LOFAR technical working group (TWG)

M.A. Brentjens

Radio Observatory
ASTRON, Dwingeloo, The Netherlands

Assen, 2015-06-01

Tasks

- The TWG responds to technical questions posed in the context of policy, investment, or development decisions to be taken by the ILT Director or Board by the ILT; may be asked to prepare background documentation or recommendations for such issues
- The TWG may of its own accord discuss or embark on studying specific technical issues identified as being of substantial importance to LOFAR astronomical functionality. May raise recommendations and conclusions with the ILT Director
- Under responsibility of the Observatory the TWG functions as the review panel to provide to the PC and the Consortia allocation panels unbiased technical assessments of all observing proposals.

Contact

Members

- Michiel Brentjens (chair)
- Ger de Bruyn
- Adam Deller
- Wilfred Frieswijk
- George Heald
- Jason Hessels
- Andreas Horneffer
- Neal Jackson
- Roberto Pizzo
- Sander ter Veen
- Christian Vocks
- Michael Wise

Wiki

- `http://www.lofar.org/operations/doku.php?id=dmt:start`
- Reports
- Supporting documents
- Calculations

Beam models

Element beam model

- Plainly incorrect
- Assumed same for all dipoles
- Encumbers absolute flux calibration
- Incorrect – but salvageable – off-the-bat polarization calibration

Digital beam model

- Not normalized by total power across sky
- Incorrect gain predictions, particularly at high HBA frequencies
- No mutual coupling
- Somewhat degraded far side lobe predictions

Activities

- R&D (Fiorelli & Wijnholds) made detailed plans for new beam modeling effort
- Lead engineer left Astron
- Position advertised soon
- Expected filled early 2016
- Despite this: quick fix normalization in beam model lib underway

Station- and delay calibration

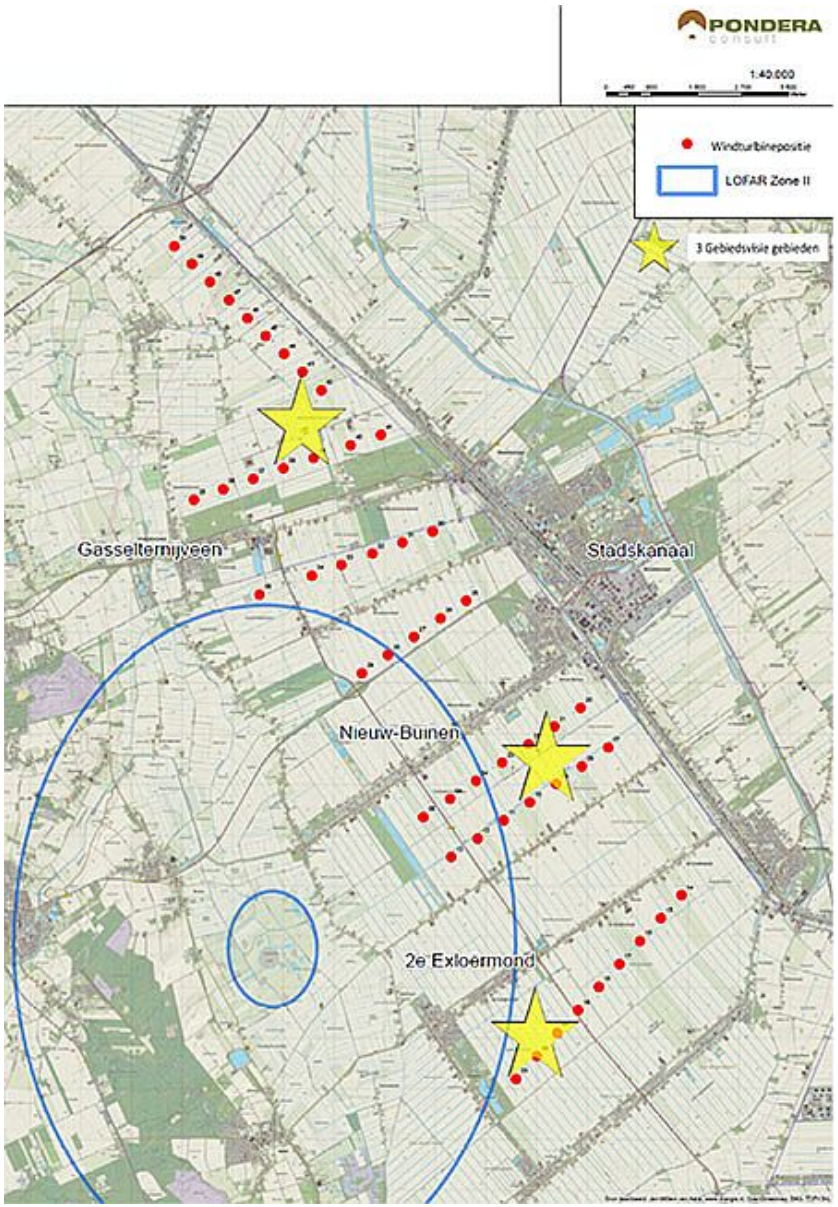
The problem(s)

