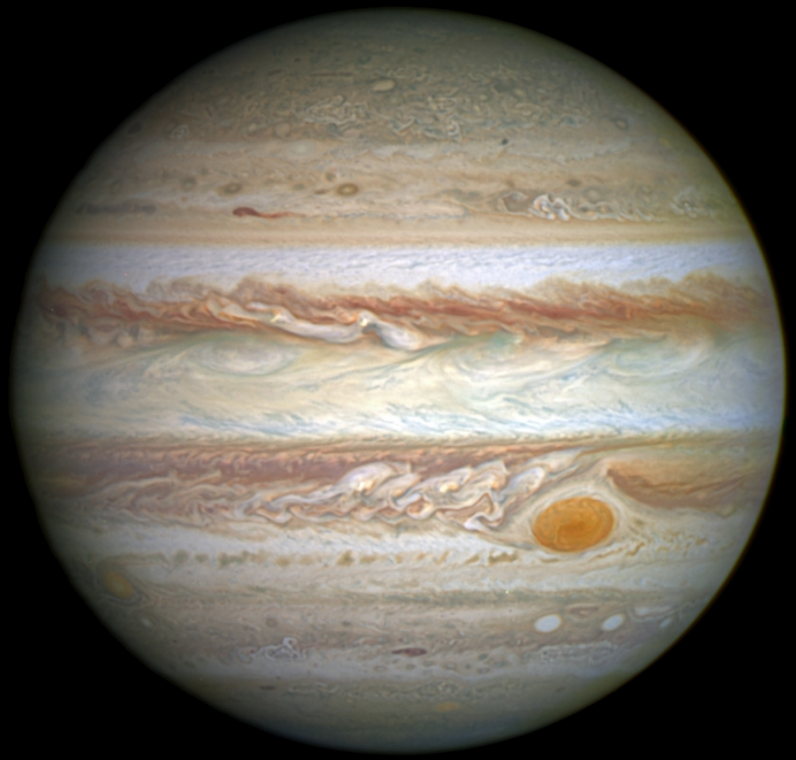
Atmospheric waves and dynamics beneath Jupiter's clouds from radio wavelength observations



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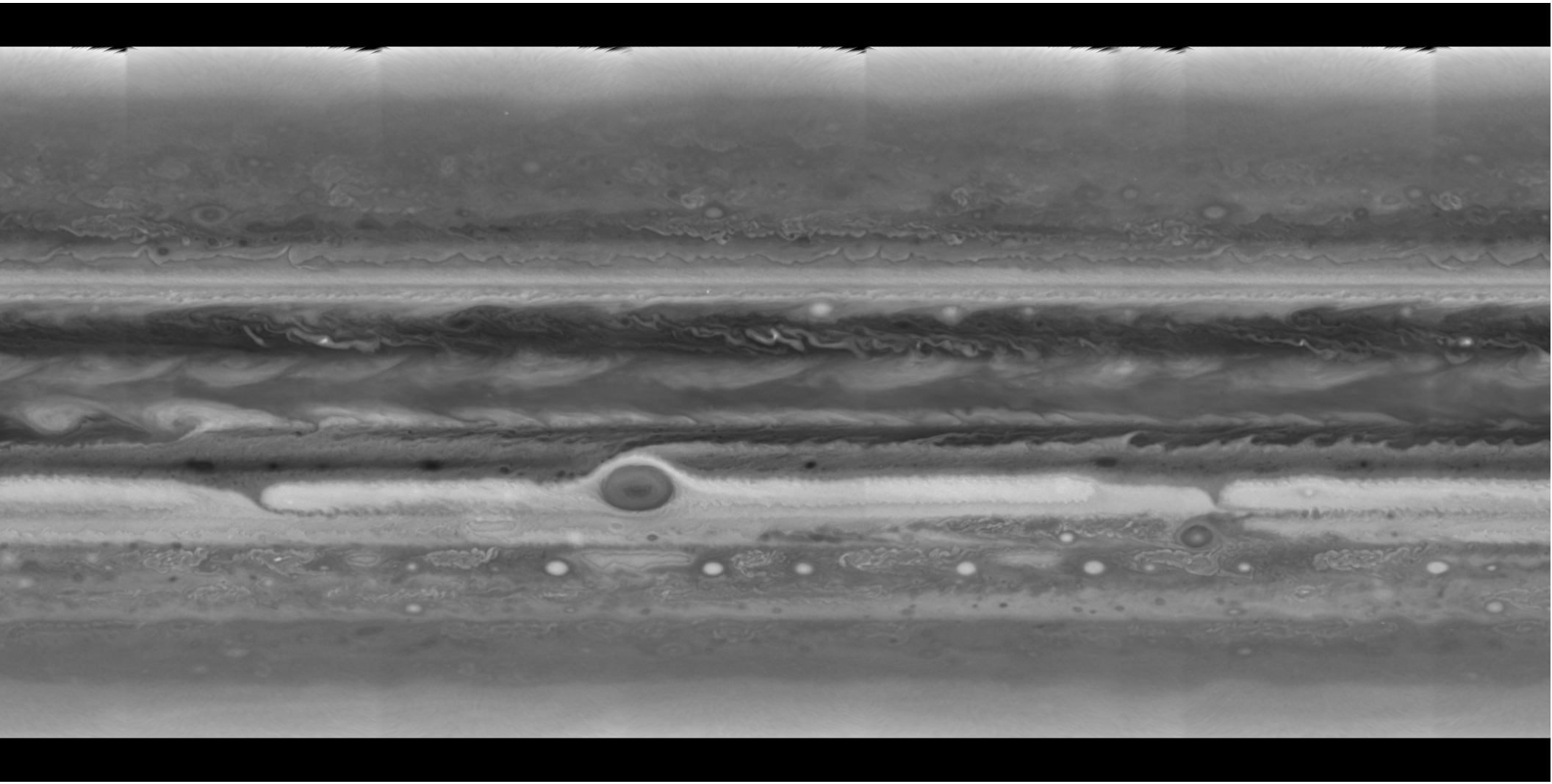
November 4 2016

