Polarisation studies on MHD simulations of molecular clouds: comparison between different approaches

Elisabetta Micelotta

University of Helsinki

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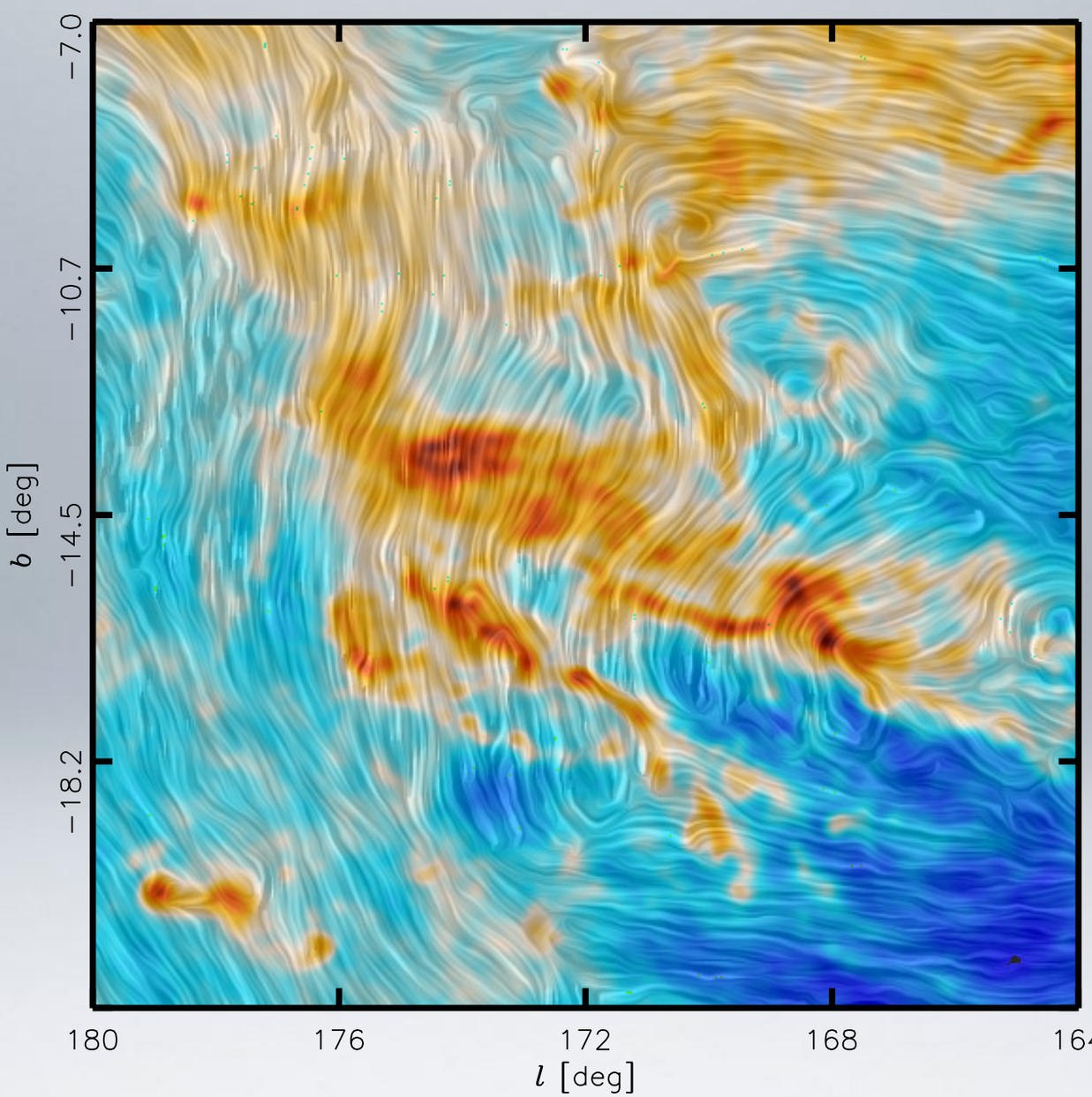
Magnetic fields & star formation



Taurus
molecular cloud

Colors:
column density

Drapery pattern:
magnetic field direction

Planck 353 GHz (815 μm)

