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The aperture synthesis imaging capability of the EISCAT_3D radars

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The built-in Aperture Synthesis Imaging Radar (ASIR) capabilities of the EISCAT_3D system, complemented with multiple beams and rapid beam scanning, is what will make the new radar truly three dimensional and justify its name. With the EISCAT_3D radars it will be possible to make investigations in 3-dimensions of several important phenomena such as Natural Enhanced Ion Acoustic Lines (NEIALs), Polar Mesospheric Summer and Winter Echoes (PMSE and PMWE), meteors, space debris, atmospheric waves and turbulence in the mesosphere, upper troposphere and possibly the lower stratosphere. Of particular interest and novelty is the measurement of the structure in electron density created by aurora that produce incoherent scatter. With scale sizes of the order of tens of meters, the imaging of these structures will be conditioned only by the signal to noise ratio which is expected to be high during some of these events, since the electron density can be significantly enhanced. The electron density inhomogeneities and plasma structures excited by artificial ionospheric heating could conceivable be resolved by the radars provided that their variation during the integration time
is not great.