- Station calibration cumbersome and unreliable
- RFI sensitivity
- Incomplete sky model requires hours to avg over errors
- Bad caltables lead to:
  - Reduced sensitivity
  - Beam shape distortion
  - Polarization distortion

Coming summer

- Investigate new approaches:
- Octocopter: strong, known signal (Italian group/Wijnholds)
- TBB dumps: observe in between RFI; improved DE609 considerably (Wucknitz)
- Holography: improve SNR and decorrelate local RFI by using distant reference station (Michiel Brentjens & summer student)

Wind turbines at LOFAR core



Minister Kamp's decision

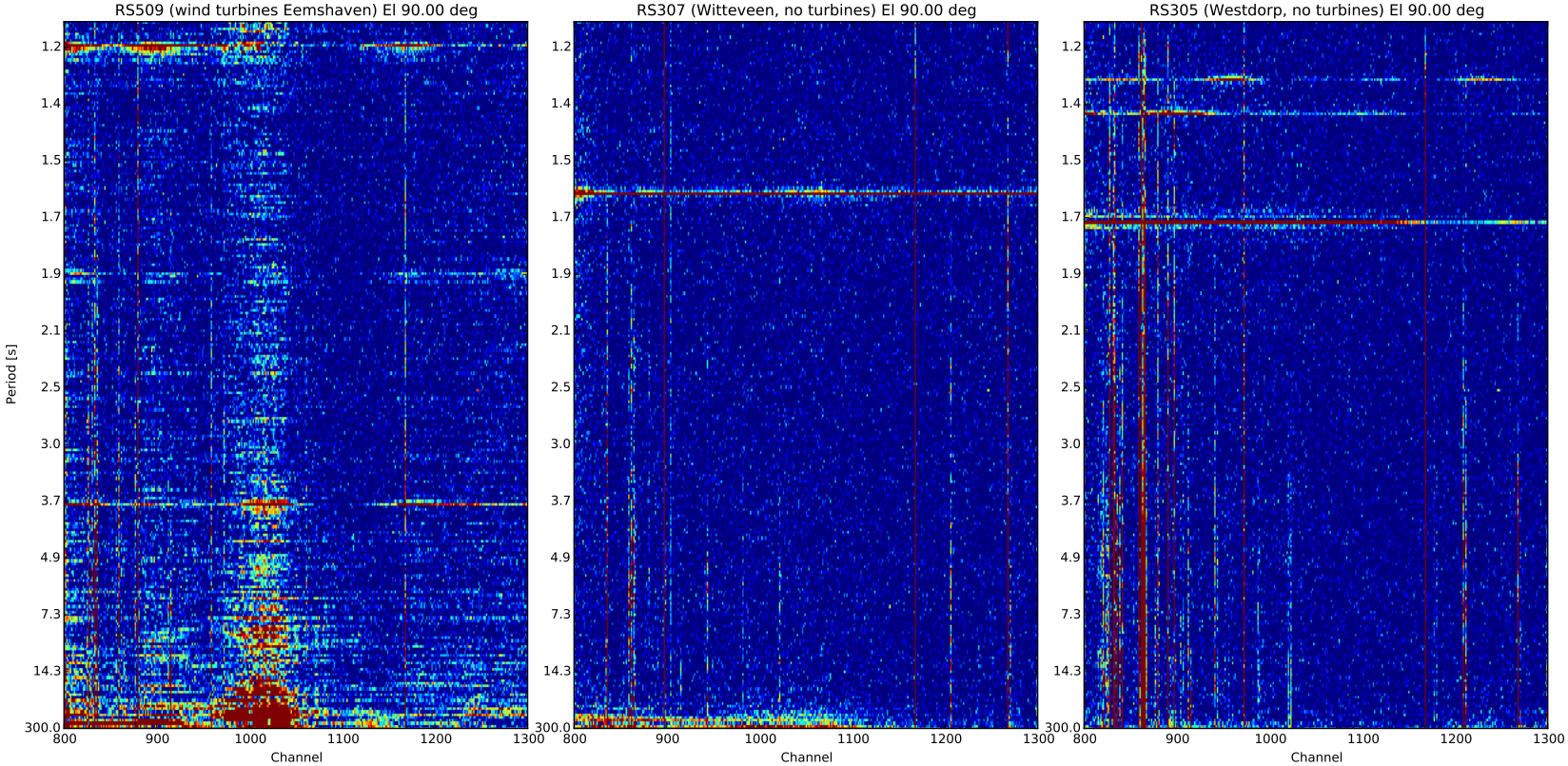
- 50 × 3 MW at 200 m tip height
- 7 turbines in LOFAR zone 2

Preliminary investigation RS509

- 2 × 6 MW at 200 m tip height
- 4.5 km away
- Tens of smaller ones too
- Beam scans LBA and HBA
- Az of turbine, El of 1.25–90 degrees
- Fly's eye 10 ms cadence wide band obs

RS509

LBA observations



Other activities

- CEP4 requirements & tender
- Explore clock distribution improvements/extension
- AARTFAAC extension analysis
- Wet HBA tiles (monitor status)