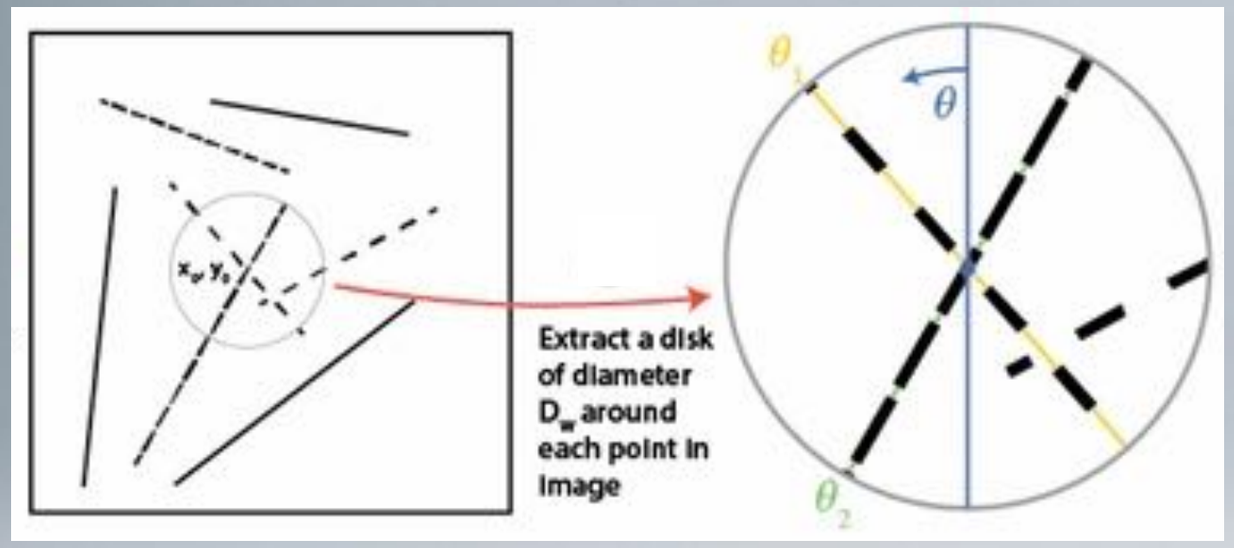
Planck Interm. Res. XXXV, 2016, A&A, 586, A138

One of the main results from *Herschel* and *Planck*:

- Low-density - **B** parallel to density structures
- High-density - **B** perpendicular to density structures

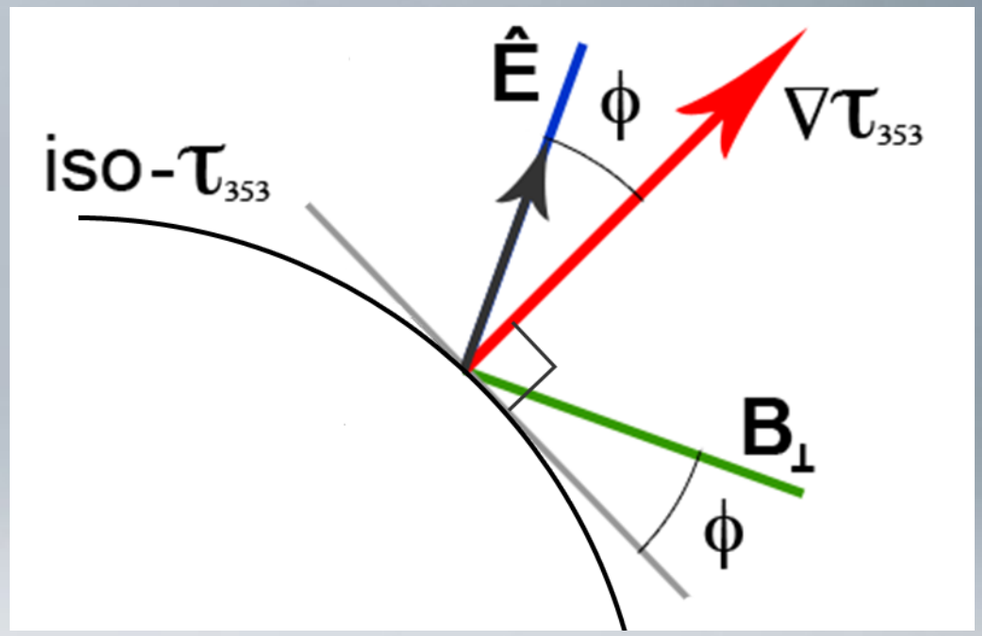
Relative orientation B - density

Two Methods



Rolling Hough Transform (RHT - Clark et al. 2014)

