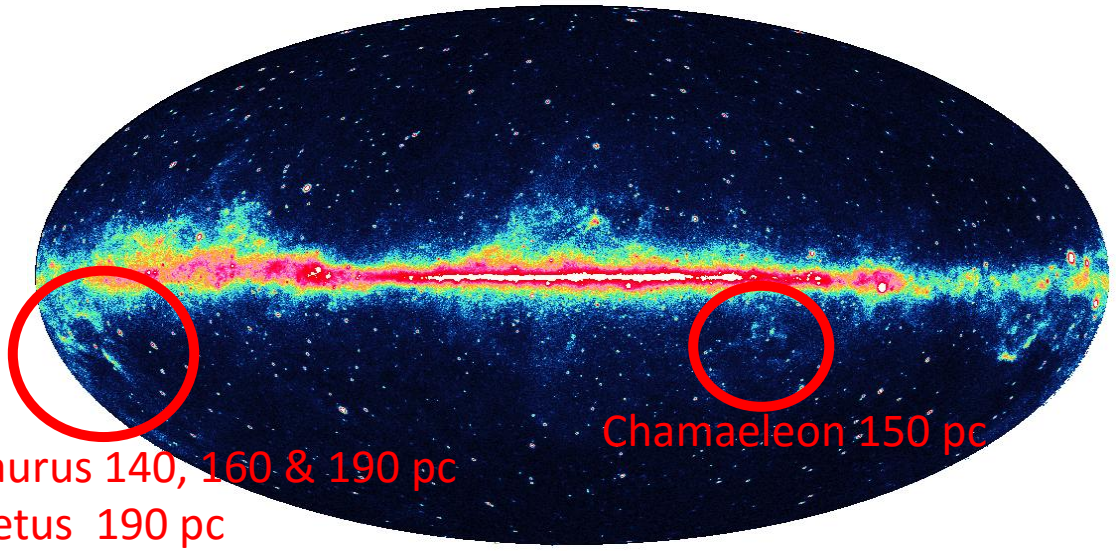
Dust variations with gas in nearby cloud complexes

Cosmic rays, gas and dust

❖ Fermi :

$n_{CR} + n_H$ -> γ rays

Detection of γ rays produced by Cosmic-Ray interactions with gas

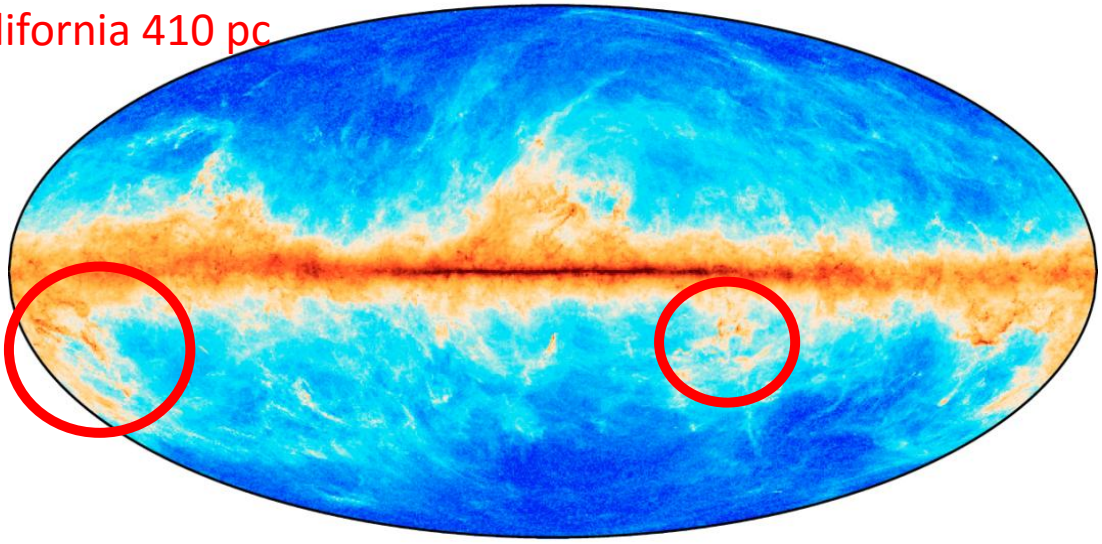


❖ Planck+IRAS :

