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Comparisons of plasma measurements by the DEMETER micro-satellite and by ground-based mid latitude Incoherent Scatter Radars

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In flight assessment and, possibly, calibration, of thermal plasma density, temperature and bulk velocity measurements performed by satellite instruments is necessary to achieve accurate studies of phenomena that are associated with plasma variations along the orbit. This is, for example, the case for the SWARM mission which will provide state of the art measurements of the Earth's magnetic field and require that the effects of the thermal plasma on electric currents and the associated magnetic perturbations can be retrieved with a good enough accuracy. This is also the case when one searches for very faint plasma variations that can arise from lithosphere-atmosphere-ionosphere coupling at periods of seismic activity.
Using DEMETER observations we are conducting a study of inter-calibration of plasma measurements, mainly the thermal ion measurements, made in orbit at 650-700 km altitude with similar measurements performed by powerful and sophisticated Incoherent Scatter Radars. Two radars have been selected because they are located at mid latitude where the ionospheric variations are much smaller both in time and space compared to high latitude regions.
More than 5 years of observations, from July 2004 to December 2009, are available from the DEMETER data base and we shall indicate how the best DEMETER passes were selected. Some initial results showing the main outcomes of the first part of this work will be given showing a first estimate of the actual accuracy of plasma measurements in orbit.