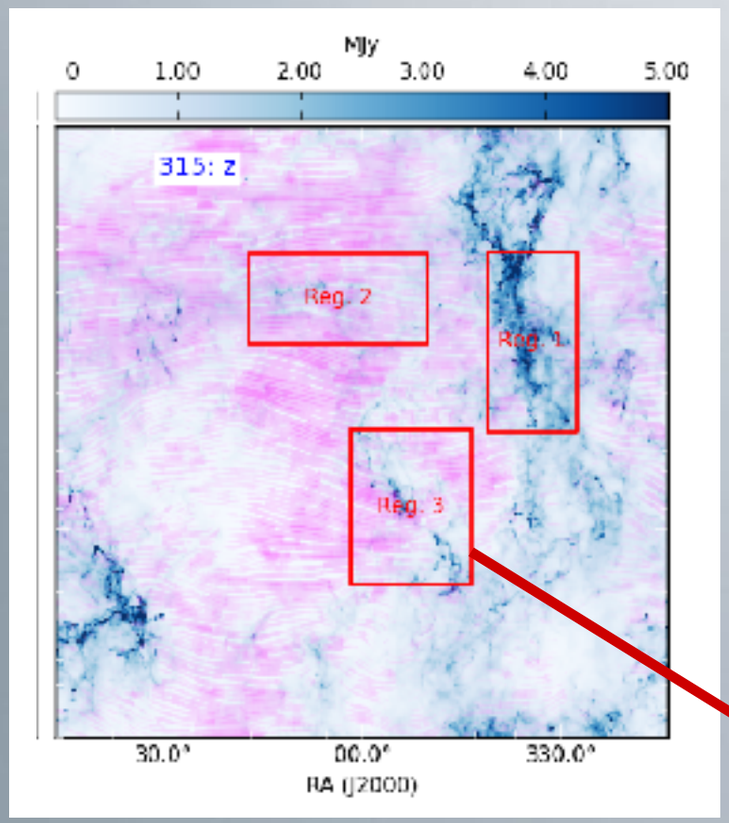
Direction of structures (linear coherency)



Gradient technique (Planck Interm. Res. XXXV 2016)

Impose threshold on gradient

MHD + RT (P. Padoan & M. Juvela)