Large dust grains mixed with gas

$\tau_{353} = I_\nu / B_\nu$ -> N_{dust}

Dust column density traced by the dust optical depth at 353 GHz



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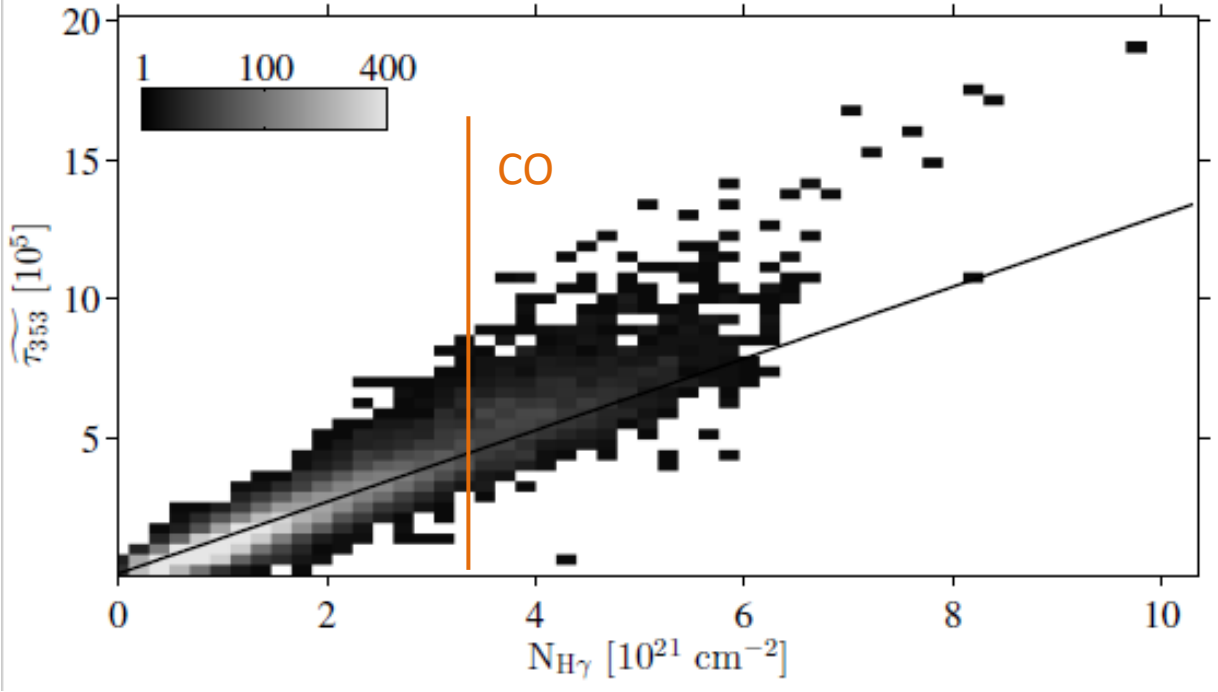
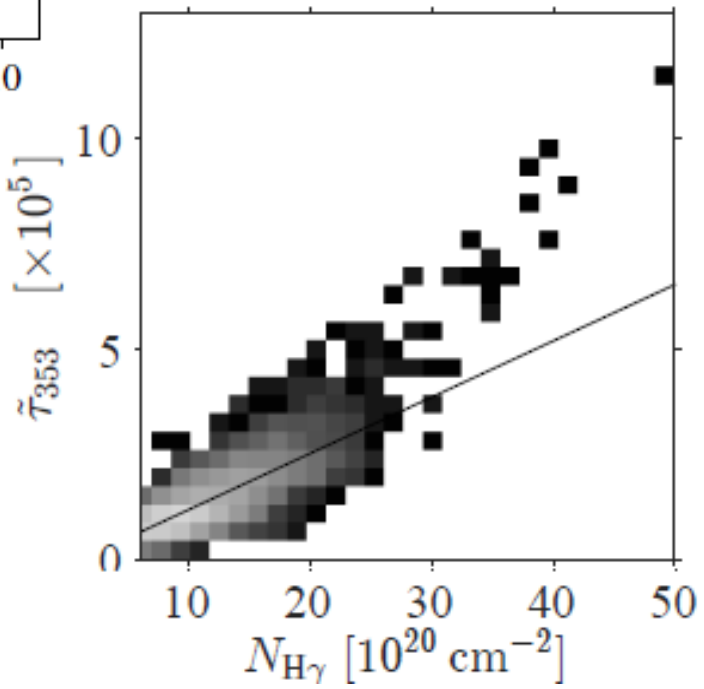


Anticentre

Chamaeleon
Planck+Fermi XXVIII (2015)



- Non-linear increase in τ_{353} with N_H
  likely due to grain evolution (coating, aggregation…)
- X_{CO} dust = (1.3-2.3) × X_{CO} γ rays