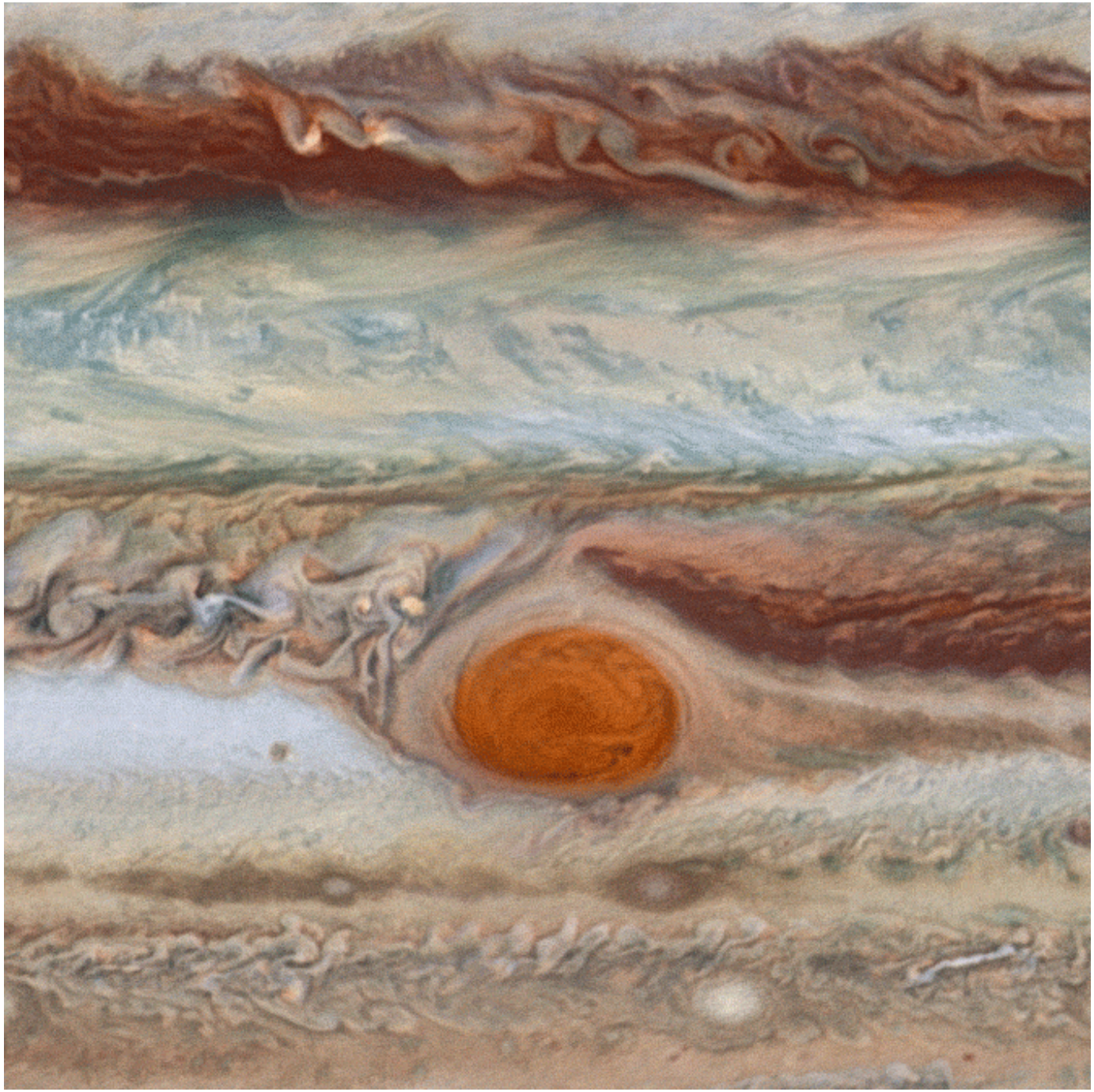
Jupiter – Cartographic Map



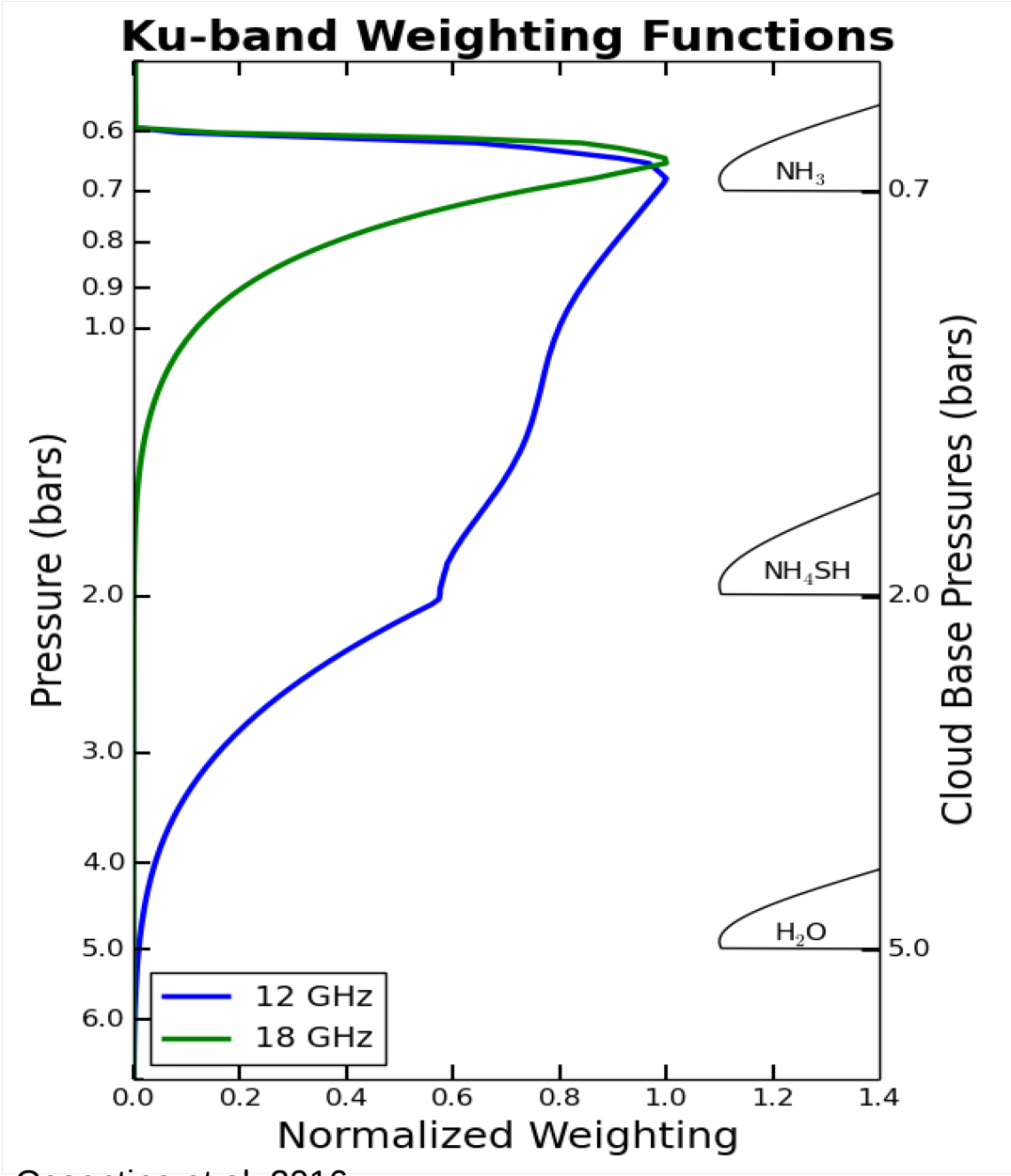
- HST – blue filter
- March 2007
- Latitude [-90, 90]
- Longitude [-180, 180]