Reg. 3

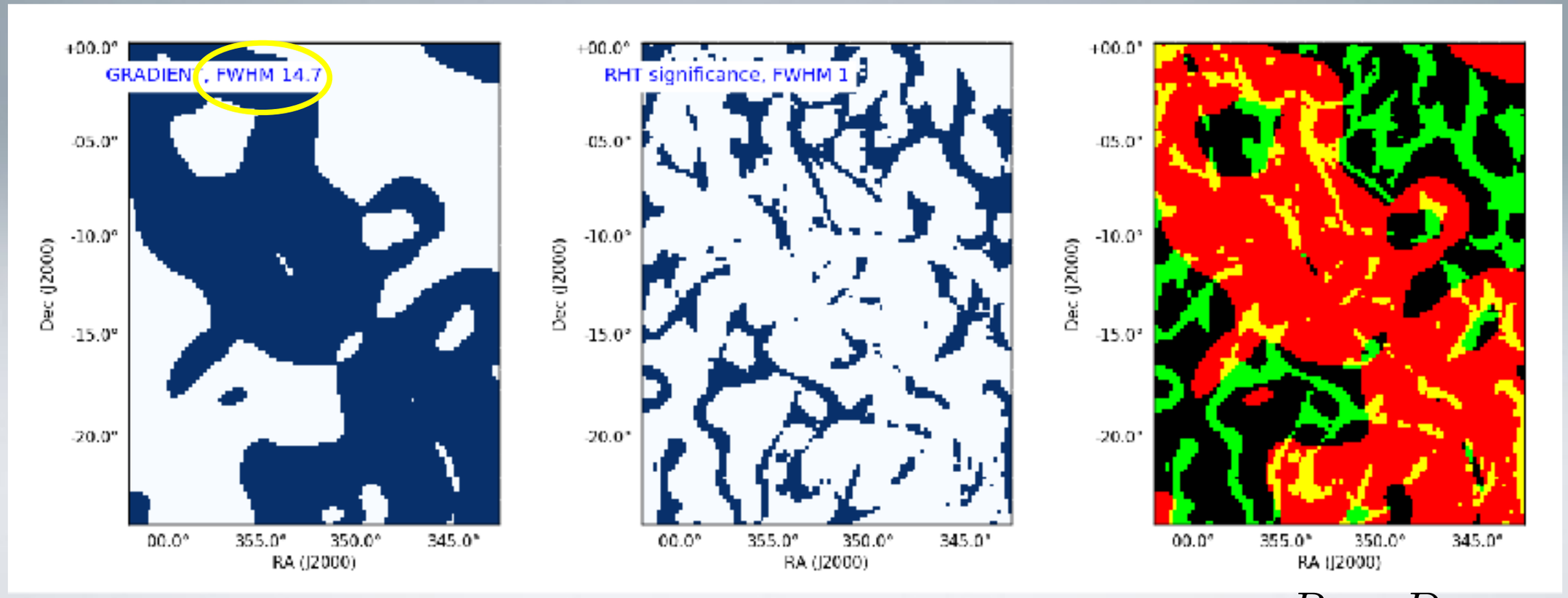
Pixel selection

Green: RHT

Red: Gradient

Yellow: Overlap

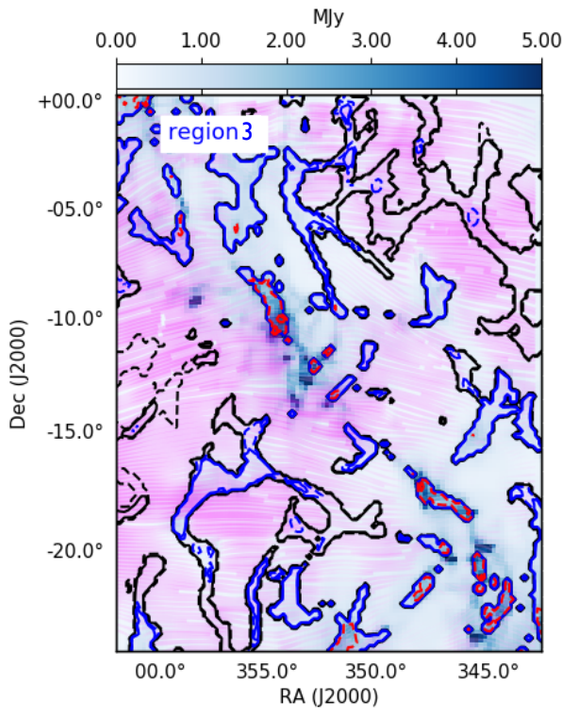
Micelotta et al. *in prep.*



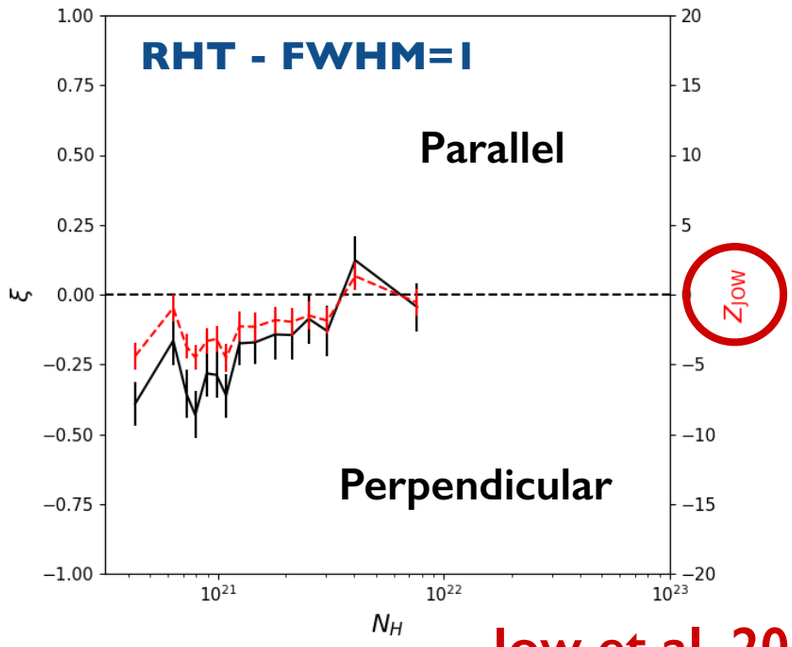
To have same resolution!!

