

# Discovery of the radio emission from the Ganymede-Jupiter interaction

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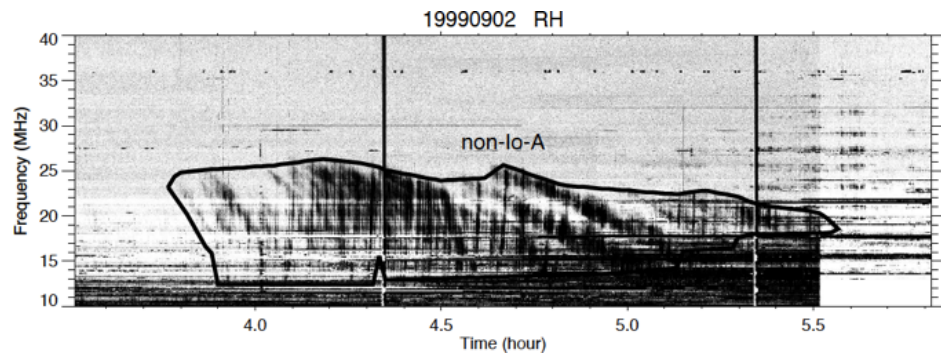
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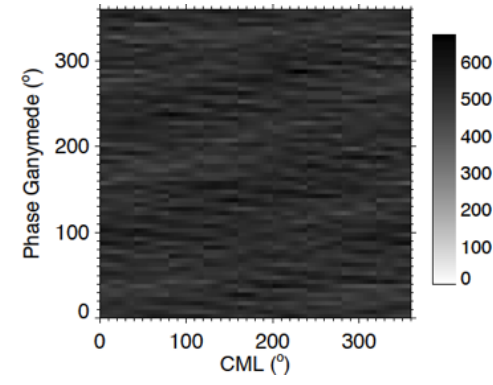
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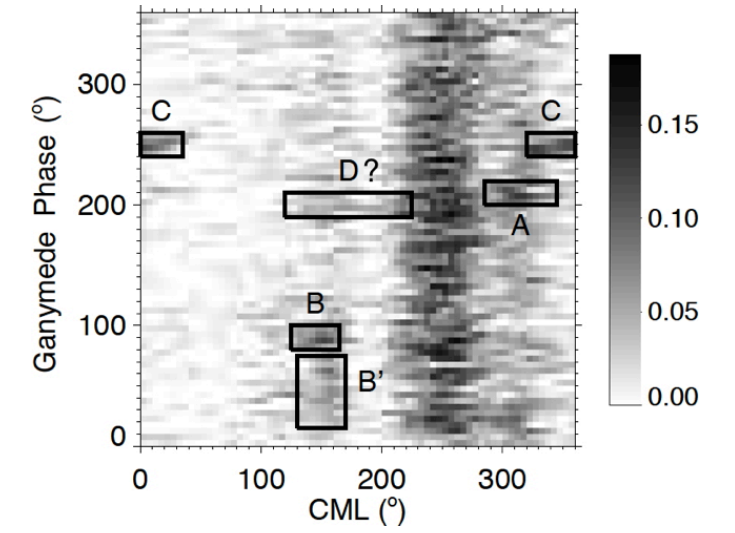
Abstract : Io-Jupiter radio emission is known since 1964, from ground-based decameter observations, and results from Alfvénic interaction of Io with the Jovian magnetic field. Ultraviolet emissions from the magnetic footprints of Io, Ganymede and Europa on Jupiter is known since 2002, from Hubble space telescope observations. In the case of Ganymede, which possesses an intrinsic magnetic field, the interaction is believed to be due to reconnection with the Jovian magnetic field. The radio emission from the Ganymede-Jupiter interaction, expected to provide new information on this interaction, has been searched for 2 decades with ambiguous conclusions. We have analyzed 20 years of observations from the Nançay decameter array and provide clear detection and characterization of this emission.



