We present a systematic study of equatorial noise emissions (ENE) observed by Cluster (perigee about 4 Earth radii) and DEMETER (altitude about 700 km) spacecraft. ENE are intense electromagnetic emissions at frequencies between proton cyclotron frequency and lower hybrid frequency that occur close to the geomagnetic equator. They propagate perpendicularly to the ambient magnetic field, with magnetic field fluctuations being linearly polarized along the magnetic field and electric field fluctuations being elliptically polarized in the plane perpendicular to the magnetic field. Since ENE are among the most intense natural emissions in the inner magnetosphere, they might have important implications for energetic particles distributions.

Simultaneous measurements of multiple field components allow us to estimate wave and Poynting vector directions. This enables us to determine whether the waves are coming to the satellite from larger or lower radial distances. Taking into account varying radial distances of satellites, a radial distance of the source can be determined. Assuming that the waves are generated at multiples of proton cyclotron frequency, a radial distance of the source is independently determined from the frequency spacing between individual lines forming the emissions. Finally, ENE occurrence rate and properties are evaluated as a function of several key parameters (radial distance, MLT, geomagnetic activity).