$$FWHM = 2\sqrt{2\ln 2}\,\sigma; \quad \sigma = \frac{R}{2} = \frac{D_W}{4}$$

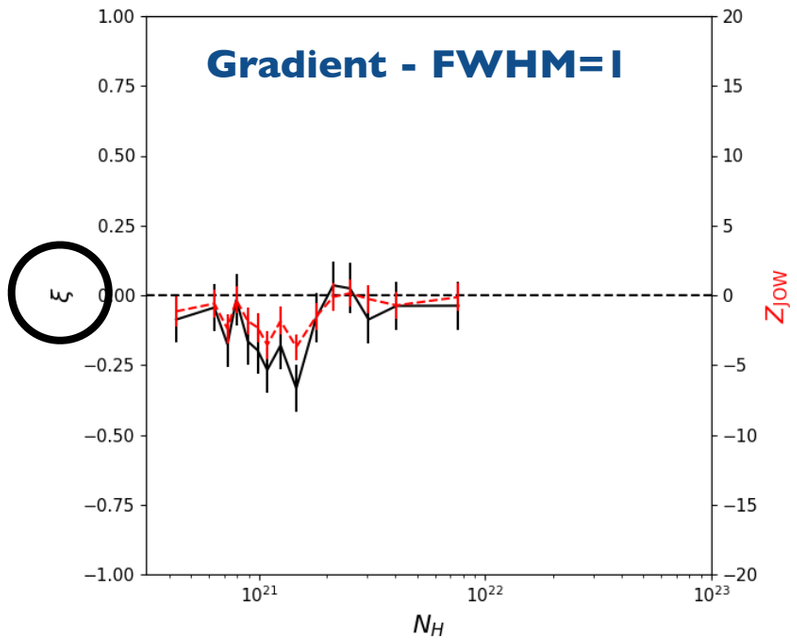
Same selection - different methods

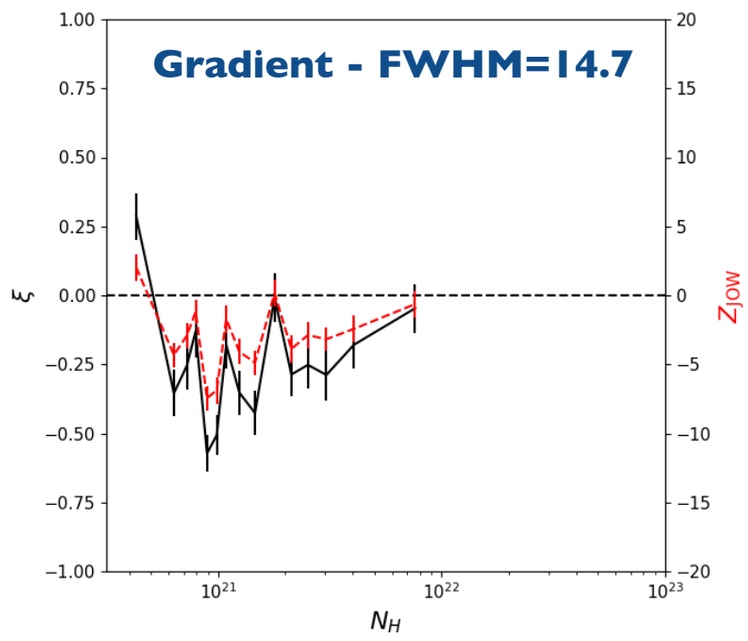


Planck Int. Res. XXXV 2016



