AR1 (spectral line) commissioning plan

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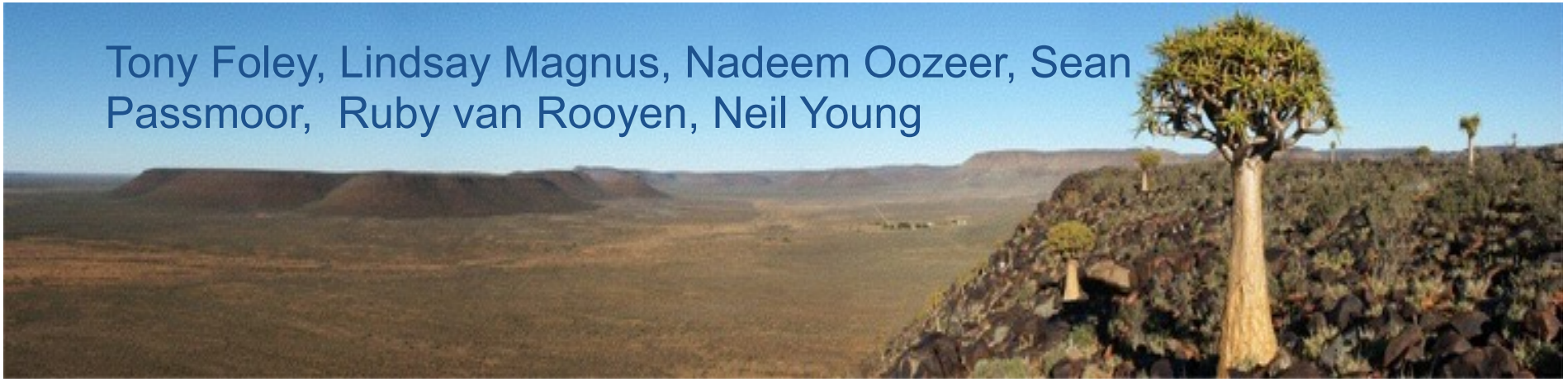
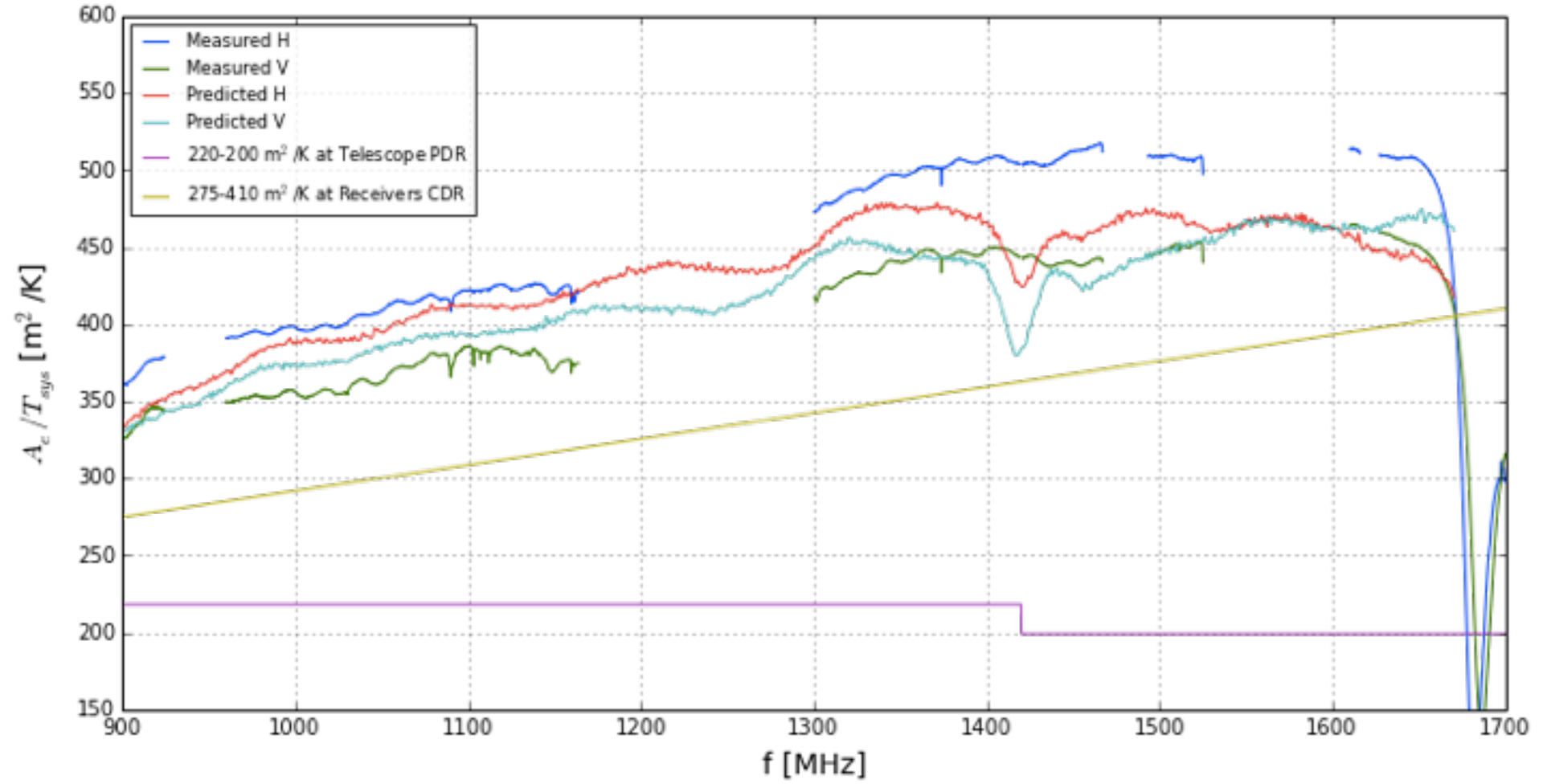


