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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Aspect sensitivity of VHF echoes from field aligned irregularities in meteor trails and thin ionization layers" *by* Q. H. Zhou et al.

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The reviewer's comments are useful for further improving the paper. The following addresses the two issues raised by the reviewer: 1) the geometry for more sensors was not considered; and 2) our model considered only scatters in the plane containing both the magnetic field and the echo direction.

It is true that we used parameters that were applicable only to the MU radar for our simulations. The most important parameter in our simulation is the angular offset of the radar beam from its perpendicular to B direction, which is independent of radar location. Although the dip angle affects the numerical results somewhat, it does not change the nature of the conclusions. This parameter affects mostly the system sensitivity and the detection threshold. The larger the dip angle is, the more difficult it is for a radar to

detect an echo from field aligned irregularities. One reason is the radar range factor and the other is that more electrons are within the first Fresnel zone for ionosphere FAI because of the finite Es layer altitude extension. In particular, the reviewer pointed out that simulations for the Arecibo geometry would be useful. Since the dip angle at Arecibo is essentially the same as that of the MU site, conclusions derived from the MU parameters are largely applicable for the Arecibo site as well.

The model we have presented assumes that scatters are within the plane of magnetic field and radar look direction (i.e, the plane of kxB). Although an arbitrary geometry can be assumed, this does not add much to the analysis of aspect sensitivity but only increases the complexity of notations. As far as interpreting the echo height is concerned, scatters off the kxB plane will make the altitude ambiguity even larger.

The reviewer further pointed out that our suggestion that off perpendicular to B echo decaying characteristics can be used to measure the diffusion rate along B is really based on reasoning outside of the numerical model. The observational basis for our suggestion is that the life-time of range-spread echoes is shorter at higher altitude Ű presumably because of larger diffusion rate. However, in order to quantitatively calculate the diffusion rate, our numerical result does show that one has to take into account of the echo arrival angle.

We will include the above discussions in the final submission.

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 731, 2004.