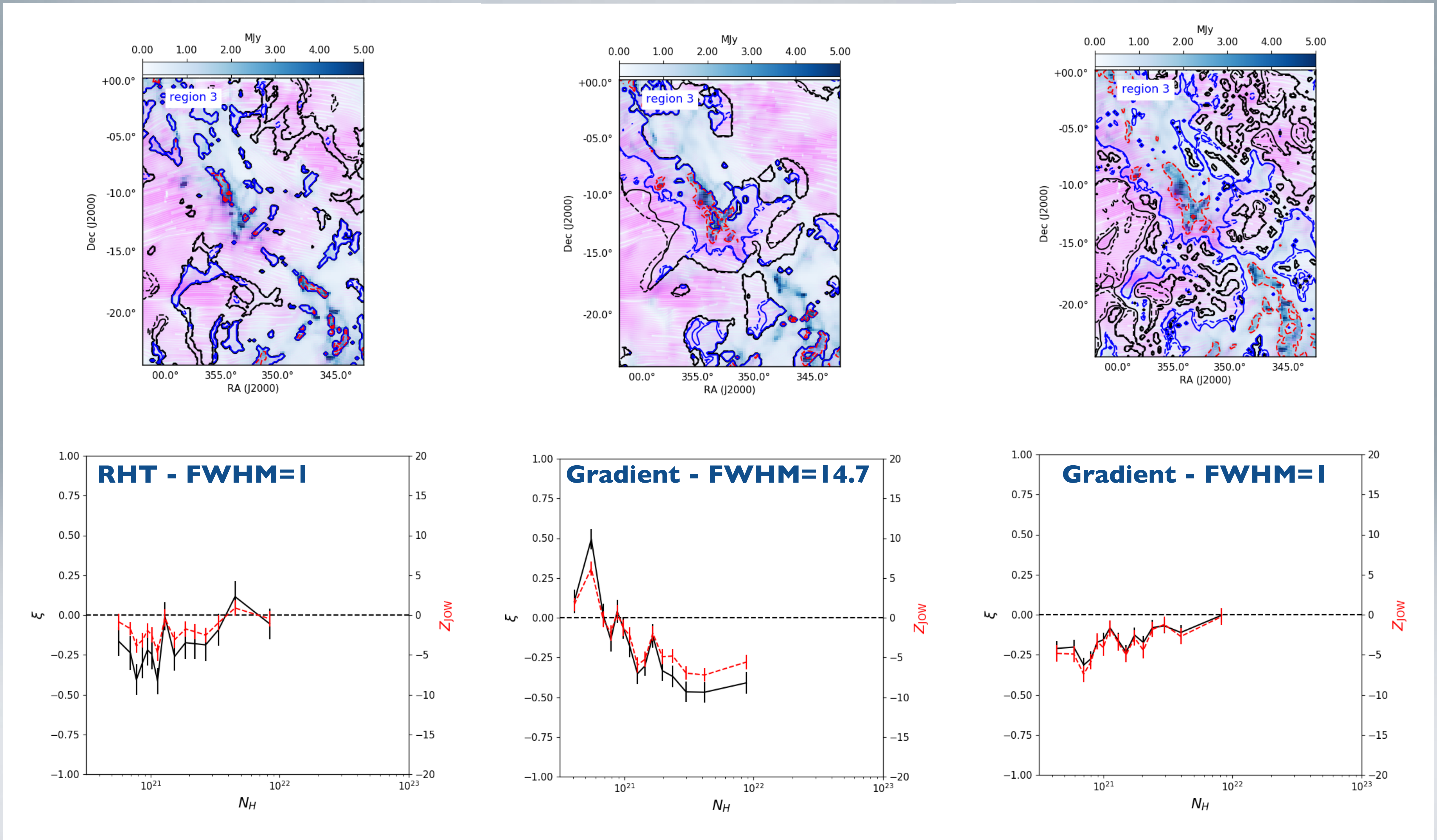
Jow et al. 2018
PRS





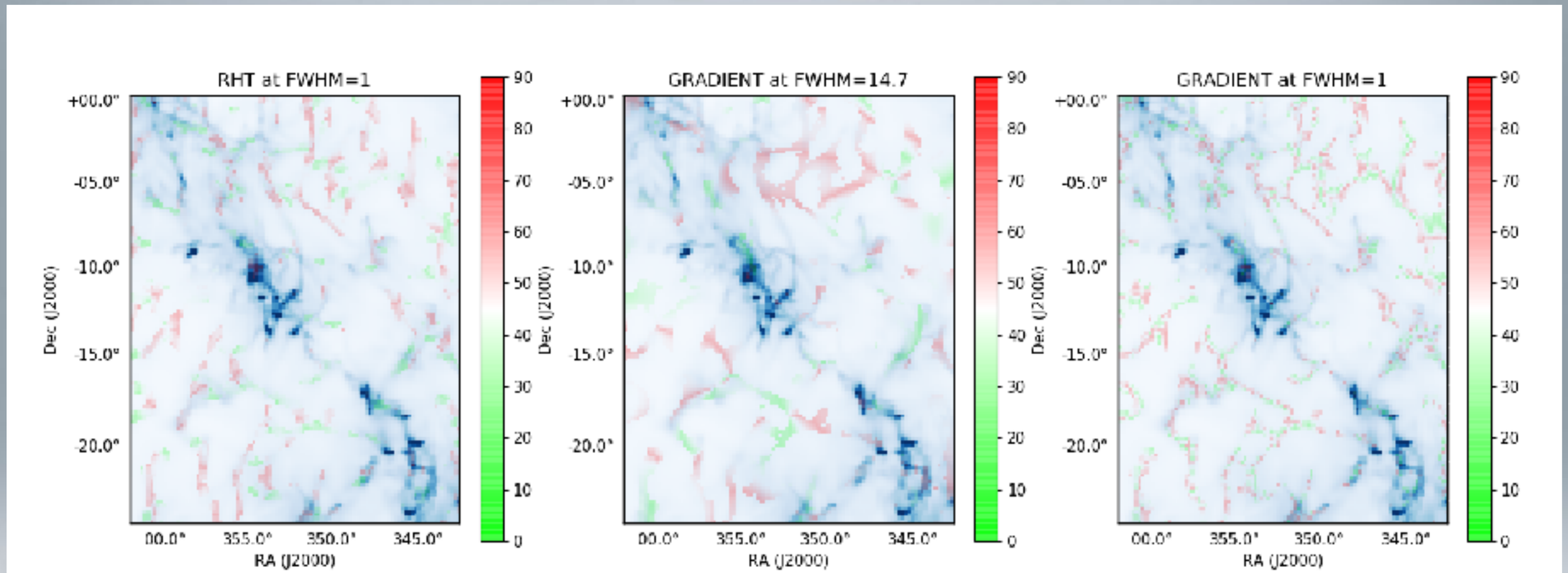
Micelotta et al. *in prep.*

Different methods - native selection



Micelotta et al. *in prep.*

Relative orientations on maps



