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Properties of the whistler precursor emitted from a curved quasi-perpendicular shock: 2-D full particle simulation.

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The few previous works dedicated to the whistler precursor analysis have been mainly based on the use of 1D simulations i.e. where the precursor propagates only along the shock normal. (Liewer et al., 1991) .
More recently, curved shock propagating in a quasi-perpendicular angular range has been analyzed self-consistently with the use of 2D full particle simulations and has allowed to recover the main features of electron foreshock (Savoini et Lembege , 2003). The present work is based on similar simulations of a 2D curved shock but is focussed on the dynamics of the emitted whistler precursor. This precursor plays an important role in the global energy partition which takes place at and around the shock front (i.e. foreshock region) since it strongly interacts with incoming upstream plasma (mainly electrons). For a given Mach regime, main results show (i) the spatial upstream angular and radial extension where this precursor is emitted as compared with the electron foreshock region, (ii) the inhomogeneity of the precursor wavefronts , (iii) that the precursor globally propagates along the upstream magnetostatic field (and not only along the shock normal), (iv) its main features of damping versus emission in order to identify what main damping mechanisms are dominant (linear versus nonlinear Landau), and (v) its impact on electron dynamics. Results are compared with previous works obtained with 1D PIC simulation. The work is extended to different Mach regimes.