Engineering verification/commissioning

- Receptor test system (RTS)
  - Acceptance testing of antennas after handover
  - 4 antenna inputs
  - 4K & 32 K channels
  - L band, 2x Ku test receivers
  - Single dish & interferometric tests
- Antennas then handed over to AR1
- Currently have M024, M025, M031

Measured sensitivity



Array release 1

- 16 dishes
- 4K (209 kHz) and 32K* (26 kHz) channelisation
- Tied array
- Basic sub-array function

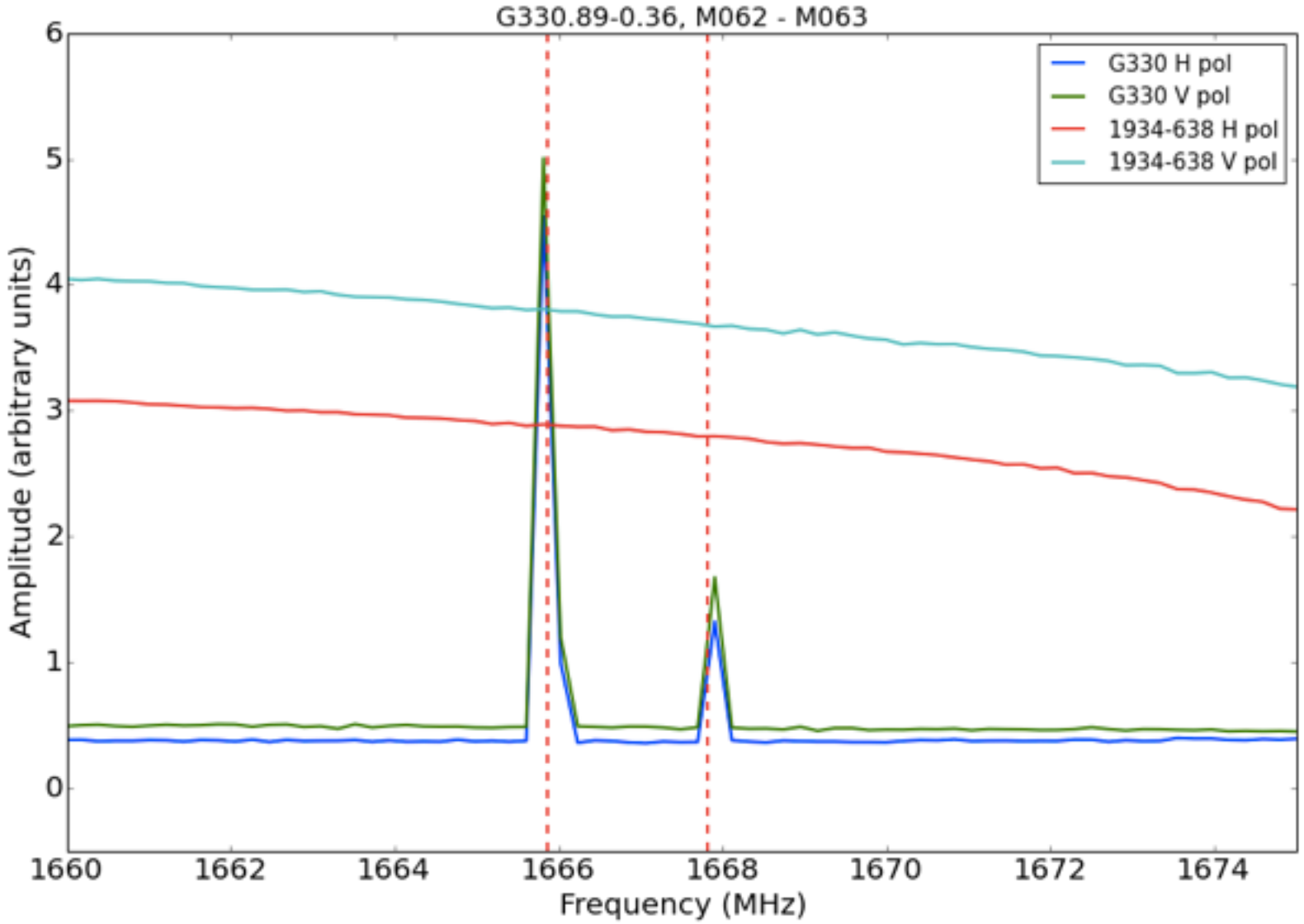
- Currently have M062, M063 (~2 km baseline)

