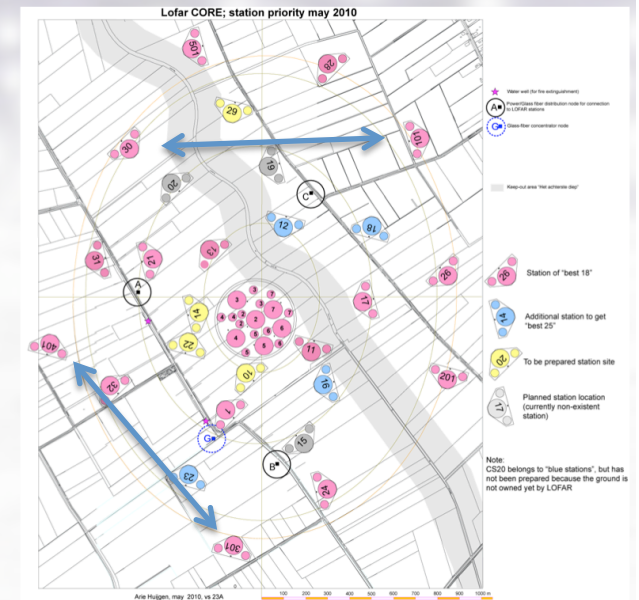
L43762_SAP000_SB045_uv.MS(D): CS301LBA - CS401LBA
 XX XY YX YY



39 MHz

CS030-CS101

CS301-CS401



Bas van der Tol movie (A-projection stabilizes ionosphere)

