



Two-dimensional map of the field-aligned potential drop obtained with ALIS observations of auroral arcs.

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We use good-quality observations of stable auroral arcs obtained on December 12th 2006 with the Auroral Large Imaging System (ALIS) located near Kiruna. ALIS consists of 6 ground-based stations equipped with optical cameras observing simultaneously the same volume of the sky located at altitudes around 90-100 km. Images of the auroral arcs are obtained in several filters corresponding to the most prominent (blue, red and green) auroral emission lines. From these set of images, we reconstruct the three-dimensional (3D) volume rate emissions of the aurora with tomographic-like inversion techniques. The 3D blue volume emission rate is then inverted to retrieve a two-dimensional map (in longitude and latitude) of the energy spectra of precipitating electrons at the top of the ionosphere. The two-dimensional map of the field-aligned potential drop $\Delta\phi_{\parallel}$ is found by solving the non-linear relationship of Lundin & Sandahl (1978) between $\Delta\phi_{\parallel}$ and the total energy flux of the precipitating electrons. Finally, we compute the 2D distribution of the magnetospheric potential ϕ_M above the acceleration region by solving the one-dimensional current continuity equation along each latitudinal direction and using an optimization method.