Jupiter – Up close

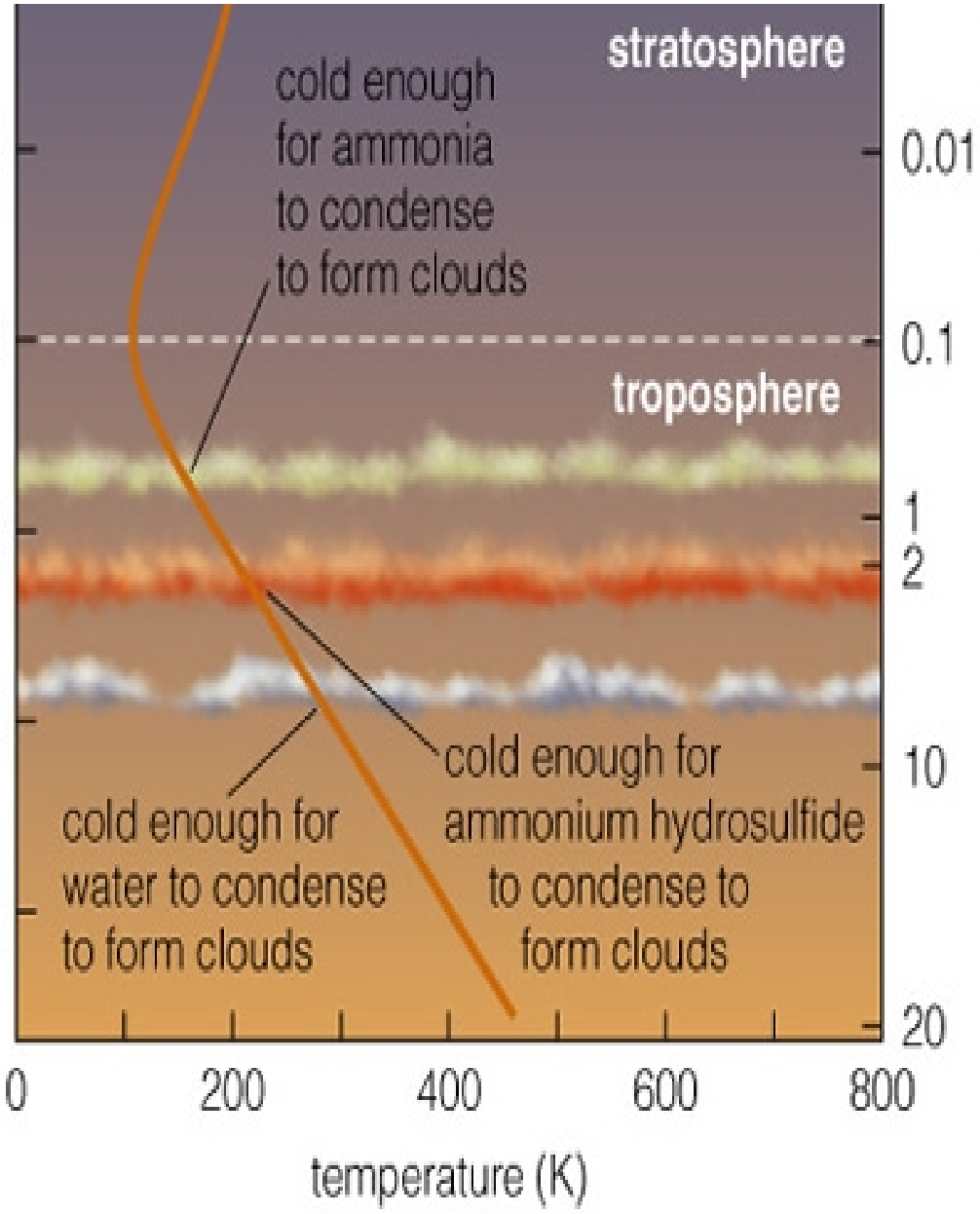
- HST high resolution 0.1°
- Part of OPAL program
- Every year until the end of HST



