Second review of Glanville and Birner, "Role of vertical and horizontal mixing...", revised manuscript

The revised manuscript addresses most of the concerns raised by this reviewer, except for sensitivities from assuming 50% enhancements and reductions in the transport parameters. Results presented in the authors' response give an indication of the sensitivity to the seasonality in the two mixing terms, and this should be discussed in the paper. But there is no corresponding result for the vertical advection.

While the assumption of a 50% variation is reasonable, it is hardly a certain value for the seasonal amplitude of the vertical advection. Two references provided in support of this 50% value are not particularly definitive. Rosenlof (1995) found seasonality in the 70-hPa mass flux, but there was a large variation in amplitude depending on year and method, ranging from +-25% to +-35% by eye in Fig 11 of that paper. The w* seasonality referenced from Abalos et al. (2013) is derived from a model and should not be viewed as observationally constrained. On the other hand, Abalos et al. (2015) compared w* from three different reanalyses. While the phases of seasonal variations were in good agreement, they found a relatively large range in both the overall magnitude of upwelling and in the seasonal amplitudes (cf. their fig 7).

The authors also point to the good agreement with the w* tendency from ERA-i (Figure 7 of the revised manuscript) as supporting their 50% value. While it is reassuring, this agreement does not provide definitive support for a 50% seasonal amplitude; it has been established (and noted in this paper) that the effective transport in ERA-i is twice as fast compared to observations. If the magnitudes differ by this much, it is hard to have confidence in precise seasonal amplitudes from reanalyses. I would not recommend turning off seasonality completely, but as suggested previously, testing a range between 30% and 70% would not be unreasonable and should be explored.