

**S.P.A.M.**

**Source Peeling &  
Atmospheric Modeling**

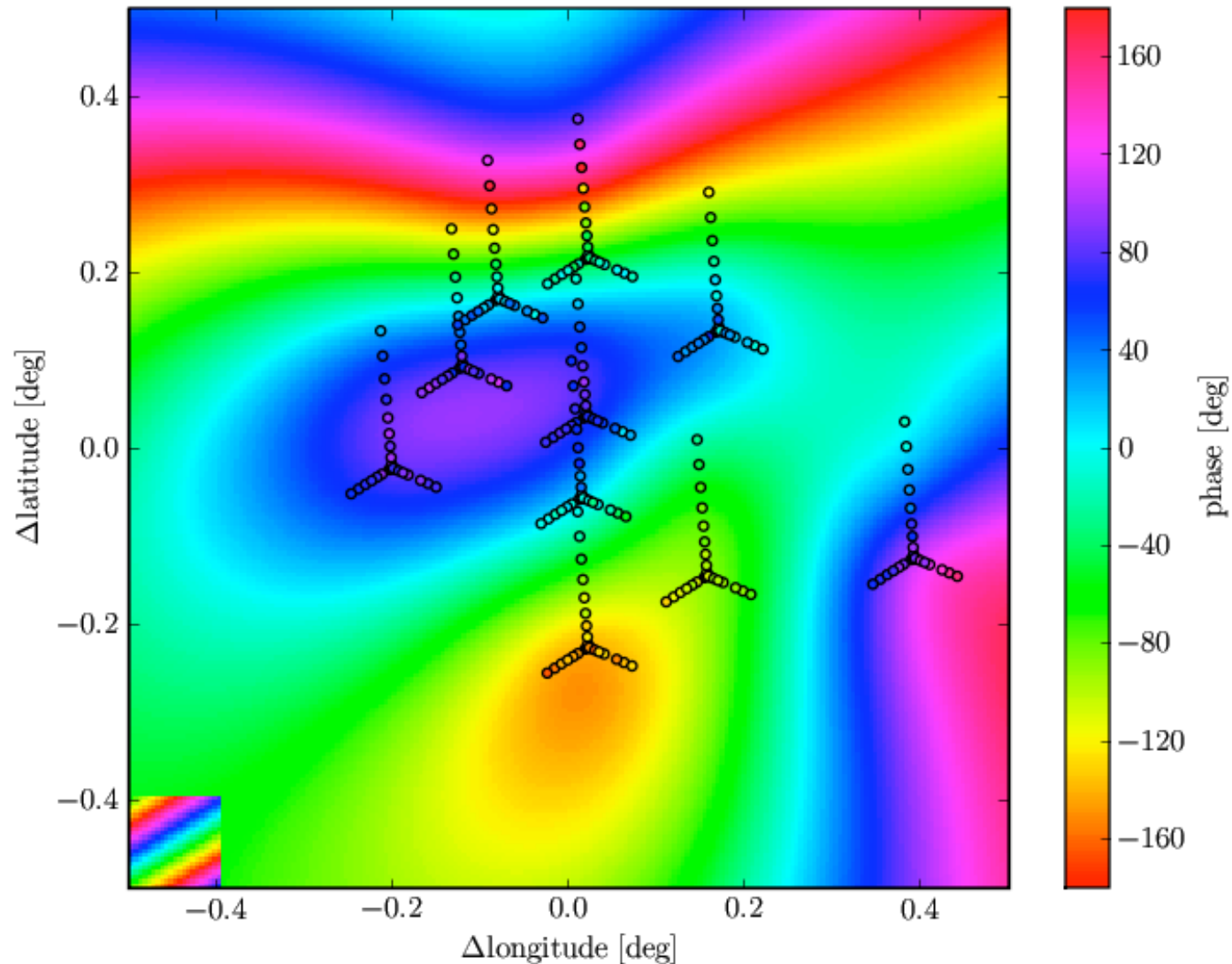
(Intema et al. in preparation)

# SPAM package overview

- Ionospheric phases are obtained from peeling sources in primary beam
- Phases are mapped on thin layer ionosphere at fixed height (200-400 km)
- 2D model is fitted using dominant terms in Karhunen-Loève basis, assuming Kolmogorov turbulence
- Primary beam is imaged while applying model corrections to small patches of sky