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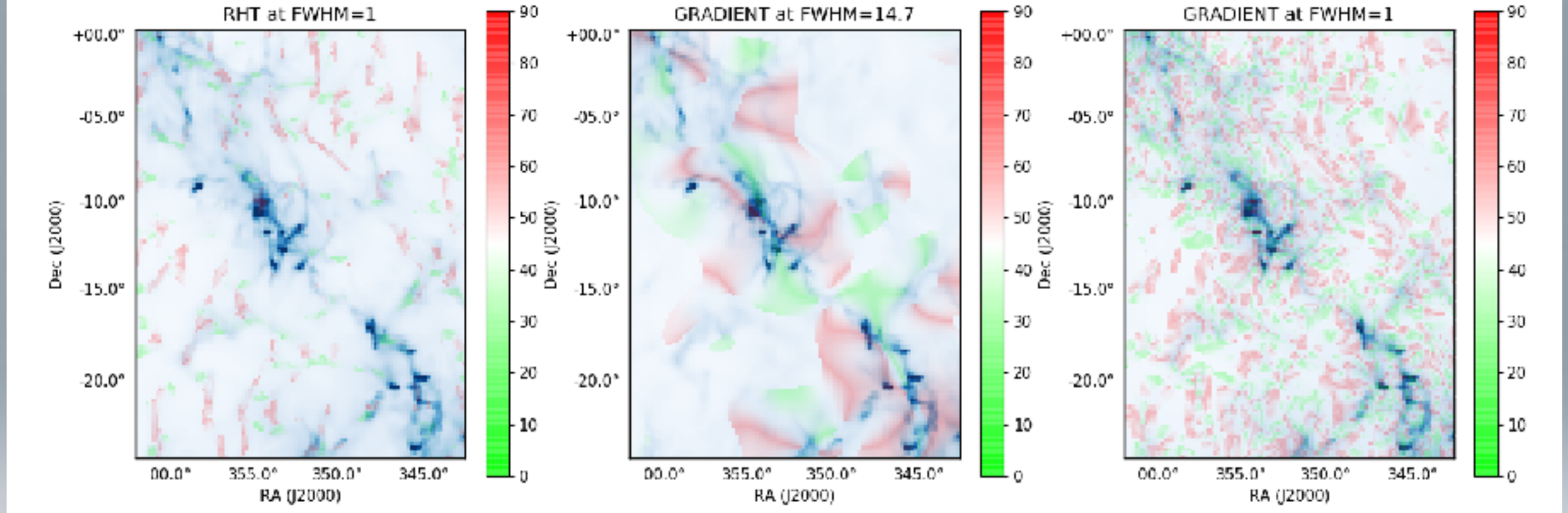

Micelotta et al. *in prep.*

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- Implications for star formation

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Thank you!