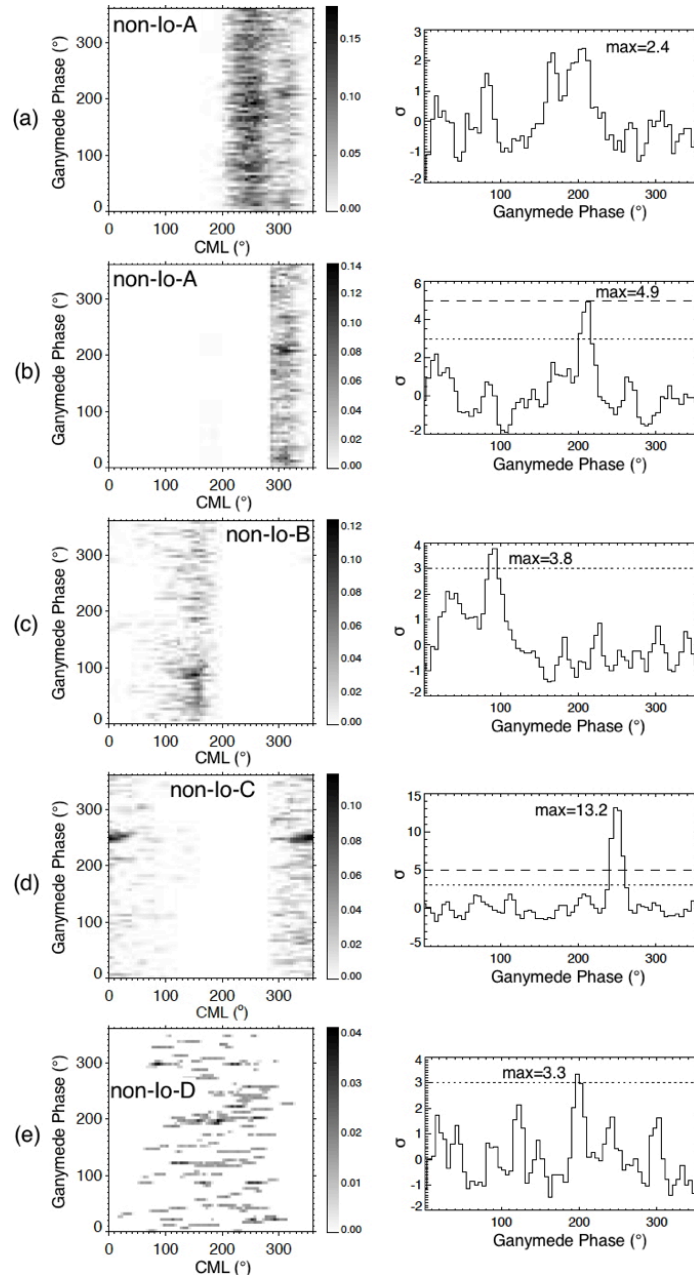
1 - Nançay Decameter Array : Jupiter's catalog



