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First results from the Sweeping Langmuir Probe (SLP) instrument on board PICASSO

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The Sweeping Langmuir Probe (SLP) instrument on board the Pico-Satellite for Atmospheric and Space Science Observations (PICASSO) has been developed at the Royal Belgian Institute for Space Aeronomy. PICASSO, an ESA in-orbit demonstrator launched in September 2020, is a triple unit CubeSat orbiting at about 540 km altitude with 97 degrees inclination. The SLP instrument includes four independent cylindrical probes that are used to measure the plasma density and electron temperature as well as the floating potential of the spacecraft. Along the orbit of PICASSO the plasma density is expected to fluctuate over a wide range, from about $1\text{e}8/\text{m}^3$ at high latitude up to more than $1\text{e}12/\text{m}^3$ at low/mid latitude. SLP can measure plasma density from $1\text{e}8/\text{m}^3$ to $1\text{e}13/\text{m}^3$. The electron temperature is expected to lie between approximately 1000 K and 10.000 K. Given the high inclination of the orbit, SLP will allow a global monitoring of the ionosphere. Using the traditional sweeping mode, the maximum spatial resolution is of the order of a few hundred meters for the plasma density, electron temperature and spacecraft potential. With the fixed-bias mode, the electron density can be measured with a spatial resolution of about 1.5 m. The main goals are to study the ionosphere-plasmasphere coupling, the subauroral ionosphere and corresponding magnetospheric features together with auroral structures and polar caps, by combining SLP data with other complementary data sources (space- or ground-based instruments). The first results from SLP will be presented.