Relationship between the VLF hiss observed at high altitudes within the polar cap and auroral dynamics during substorms

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Strong variations of intensity and cutoff frequency of the auroral hiss were observed by INTERBALL-2 and POLAR satellites at high altitudes well poleward from the auroral oval. We show that intensifications of the hiss are correlated with auroral activations during substorms and/or pseudo-breakups. The cutoff frequency of the auroral hiss depends on the distance between aurora and satellite footprint, it decreases (increases) when the distance decreases (increases). The multicomponet wave measurements of the hiss emissions onboard the Polar spacecraft show that the auroral hiss propagates upward from the aurora region. The horizontal component of the auroral hiss Poynting flux changes its direction in good accordance with longitudinal displacements of the bright auroras. This means that these auroras are related to the source of the emissions. We believe that the auroral hiss at high altitudes is generated by upgoing electron beams. The relationship between the hiss and aurora dynamics means that upgoing electron beams are closely related to downgoing electron beams producing the aurora. During the auroral activations the up- and downgoing beams move and change their intensity simultaneously.