Radio Emission and Vertical Structure of Jupiter



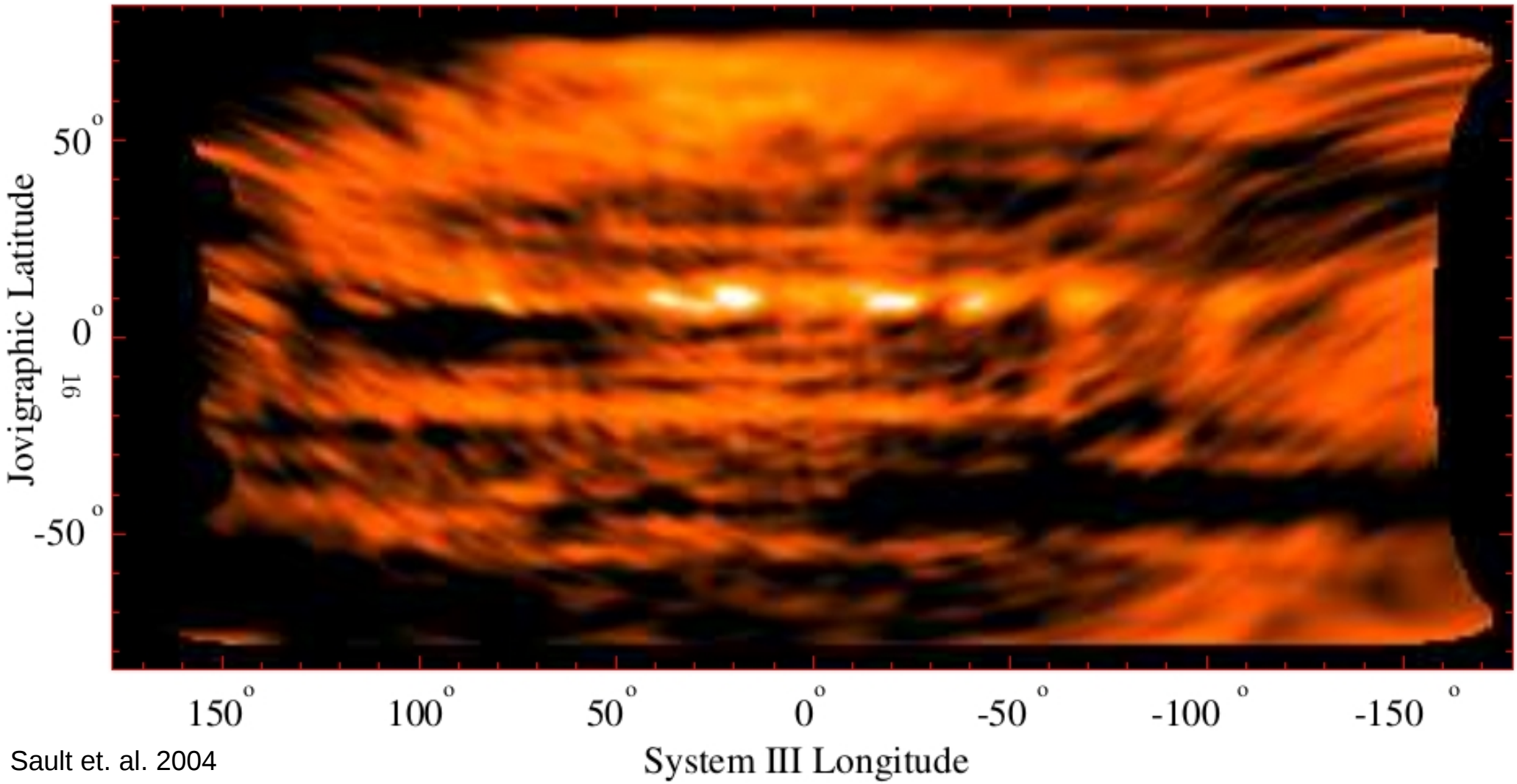
Cosentino et al. 2016



De-Projection Jupiter with VLA

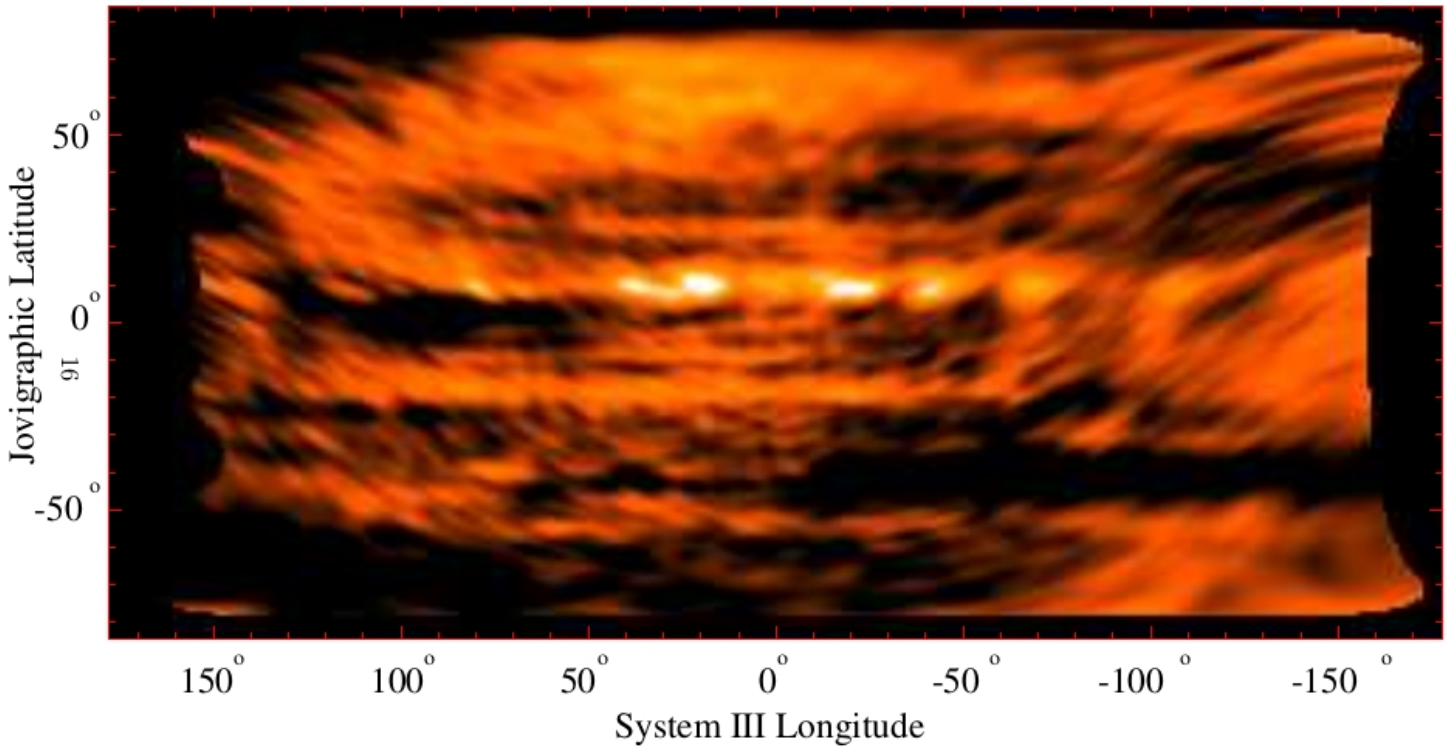
- B-configuration (BnC)
- Ku-band (12-18 GHz)
- Resolution on Jupiter ~ 1.4^{o}