# Example: SPAM ionospheric model fit

$n = 131, \sigma_{\text{phase}} = 16.933 \text{ deg}$



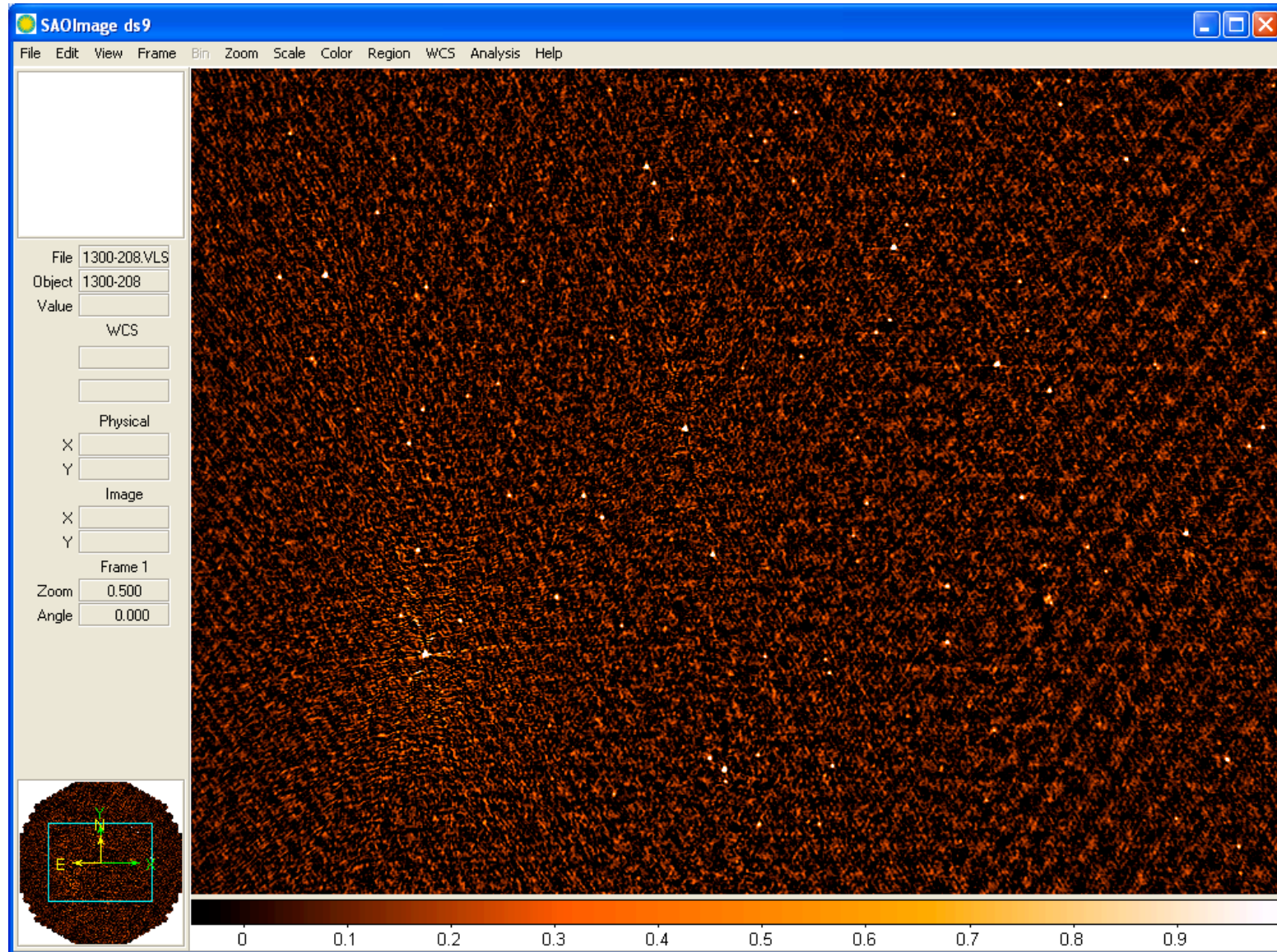
# Successful application to VLSS data

- VLSS: VLA@74 MHz, 1.5 MHz BW, 80'' res., 12 deg. FOV
- B-configuration (up to 10 km baselines), but low decl. field have AnB configuration (up to 22 km baselines)
- Uses field-based calibration (Cotton et al. 2004)
- Average noise level is  $\sim 100$  mJy/beam