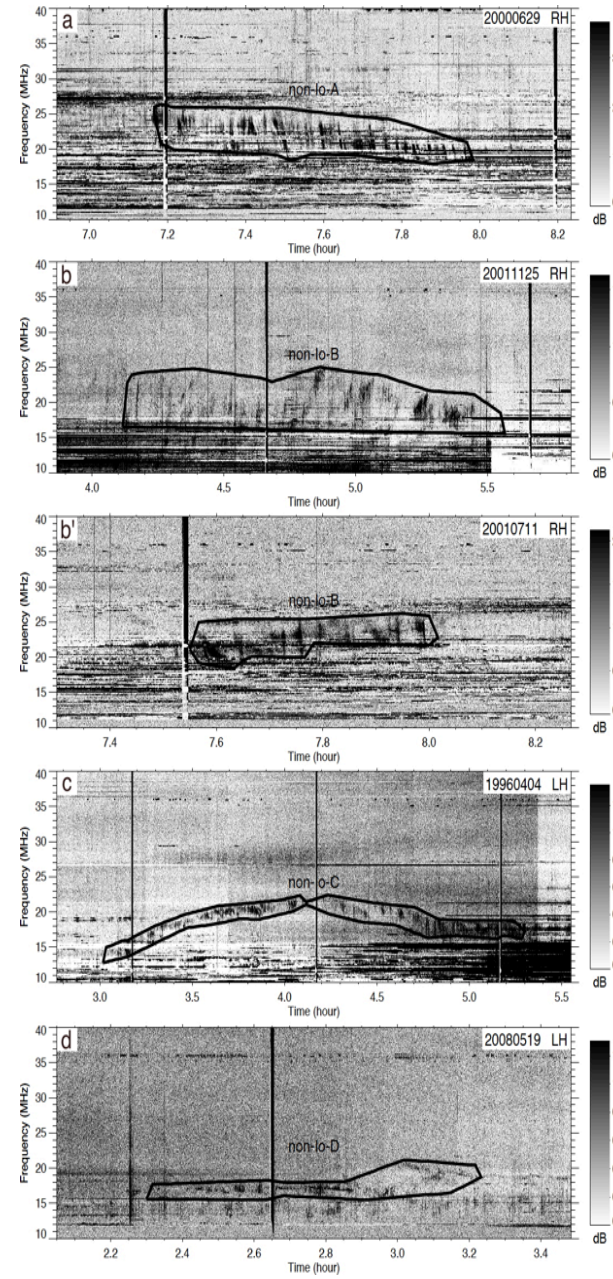
2 - Coverage of the observations



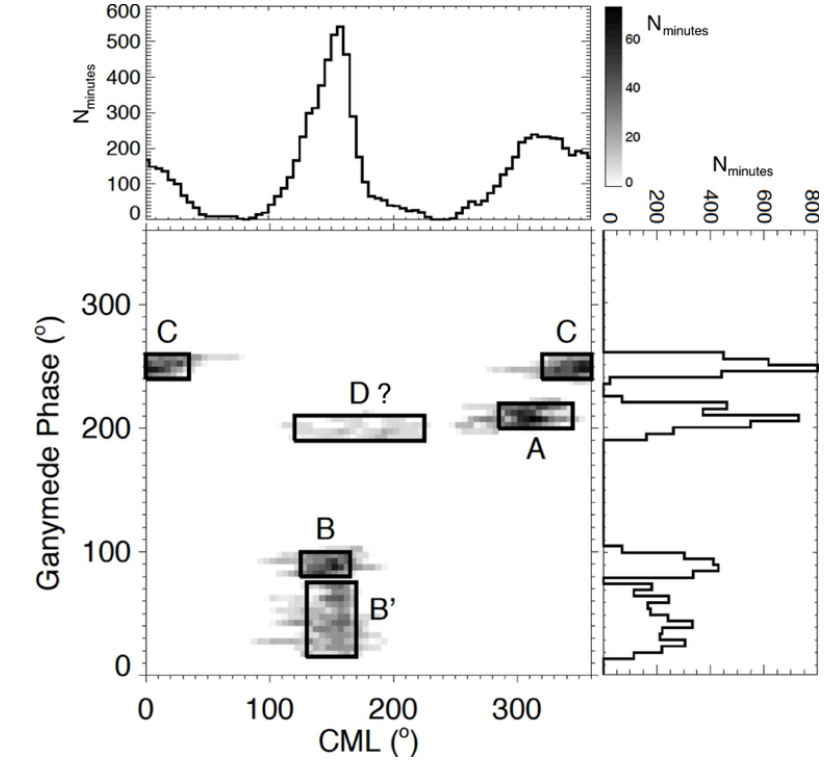
5 - Ganymede emissions within non-lo ones



3 - Detection of each component



4 - Examples of dynamic spectra



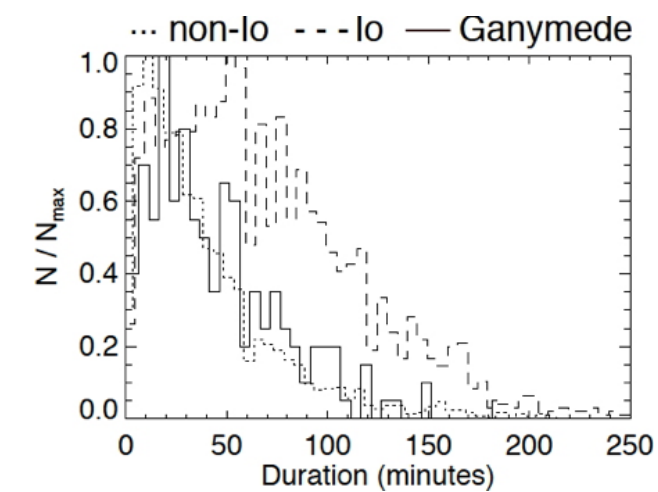
6 - Ganymede emissions only

Table 1: Number of Io, non-Io, and Ganymede emissions, per emission type, detected over the interval 1990-2009. Total number of observations was 6341 (~8h/day), during which 3887 emissions were detected.