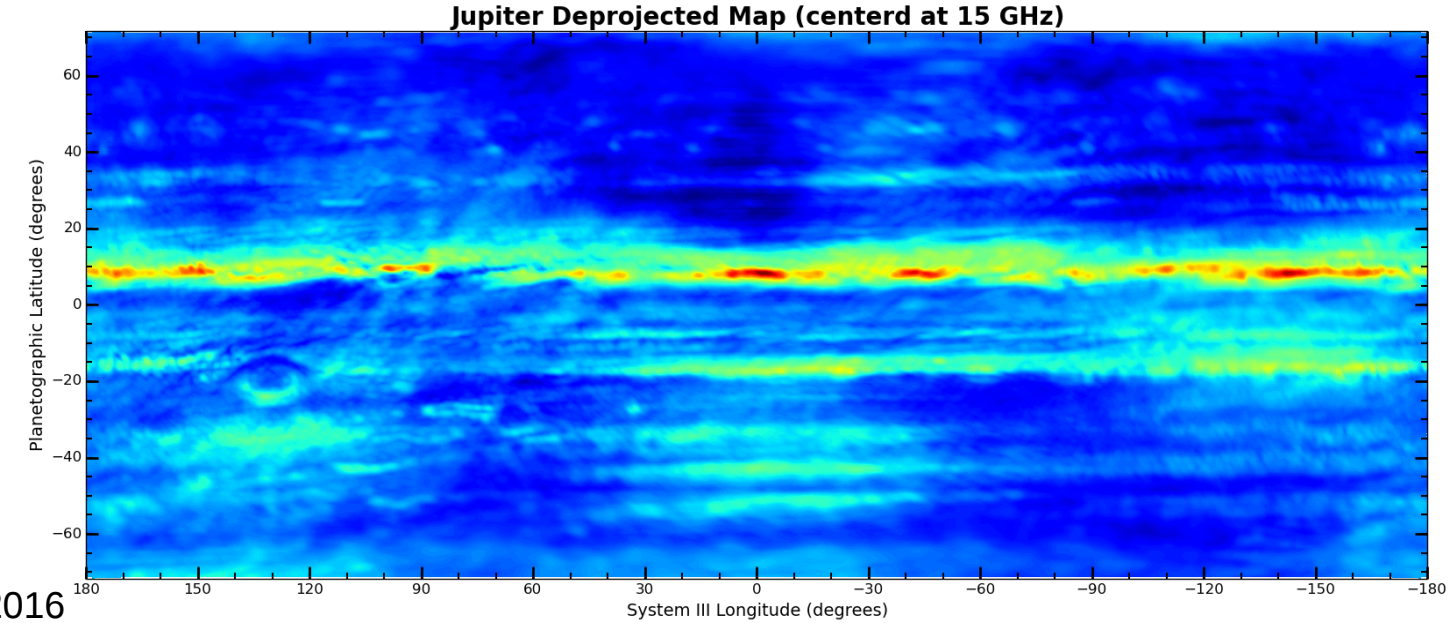
- Algorithm applies linear phase adjustment and adjusts for projection effects to de-rotate emission onto oblate spheroid



