Assessing the accuracy of the new Chisham *et al.* SuperDARN virtual height model in mapping ionospheric backscatter

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Abstract - Currently the ground projections of the SuperDARN HF radar returns are routinely determined by a simple rangefinding algorithm, which takes no account of the prevailing, or indeed the average, HF propagation conditions. This is in spite of the fact that both direct E- and F-region backscatter and 1½-hop E- and F-region backscatter are commonly used in geophysical interpretation of the data. Over shorter propagation paths the existing rangefinding algorithm is adequate, but mapping errors become significant for longer paths where the roundness of the Earth becomes important, and a correct assumption of virtual height becomes more difficult. Chisham et al. [1] have suggested a new virtual height model for SuperDARN, based on average measured propagation paths. The SuperDARN radar at Hankasalmi has a propagation path to high power HF ionospheric modification facilities at both Tromsø on a ½-hop path and SPEAR on a 1½-hop path. The SuperDARN radar at Þykkvibær has propagation paths to both facilities over 1½-hop paths. These paths provide an opportunity to quantitatively test the available SuperDARN virtual height models. It is also possible to use HF radar backscatter which has been artificially induced by the ionospheric heaters as an accurate calibration point for the Hankasalmi elevation angle of arrival data, providing a range correction algorithm for the SuperDARN radars which directly uses elevation angle. These developments enable accurate mappings of the SuperDARN electric field

1. Chisham, G., Yeoman, T. K., and Sofko, G. J.: Mapping ionospheric backscatter measured by the SuperDARN HF radars – Part 1: A new empirical virtual height model, *Ann. Geophys*., 26, 2008.