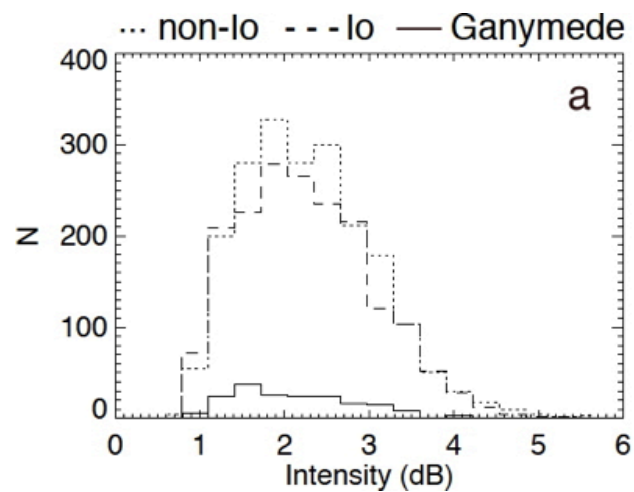
|                                    | Io   | non-Io | Ganymede <sup>3</sup> |
|------------------------------------|------|--------|-----------------------|
| Number of A <sup>1</sup> emissions | 823  | 1273   | 39                    |
| Number of B <sup>2</sup> emissions | 586  | 382    | 101                   |
| Number of C emissions              | 252  | 269    | 36                    |
| Number of D emissions              | 169  | 133    | 13                    |
| Total                              | 1830 | 2057   | 189                   |

<sup>1</sup> A = (A+A'+A''); <sup>2</sup> B = (B+B'); <sup>3</sup> Identified among the non-Io emissions of the same type.

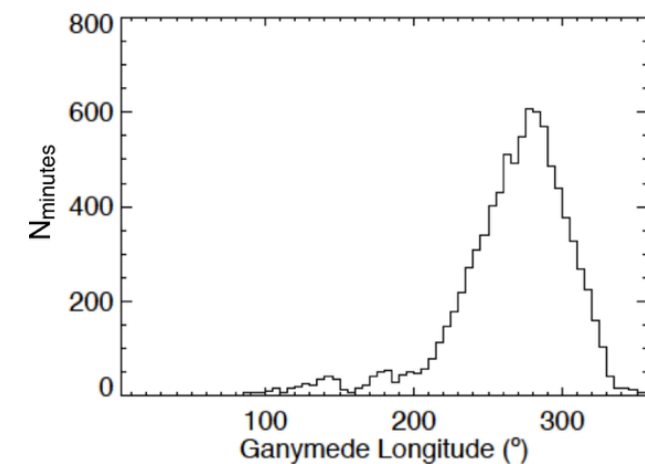
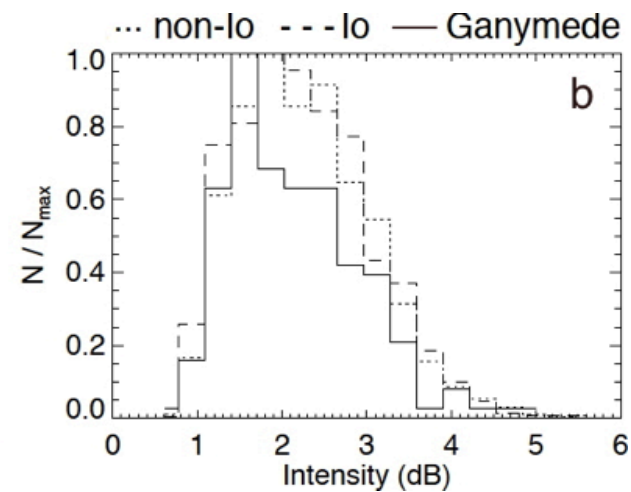