Sault et. al. 2004

JVLA Improved Sensitivity



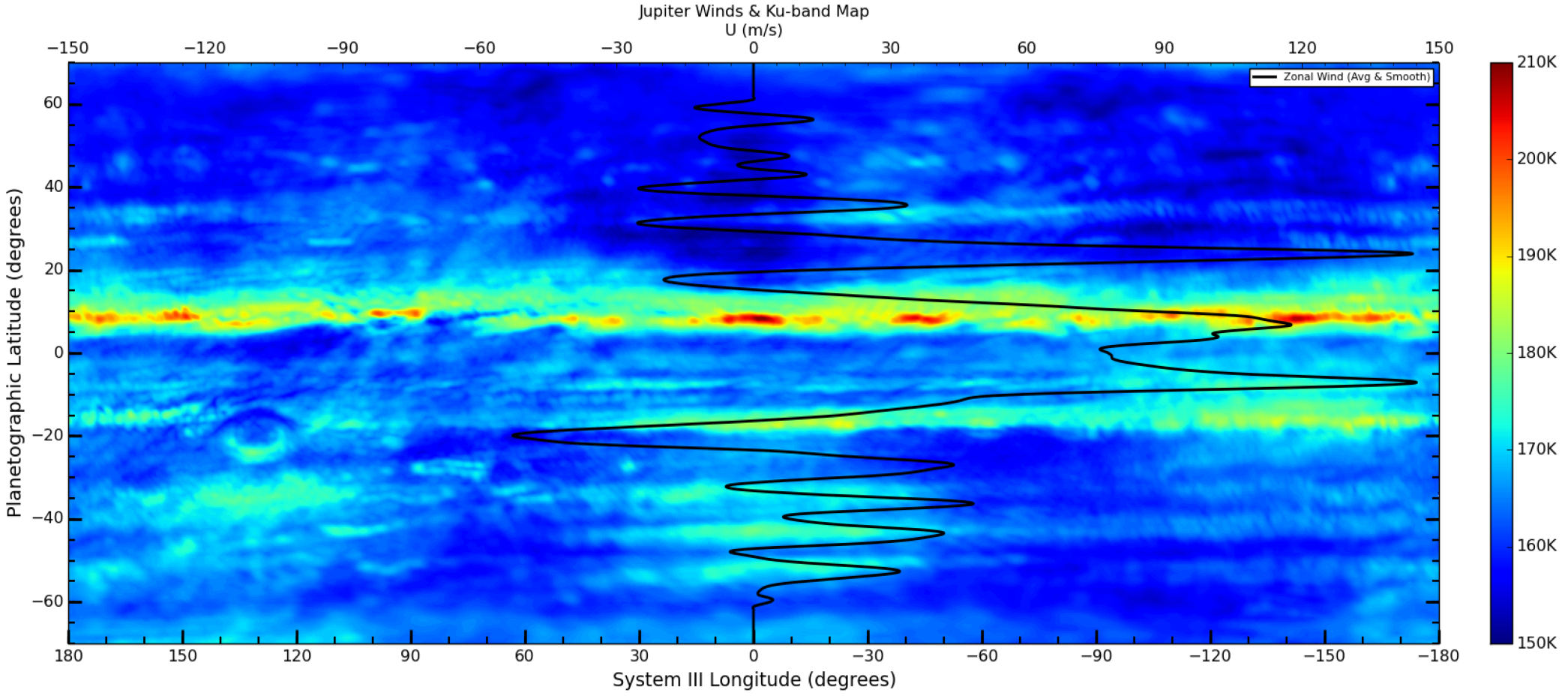


Cosentino et al. 2016

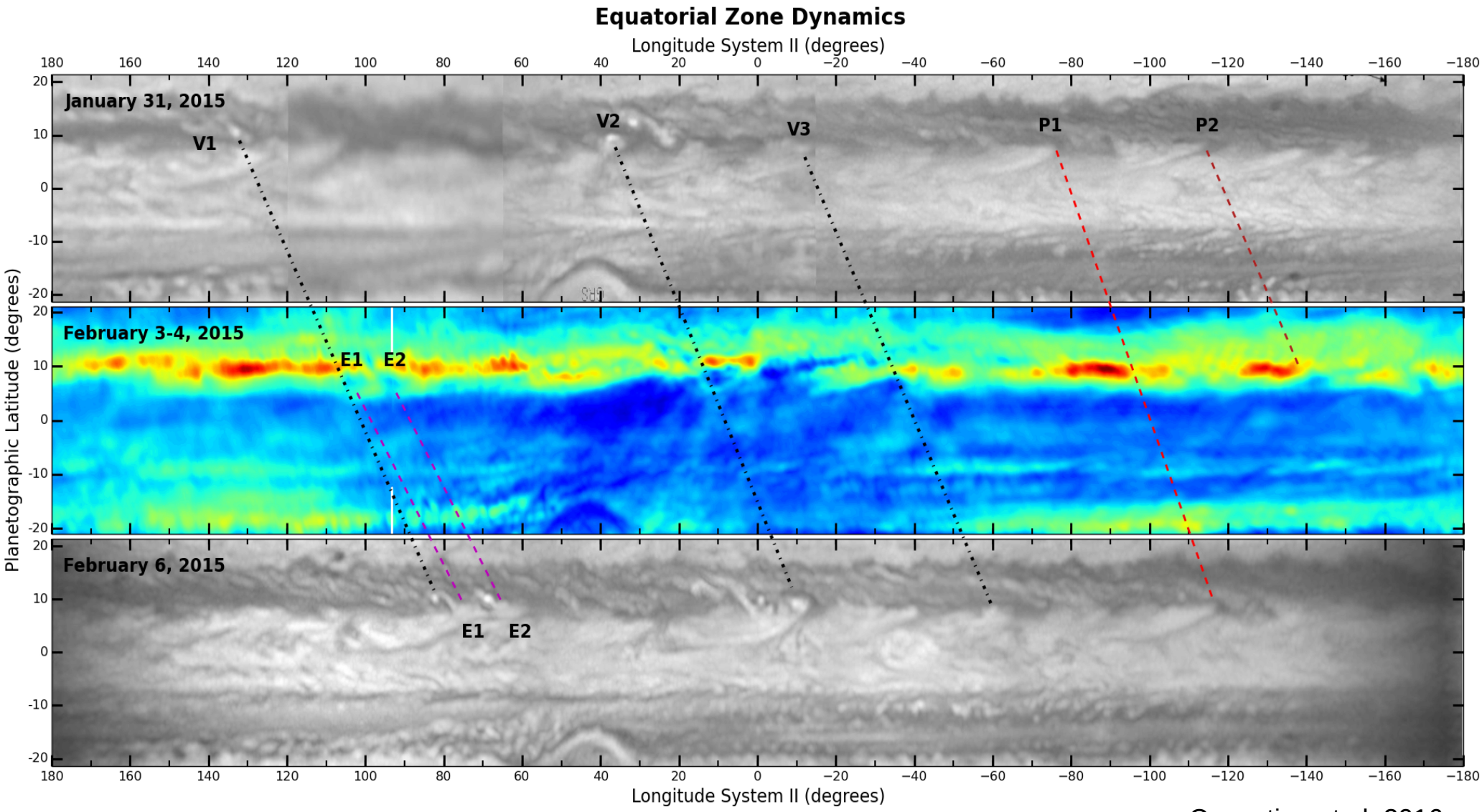
De-Projection Jupiter with JVLA

- B-configuration (BnC)
- Ku-band (12-18 GHz)
- Resolution on Jupiter ~ 1.4^{o}

- Same technique from Sault et al. 2004 with JVLA increased sensitivity



The North Equatorial Belt & “Hotspots”