# VLSS 1300-208 field

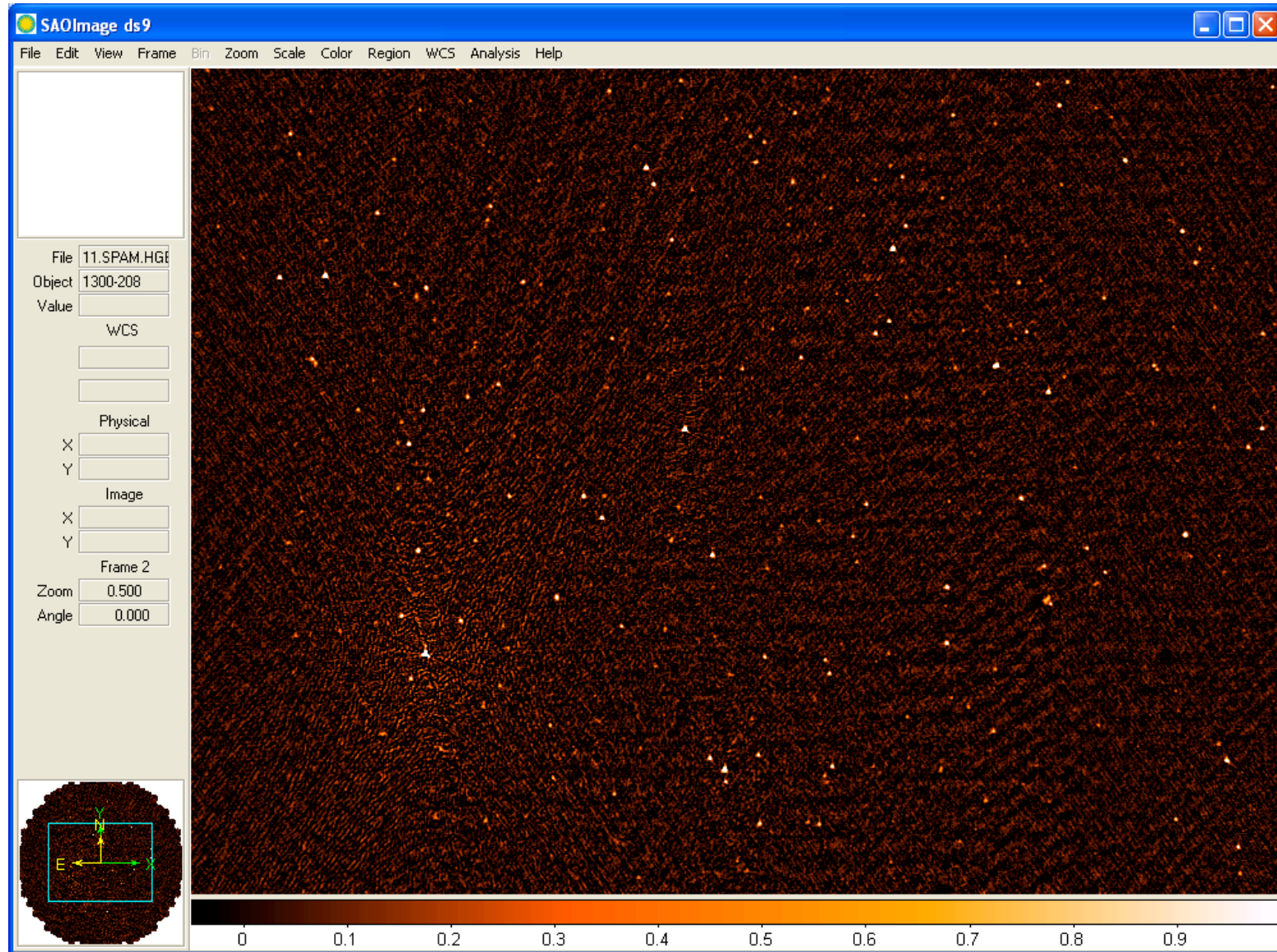
- AnB configuration
- Number of bright ( $> 10$  Jy) sources
- Noise level  $\sim 120$  mJy / beam
- Evidence of excessive smearing due to ionosphere

