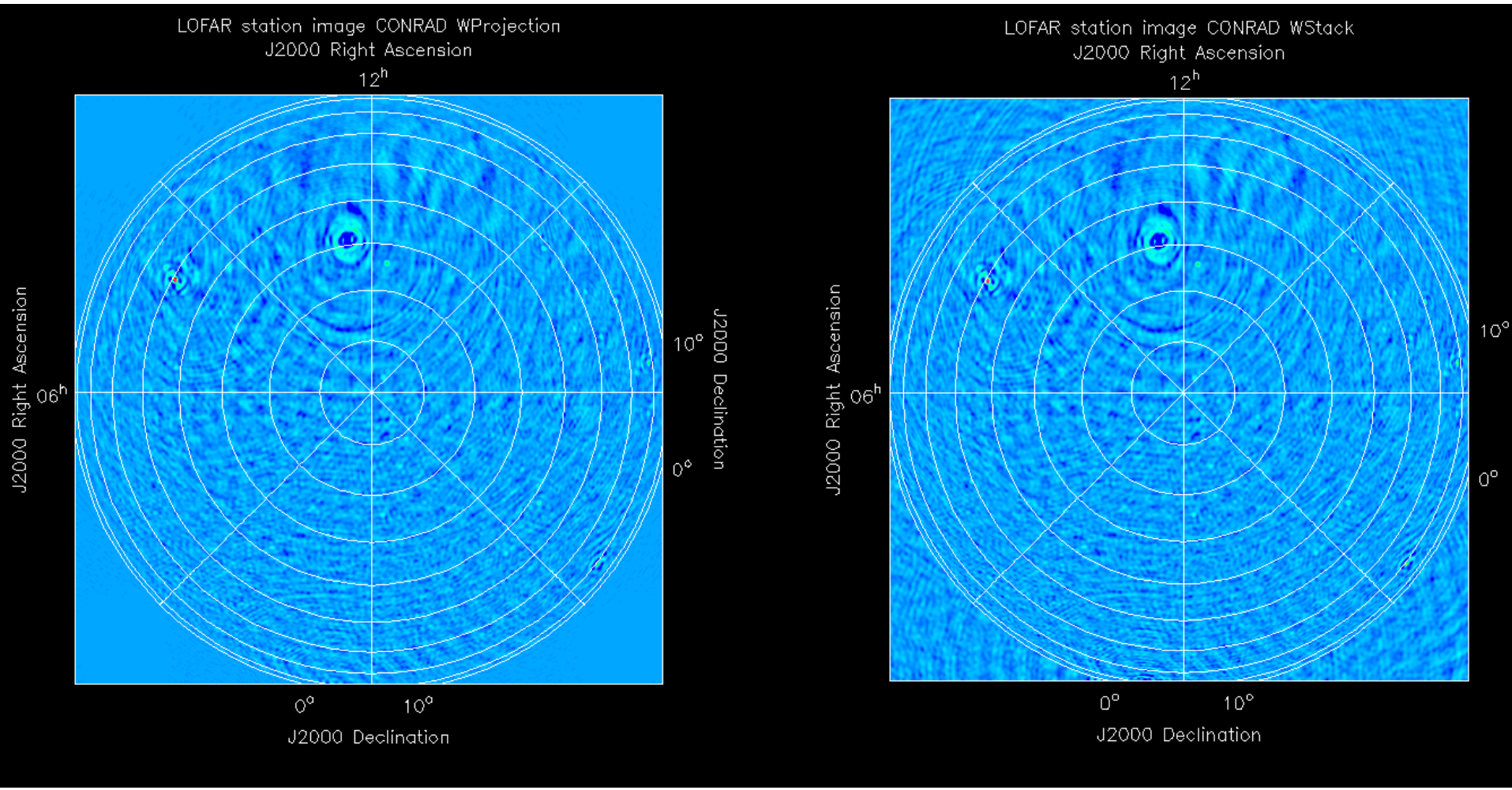
Wide field imaging

- cimager
  - Distributed
  - Not multi-threaded yet
- W-projection with large (>100) convolution support
- W-stack:
  - W-projection on multiple w-planes
  - faster because smaller support needed
  - requires more memory
- No facetted imaging yet

W-projection and W-stack



Direction dependent corrections

- Determine in BBS (Ionosphere, beam)
- Apply during imaging
- Facetted imaging:
  - As constant correction per facet
  - Expensive if many facets needed
- As part of convolution function:
  - Experimental work by S. Bhatnagar

Imaging Full LOFAR

- 3200 channels, 4 Stokes, single precision
- LBA: 5333^2 1.46 Tbyte
- HBA: 6860^2 2.41 Tbyte

54 station HBA:

- data rate of 7.2 Tbyte/hr = 0.25 Gvis/sec
- Gridding one point is 10 Flops
- W-projection; support function of, say, 100^2
- Thus 25 TFlops/sec

Imaging MSSS

- 5 channels, 4 Stokes, single precision
- LBA: 1325^2 140 Mbyte / 3*15 minutes
- HBA: 1225^2 120 Mbyte / 3*5 minutes

- Gridding one point is 10 Flop
- Support function of 100*100
- LBA: 0.5 Gvis/45 min = 0.2 Mvis/sec

  10*10^4*0.2 = 20 GFlop/sec
- HBA: 0.125 Gvis/15 min = 0.14 Mvis/sec

  14 GFlop/sec

Future

- Add facetted imaging
- Add multi-threading
- Gridding is random, so bad CPU cache behaviour
  - Might not scale well to many-core machines
- Investigate accelerators
  - Cell (Delft; Ana Verbanescu)
  - GPU (MWA, ASKAP)
  - FPGA (ASKAP, Cray)