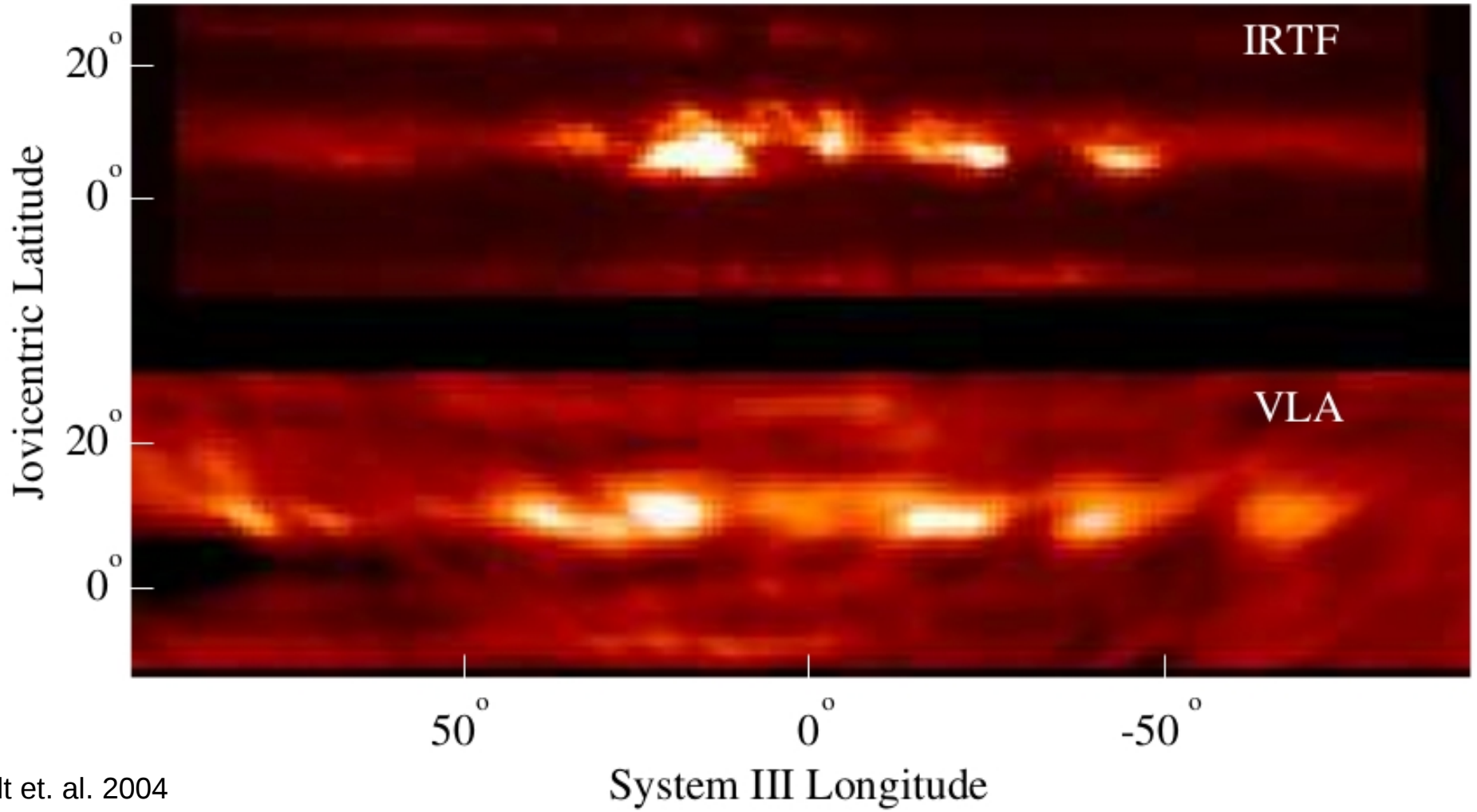


Cosentino et al. 2016

- “plumes” = “hotspots” ?
  - Radio vs Infrared “hotspots”

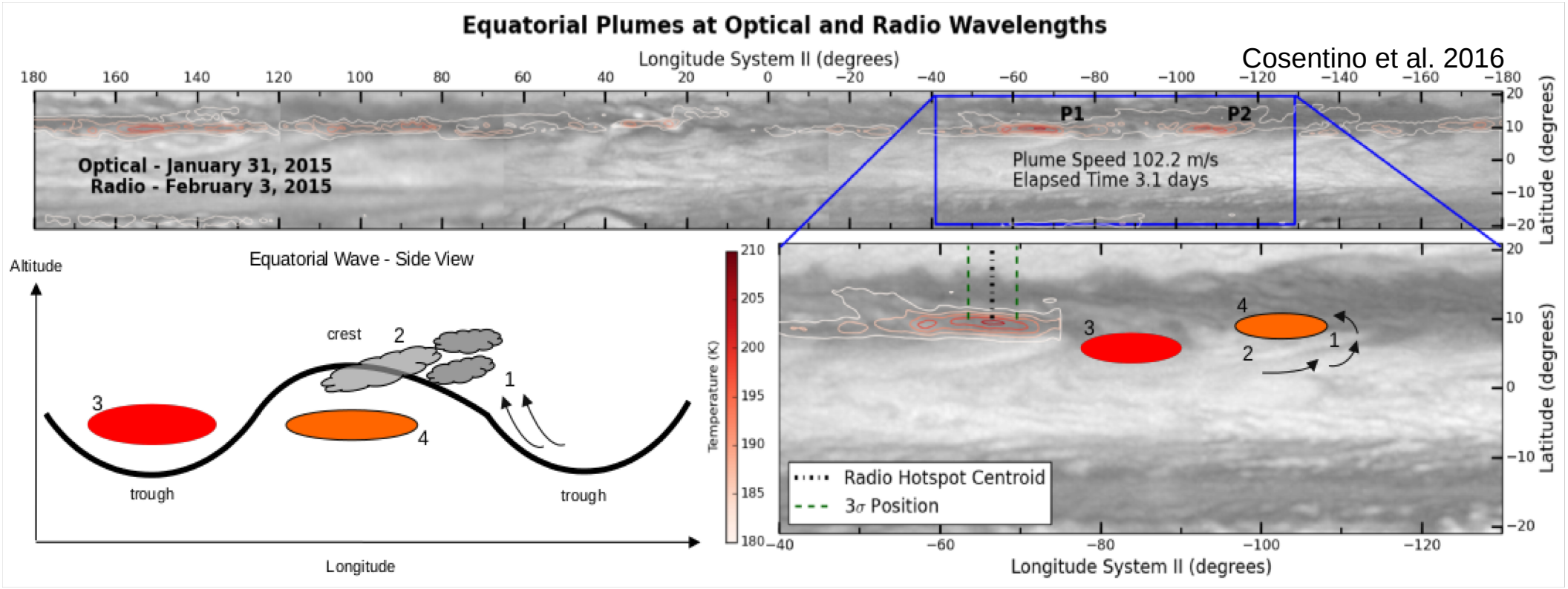
IRTF and the VLA "5 micron hotspots"

