Beaming cone of the Jovian decameter emission derived from the JRM09 magnetic field model

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The magnetic field model JRM09, proposed by Connerney et al. [*Geophys. Res. Lett.*, *45*, 2590-2596, 2018], is used to investigate the angular distribution of the Jovian decameter radiation occurrence probability, relatively to the local magnetic field **B** and its gradient ∇*B* in the source region. This model is derived from Juno's first nine orbits observations by the magnetometer experiment MAG. We compare the results to those obtained several years ago using older models (O6, VIP4, VIT4 and VIPAL). The JRM09 model confirms the former results: the radio emission is beamed in a hollow cone presenting a flattening in a specific direction. The same assumptions were made as in the previous studies: the Jovian decameter radiation is supposed to be produced by the cyclotron maser instability (CMI) in a plasma where **B** and ∇*B* are not parallel. As a consequence, the emission cone does not have any axial symmetry and then presents a flattening in a privileged direction. This flattening appears to be more important for the northern emission (34.8%) than for the southern emission (12.5%) probably due to the fact that the angle between the directions of **B** and ∇*B* is greater in the North (~10°) than in the South (~4°).

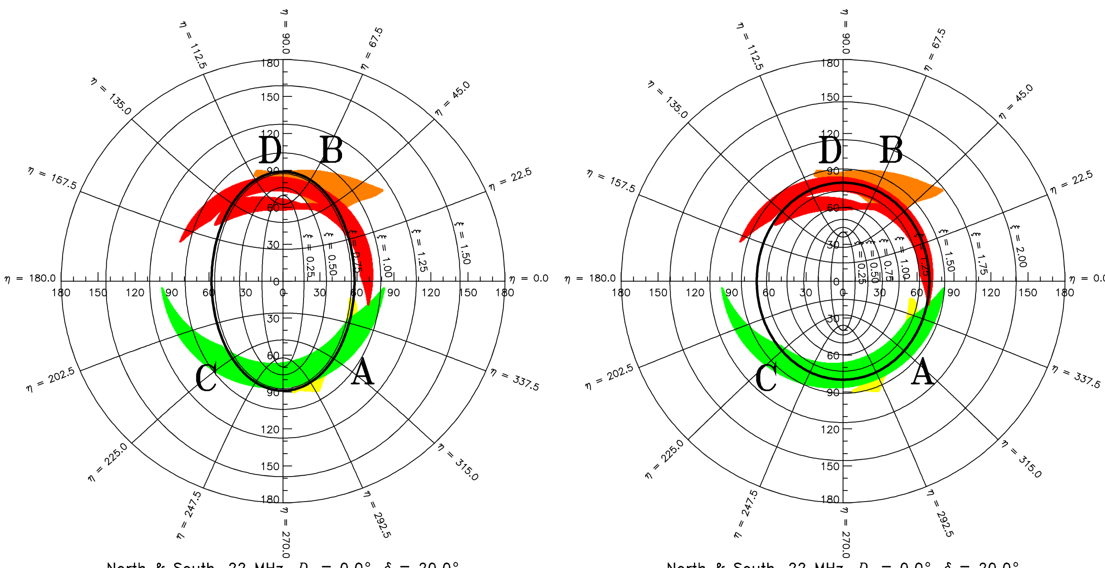

Figure 1. Polar diagram of the distribution of the four Io-controlled Jovian decameter sources Io-A, Io-B, Io-C and Io-D where the radial distance corresponds to the colatitude angle relatively to ∇*B* and the polar angle to the azimuth relatively to the direction of the local magnetic field **B**. The diagram displays elliptic coordinate lines which are confocal ellipses (curves of constant ξ) and hyperbolae (curves of constant η). The distance between the two foci is 2*a*. For each hemisphere (north in left panel, south in right panel), two numbers *a* and ξ_0 are chosen so that the ellipse $\xi = \xi_0$ fits the source regions. θ_{min} and θ_{max} correspond to the opening angles of the flattened beaming cone in the direction of the magnetic field and the perpendicular direction, respectively. The frequency of the radiation is f = 22 MHz.