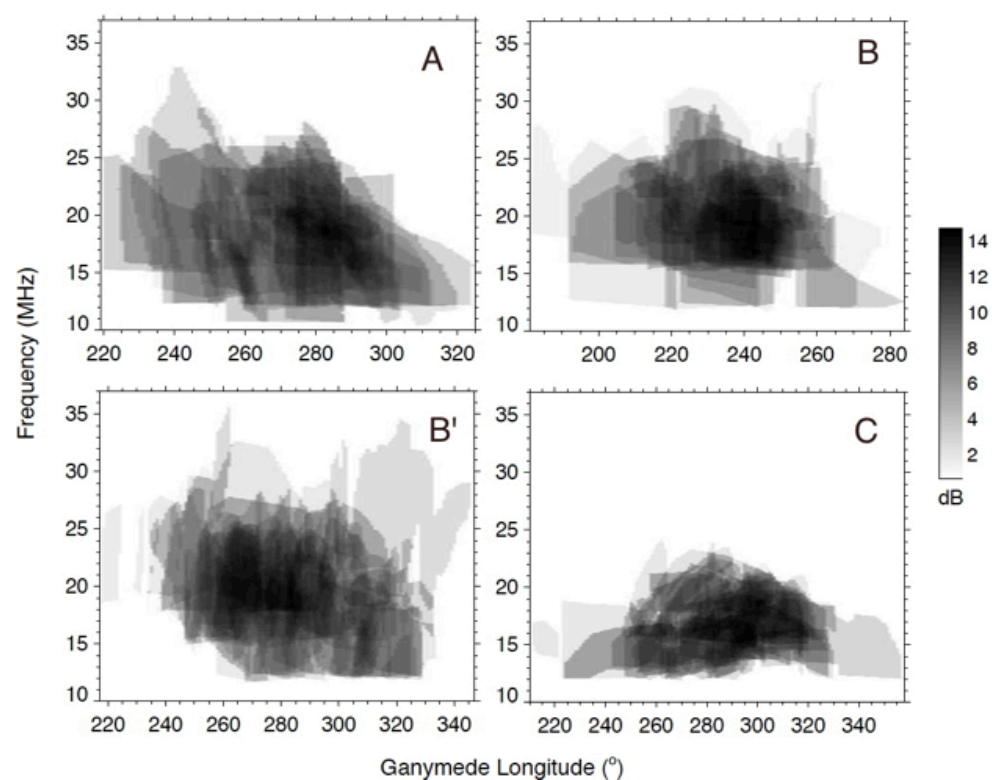
7 - Emissions duration



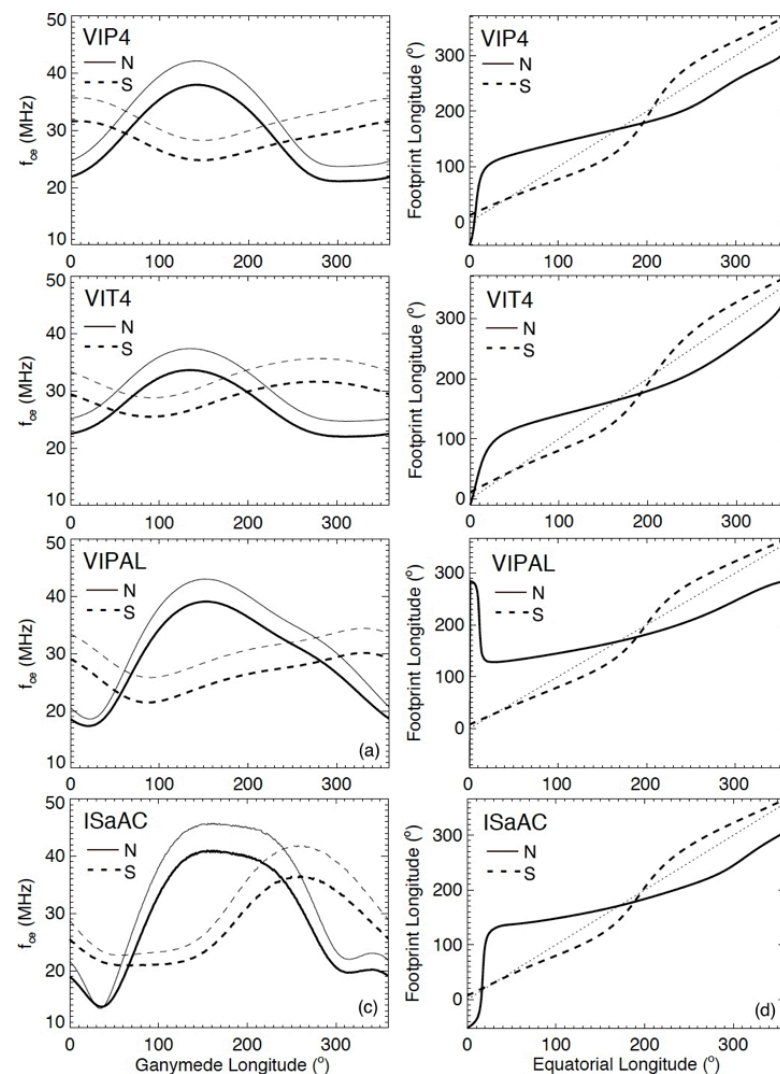
8 - Emissions intensity



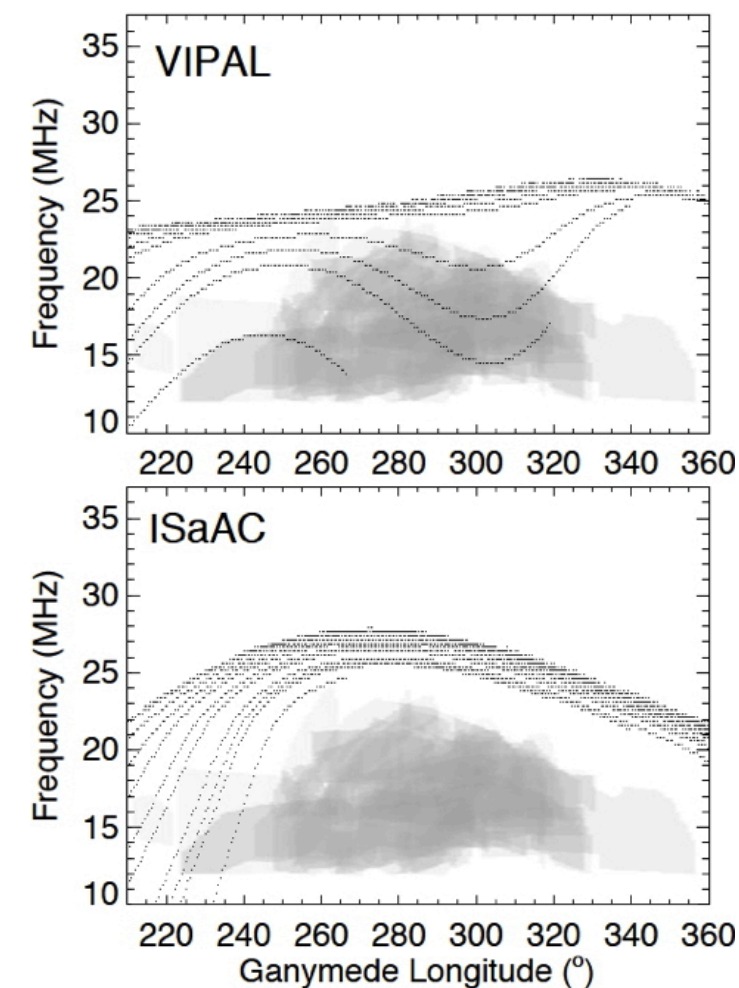
9 - Longitude range of sources



10 - Typical ( $\Lambda_G, f$ ) envelope covered



11 - Maximum  $f_{ce}$  at N & S Ganymede field line footprints and equator-footprints relationships



12 - Tentative EXPRES modeling of Ganymede-C component