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Interactive comment on "The global climatology of the intensity of ionospheric sporadic *E* layer" *by* Bingkun Yu et al.

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This paper reports some novel data and modelling on the occurrence and intensity of global Sporadic E layers and provides some interesting perspectives on the formation mechanisms of these layers. The data are derived from measurements of the S4 index from radio occultation measurements made by the COSMIC satellite constellation and the global distribution of Sporadic E which they reveal is similar to those derived from previous studies, with a strong occurrence peak in the mid-latitudes of the summer hemisphere. The authors comment on some interesting distinctions between occurrence and intensity of sporadic E layers; for example they notes that high-latitude layers, while being lower occurrence, tend to be quite intense when they do arise.

These are interesting data sets, but are somewhat spoiled by their relatively poor presentation. For example it would be nice to have seen graphs of global Sporadic-E

occurrence and global Sporadic-E intensity in the same format, whereas what we actually see is a map of global occurrence (presumably averaged across seasons) in Figure 3 and then separate maps of intensity for each season in Figure 4.

The most interesting part of the study is the attempt to explain the occurrence and intensity of the Sporadic E layers in terms of modelled neutral wind convergence, using wind fields from the WACCM model. This provides qualitative agreement with the observations, if it is assumed that the layers are due to neutral wind convergences in the lower E-region (97-114 km) but strongly suggests that wind convergences at higher E-region altitudes cannot explain the observations. A nice feature of the wind field modelling is that the magnetic declination has been properly included in the calculations and it is demonstrated that allowing for this factor changes the expected distribution of the modelled wind convergences significantly.

Unfortunately, however, the paper is not able to make any firm conclusions, because the correspondence between the modelled wind convergences and the occurrences and intensities of the Sporadic E layers remains only qualitative at best. This almost certainly illustrates the deficiencies of the modelling assumptions. The wind fields, for example, are obviously idealised and must have significantly greater variability than the modelling suggests, an idea reinforced by the inter-annual changes in the occurrence data shown in Figure 2. In addition the authors comment on various other factors such as the variability of the meteor flux, the effects of geomagnetic storms and the effect of meteorological processes, any and all of which could result in differences between the modelling and the observations, but which would be hard to account for without much more complicated modelling. As a result, the interesting features which are observed are not very well explained.

The language of the paper could be improved. It is occasionally imprecise, so that the meaning can be hard to decrypt. There are also some mistakes in spelling and grammar. These are not really what weaken the paper, however. The fundamental problem is that the processes which produce the Sporadic E layers are likely to have

such a complex variability that no simple model can do a good job of characterising them, and this is what the study ultimately shows.

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