* Not yet available

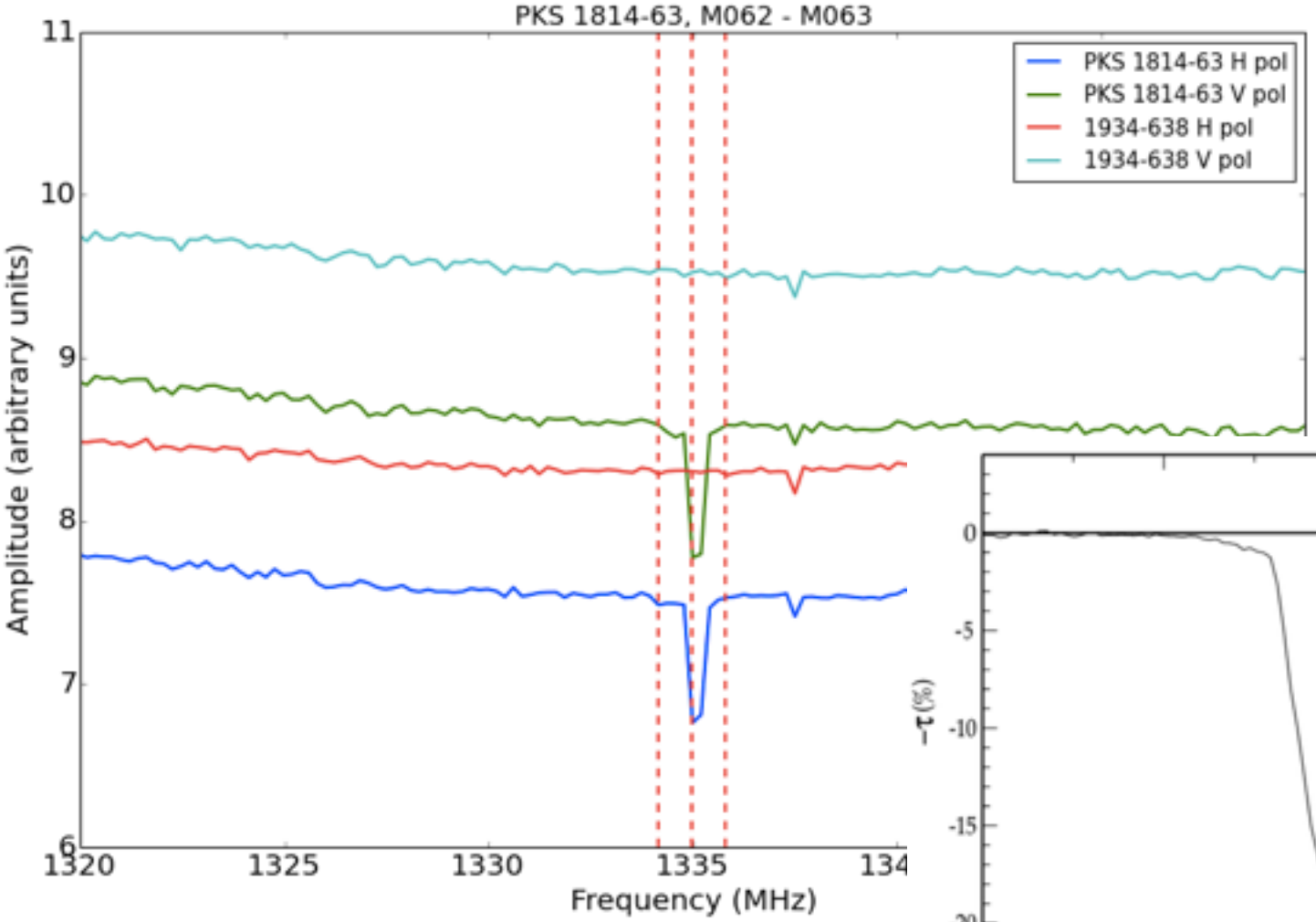
Basic tests

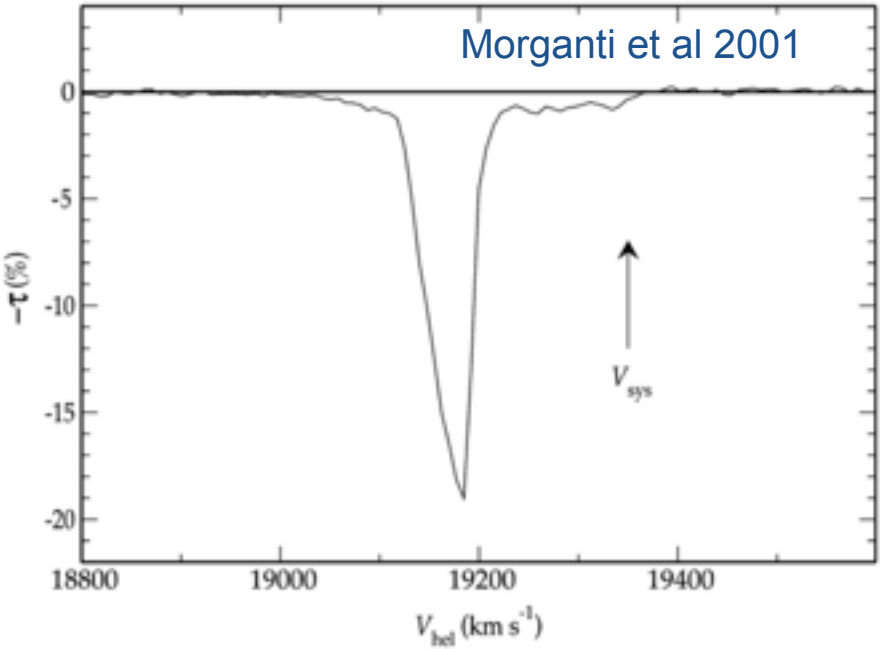
- Single dish
  - Pointing
  - Tipping curve
  - Flux calibration
  - Gain stability
  - Spectral baseline
  - RFI
- Single-baseline
  - Verify fringes
  - Verify stopped fringes/ delay tracking
  - Verify strong spectral lines detected

OH maser (M062 - M063)

