

## ***Interactive comment on “An orthogonal curvilinear terrain-following coordinate for atmospheric models” by Y. Li et al.***

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Thank you for the comment! In the revised manuscript, we will implement two sets of experiments: (1) reproducing the Fig. 4 - experiments of Schär et al. (2002) through using the OS coordinate; (2) implementing the modified experiments using the non-zero velocity and the tracer right down to the top of the mountain. And each set will have 6 experiments (Fig. 1). Then, we will do 3 kinds of comparisons:

- (1) Comparing the result obtained by the OsBr1 to that of the Cs to investigate the distinct effect of “the orthogonal grids” under the condition of the classic  $\sigma$  coordinate;
- (2) Comparing the results obtained by the OsBr2 and OsBr3 to those of the Cs to investigate the combined effect of “the orthogonal grids” and “the smoothed vertical

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levels”;

- (3) Comparing the results obtained by the OsBr2 and OsBr3 to those of the CsHybrid2 and CsHybrid3 to investigate the distinct effect of “the orthogonal grids” under the condition of the hybrid  $\sigma$  coordinate (smoothed  $\sigma$  levels).

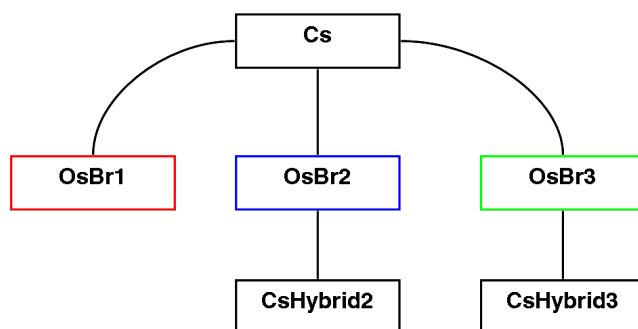
From the first comparison, we can obtain the distinct effect of the orthogonal grids under the classic  $\sigma$  coordinate, and by the second and the third comparisons, we can obtain the distinct effect of the orthogonal grids (by calculating its percentage of the combined effect) under the condition of the hybrid  $\sigma$  coordinate.

In addition, since the difference of the orthogonal grids and the non-orthogonal grids has the maximum near the surface and decreases according to the increasing height, the first set of the experiments is to investigate the impact of the orthogonal grids with small difference to the non-orthogonal grids, and the second set is to analyze those impact with great difference between the orthogonal and non-orthogonal grids.

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**Fig. 1.** Design of the experiments. The CsHybrid2 and CsHybrid3 represent the experiments using the hybrid  $\sigma$  coordinate with the vertical layers similar to those in OsBr2 and OsBr3.