# VLSS 1300-208 image

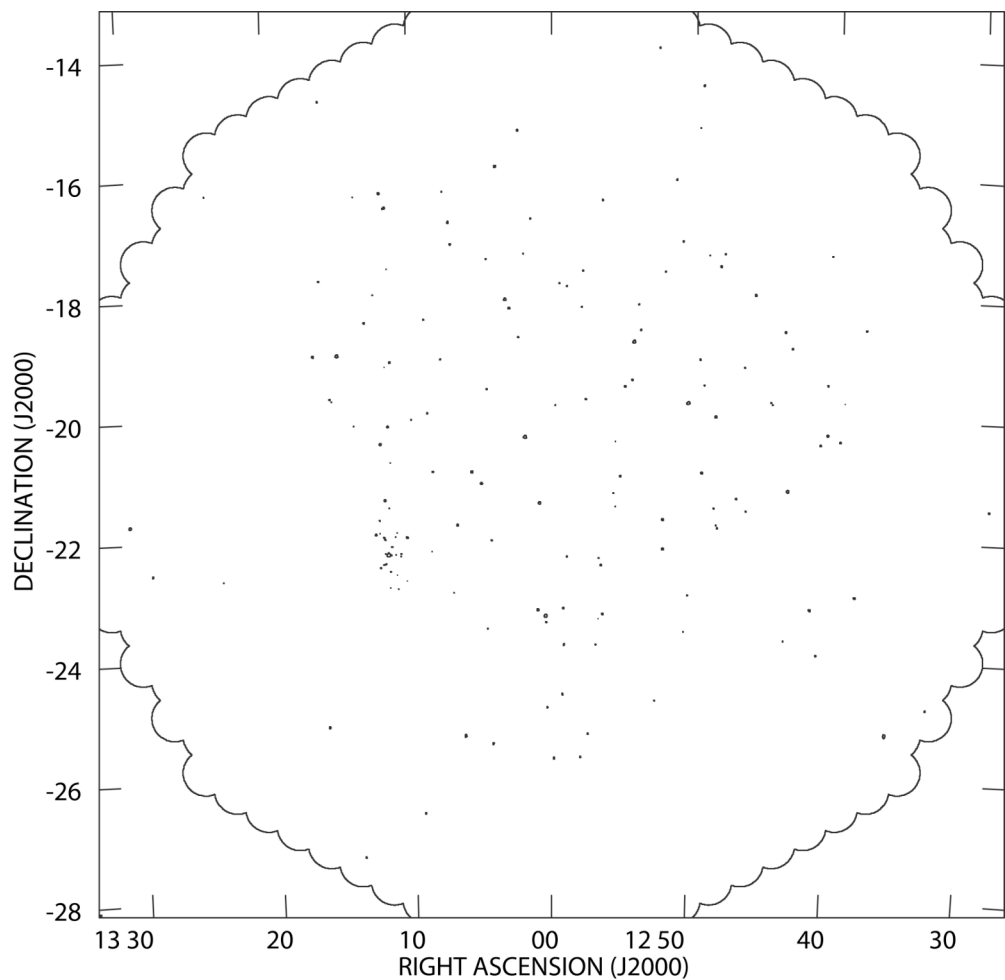




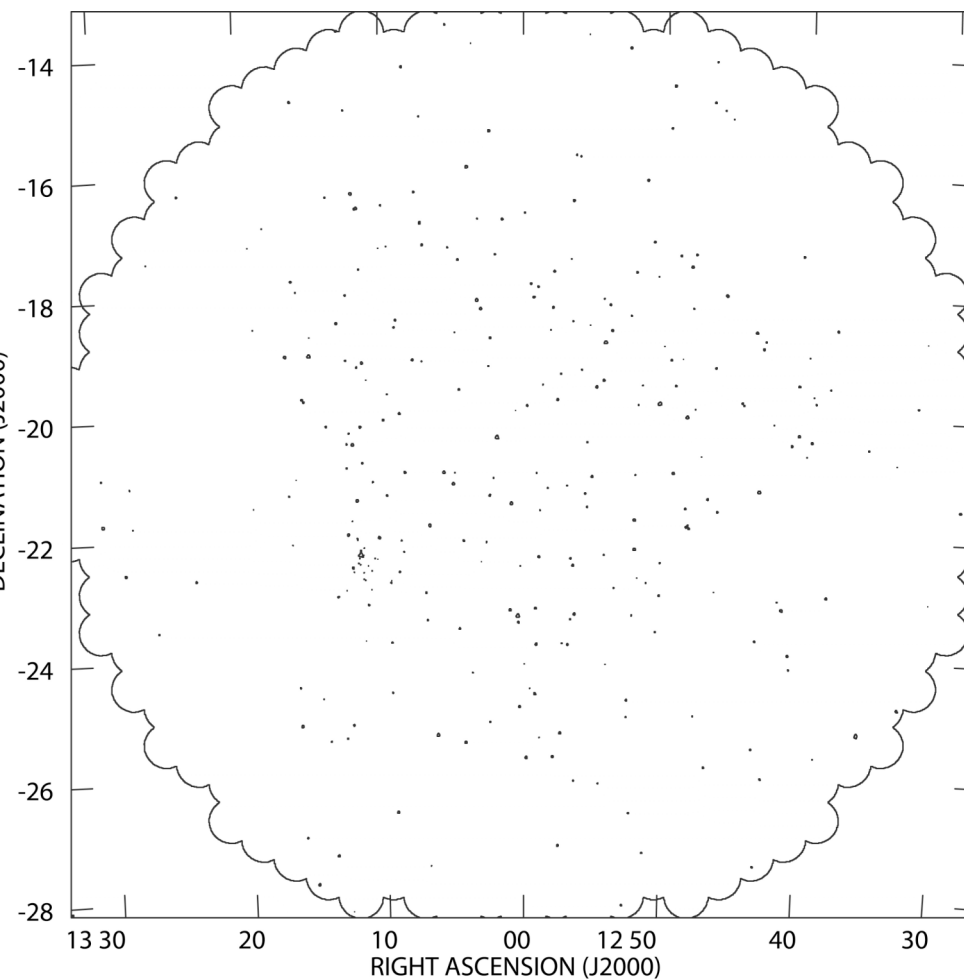
# SPAM 1300-208 image



# 1300-208: 7 sigma source detections



VLSS image

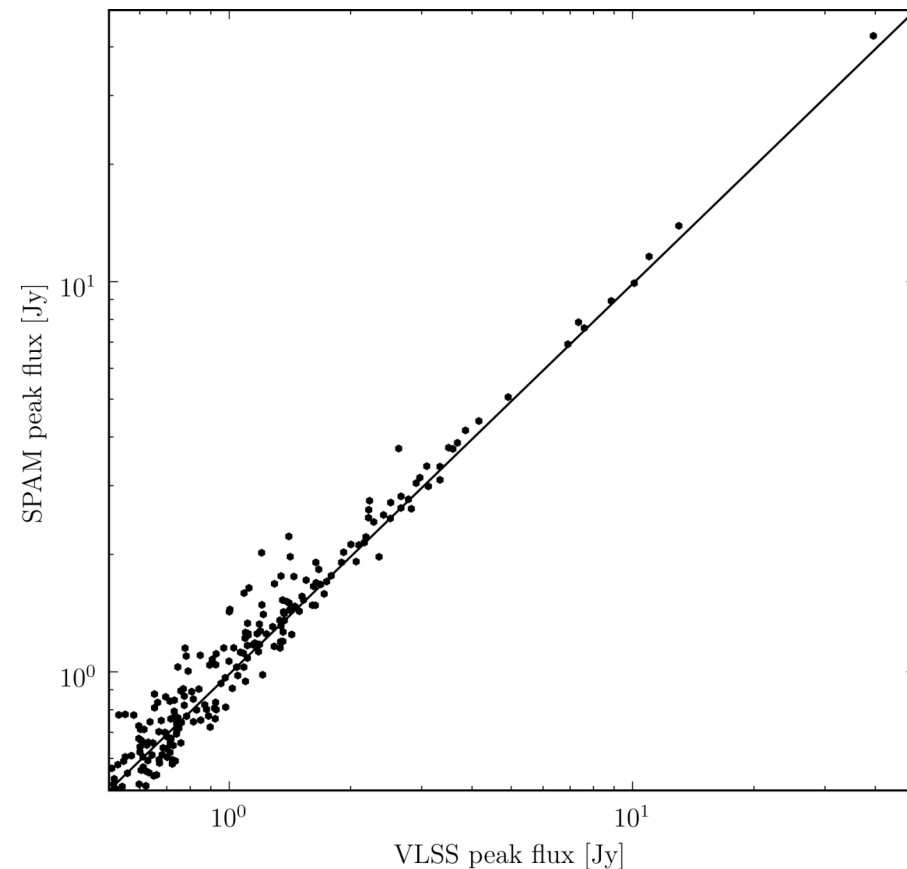


SPAM image



# 1300-208: SPAM versus VLSS

- 70 versus 120 mJy/beam
- 300 versus 150 source detections (7 sigma)
- Less smearing of sources (higher peak fluxes)



# General: SPAM versus VLSS

- Does not / does assume compact array configuration
- Ionospheric model fit domain is attached to Earth / sky
- Uses adaptive KL basis / non-adaptive Zernike basis
- Nice / horrible extrapolation properties
- Possible / impossible to extend to 3D