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Interactive comment on “Using beryllium-7 to assess cross-tropopause transport in global models” by H. Liu et al.

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This is an interesting paper on the uncertainties in simulating STE in global models, especially with regard to global mean cross-tropopause flux. However, I believe your introduction and discussion sections will be more complete if you could place your study in the context of recent new findings on stratospheric influence on tropospheric ozone, particularly on high surface ozone events in the western United States [Langford et al., 2009; Lin et al., 2012]. A recent work by Lin et al. [2015, Nature Geoscience] shows that deep stratospheric intrusions can explain much of the year-to-year variability of springtime high surface ozone events measured at western US high-elevation sites during 1990-2012.

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Large interannual variability in STE can confound the attribution of observed tropospheric ozone changes to human-induced emission trends [Lin et al., 2015; GRL]. There is great current interest to better understand the stratospheric influence on tropospheric ozone variability observed over the past few decades [e.g. Hess et al., 2015; Strode et al., 2015]. However, different models can do very differently in terms of STE and thus their simulation of tropospheric ozone interannual variability. Can you discuss if beryllium-7 can provide constraints on interannual variability of STE simulated in the model?

Most discussions on STE in your introduction section are based on the models with linoz or synoz chemistry, but there are recent model developments with interactive stratrop chemistry at higher horizontal resolution (e.g., 50 km), which may be important to realistically simulate stratospheric intrusion events [e.g., Lin et al., 2012; Langford et al., 2014].

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