Common volume EISCAT-MAARSY meteor head echo observations

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We present the initial results from a set of multi-instrument observations campaigns conducted 2016-2017. The radar systems in the study are the EISCAT UHF radar located near Tromsø, Norway (69.59°N, 19.23°E), and the Middle Atmosphere Alomar Radar System (MAARSY) located on the Norwegian island Andøya (69.30°N, 16.04°E). These are the first ever common volume radar observations using EISCAT and MAARSY. The EISCAT UHF radar was pointed to elevation 37° and azimuth 257° towards a measurement volume at 100 km altitude in zenith above MAARSY. The campaigns were concentrated during nights close to new-moon conditions in the period October-March to enable simultaneous meteor detections with a double-station optical system temporarily installed near MAARSY at Alomar. The purpose of the campaigns is to collect a data set of double-frequency radar head echo and optical meteors to confine radar cross section (RCS) frequency dependent parameters in a full-wave model of radio wave scattering from meteor plasmas. The ultimate goal of the simulation work is to enable meteoroid mass determination from well-calibrated head echo meteor plasmas in order to improve the estimation of the meteoroid mass influx to the Earth's atmosphere. Here, we give an overview of the observation campaigns, focusing on a comparison of the meteor detection sensitivity limits of the two radar systems and the frequency dependence of meteor head echo RCS.