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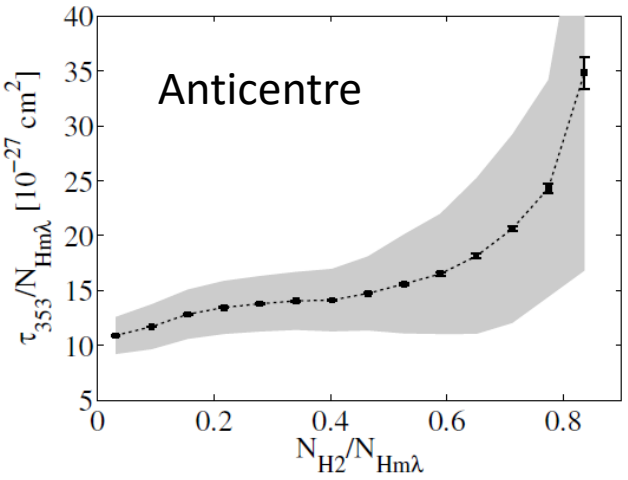
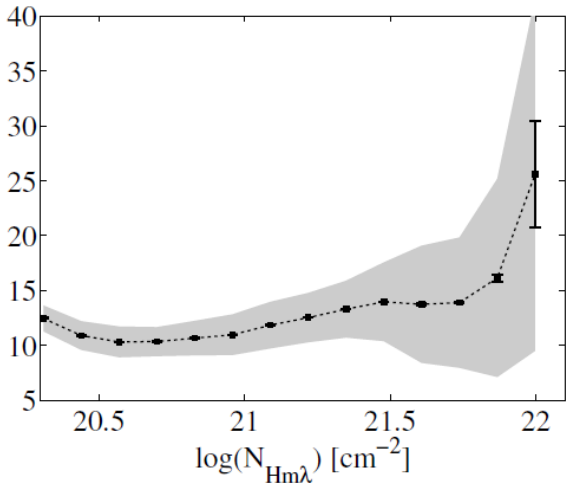
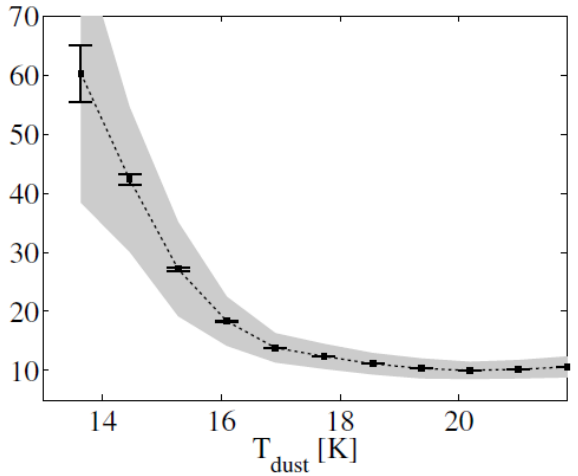
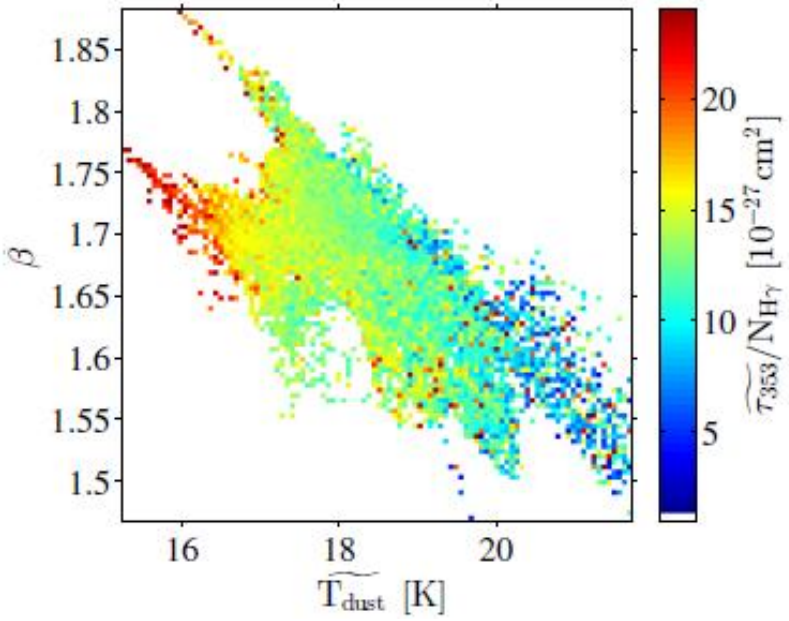


