EISCAT_3D as an important segment of the ESCAPE mission proposed for ESA's M5-call

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ESCAPE (European SpaceCraft for the study of Atmospheric Particle Escape) is a mission proposed in response to the ESA M5 call. The mission will quantitatively estimate the amount of escape of the major atmospheric components in both neutral and ionized forms, as well as closely assess the escaping mechanisms, by making thorough observations of the spatial distribution and temporal variability of these elements. The measurements will benefit from high mass resolution observations deriving even the isotopic ratios for the first time, from the exobase/upper ionosphere (500 km altitude) up to the magnetosphere.

With a slowly spinning spacecraft on a polar orbit, the ESCAPE mission will combine optical remote imaging for limb observations and in-situ particle observations within 1-hour time difference, both with altitude resolution of < 100 km over 500-2000 km altitude range (upper ionosphere/lower exosphere). The measurement target includes densities and temperatures of cold ions/electrons and neutrals, which can directly be compared with the EISCAT observations, benefitting both to ESCAPE and EISCAT_3D.

Since EISCAT_3D will be able to continuously monitor the ionosphere in a region with about 500 km diameter at around 500 km altitude, the EISCAT_3D data will help distinguishing temporal and spatial structures, and will continuously monitor the ionospheric conditions in a 3D-volume that is conjugate with the spacecraft location. Thus, EISCAT_3D can be regarded as a companion spacecraft to ESCAPE, on a very low altitude orbit.