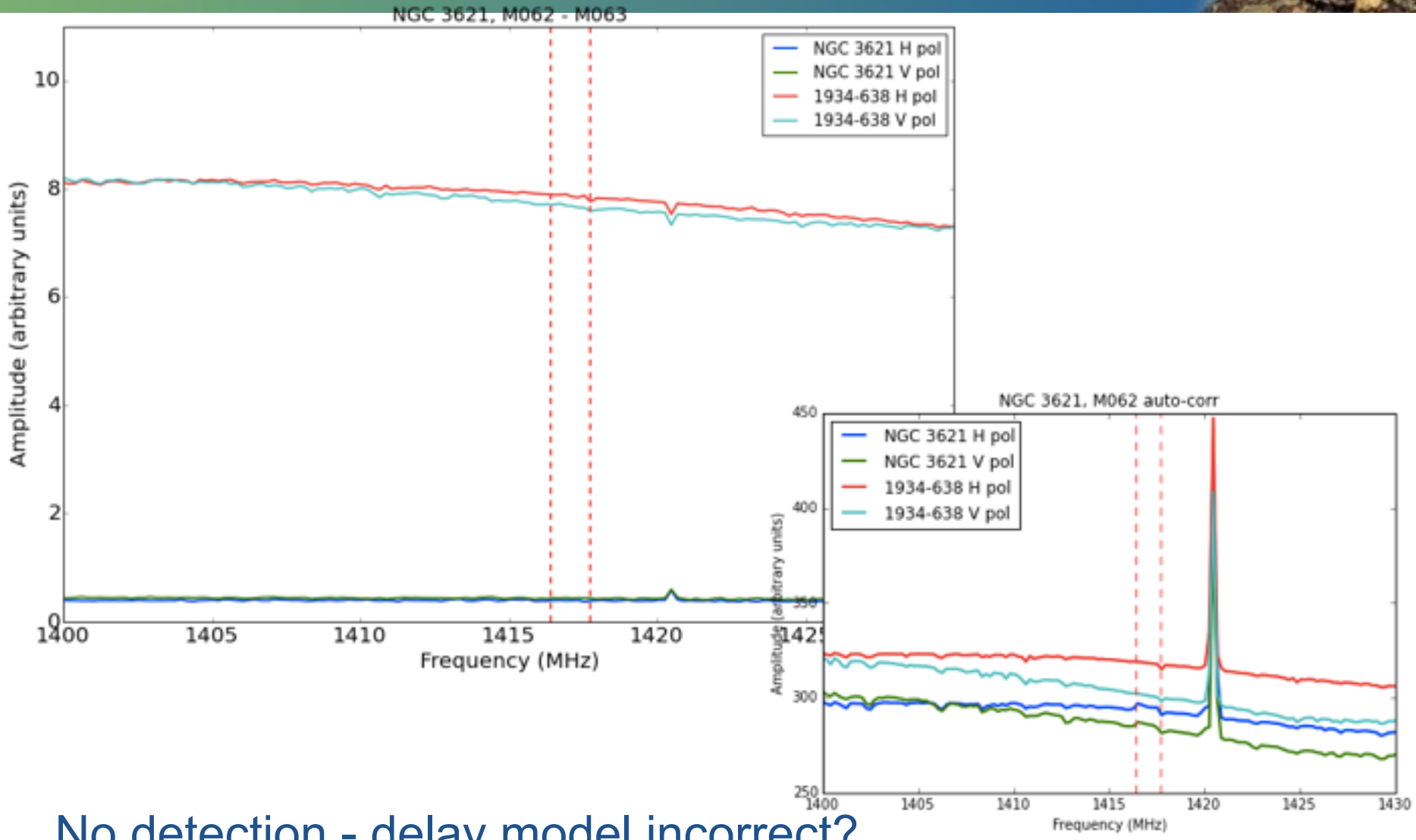


HI absorption PKS 1814-63 (M062-M063)





HI emission NGC 3621



No detection - delay model incorrect?

(min 4 antennas)

- Phase & amplitude closure
- Baseline calibration
  - track strong unresolved continuum sources
  - confirm antenna positions and determine delays
- Delay tracking
  - track strong unresolved sources
  - verify phase stability and coherence across channels and in different pointing directions

Calibration

- Bandpass and delay stability
- Gain stability
- Flux-scale calibration
- Polarisation stability
- Direction dependent effects
  - Field with strong point sources across FOV (J1915-7439)
  - antenna pointing
  - polarisation

Spectral line requirements (full array)

- The telescope shall achieve limiting sensitivity in Stokes I of RMS < 0.8 mJy in 5 km/s channels after only 2 hours of integration, when observing HI or OH lines across the entire frequency range
- After (self) calibration, **line-to-continuum** dynamic range of 60 dB or more must be achievable in L-band, across the -3 dB FoV.
- After (self) calibration, **line-to-line** dynamic range of 40 dB or more must be achievable in L-band, across the -3 dB FoV.
- On applying natural weighting the L-band sensitivity of the interferometer shall change by no more than 25% for angular scales from 8" to 80" for declinations < +10° and tracks of ≥ 2 hour duration.

Test fields (AR1)

- Strong continuum sources (overlap with continuum commissioning)
- PKS 1814-63 (10 Jy continuum, 2.3 Jy absorption)
- G330.89-0.36 (OH maser, 800 Jy peak, sub-Jy maser sources in field of view, extended continuum, weak absorption)
- NGC 3621 (very bright HI galaxy)
- NGC 5236 / M83 (extended HI)
- IC 1459 (faint extended HI, mosaicing?)
- Cen A (extended strong continuum + HI emission)