- IRTF – Jan 22, 1996 at 4.9 μm
- VLA - Jan 26, 1996 at 2 cm



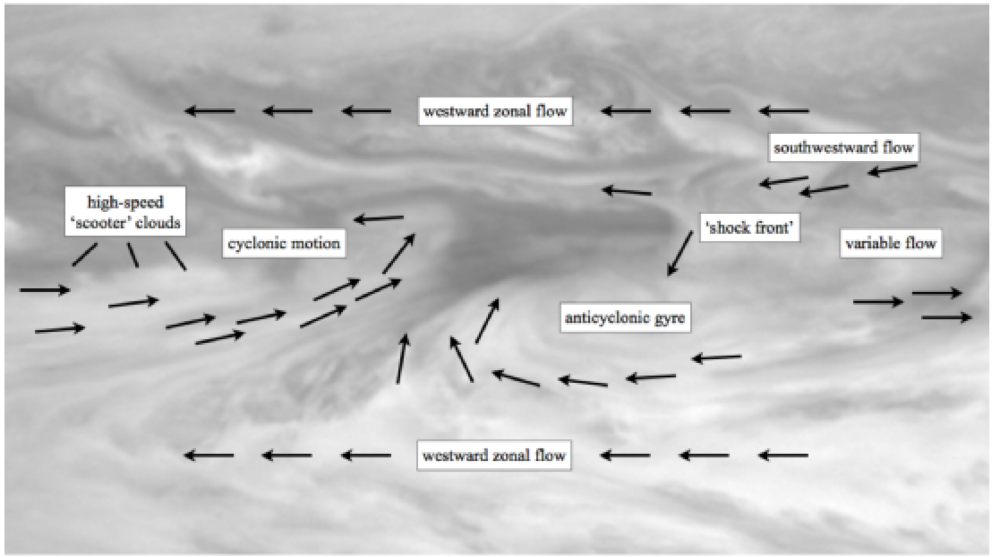
Sault et. al. 2004

Radio and Infrared “Hotspots”



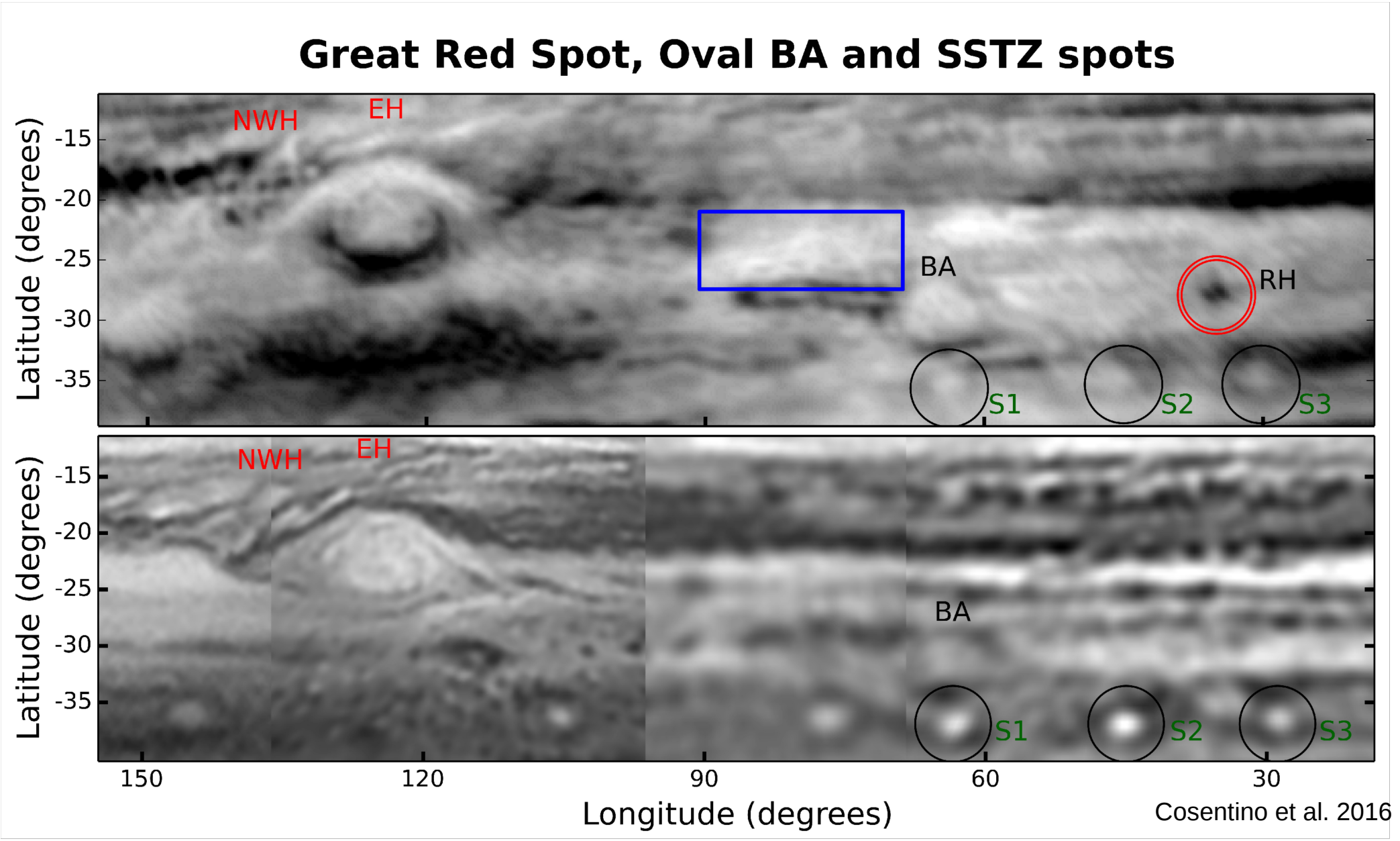
Cosentino et al. 2016

1) Cyclonic motion
2) Upper level “plume” clouds
3) Infrared “hotspots”
4) Radio “hotspots”



Choi et al. 2013

Comparing Optical and Radio Wavelength Images



What's next?

- Juno has arrived!
- Jovian circulation
  - shallow or deep?
- More radio observations, more dynamics
  - Directly measure deep winds