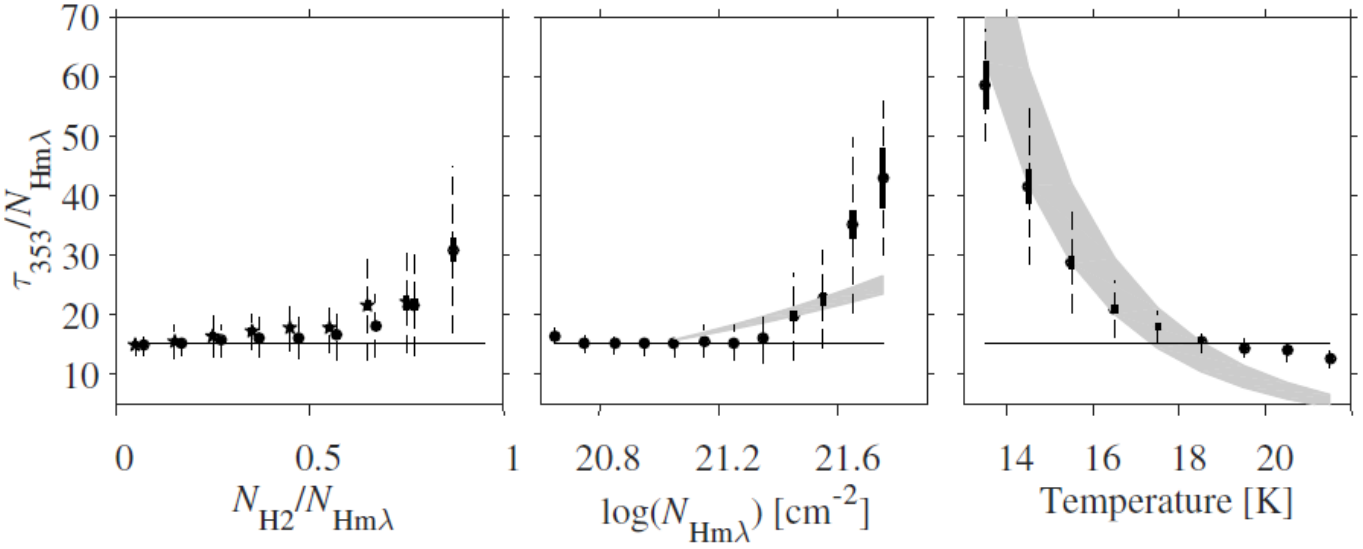




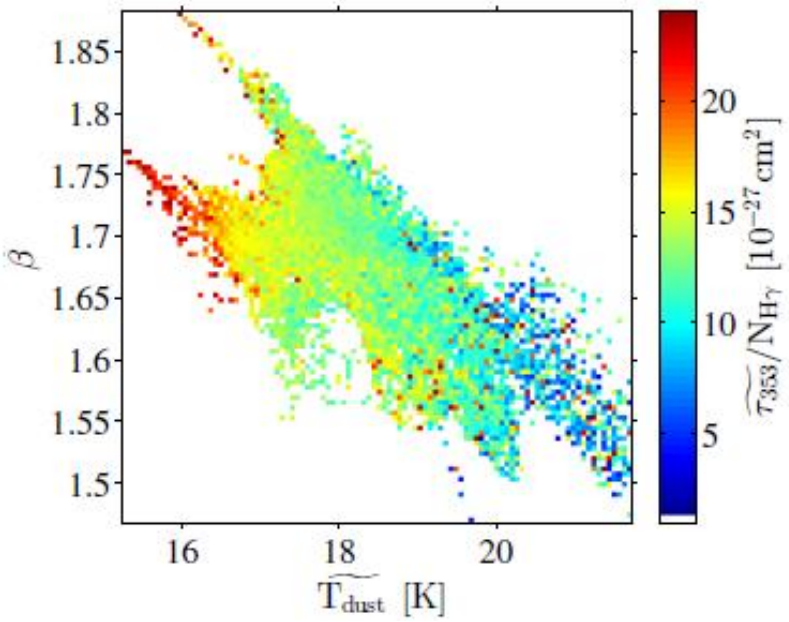


- Large increase of τ_{353}/N_H in the molecular phase of both Anticentre and Chamaeleon regions
- Correlation between dust colour temperature, T_{dust}, spectral index, β and opacity τ_{353}/N_H (see Kohler 2016)

Dust variations with gas in nearby cloud complexes



Chamaeleon
Planck+Fermi
XXVIII (2015)



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