

## ***Interactive comment on “The 1986–1989 ENSO cycle in a chemical climate model” by S. Brönnimann et al.***

### **Anonymous Referee #2**

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#### General Comments

The paper gives interesting insights into the atmospheric response to sea surface temperature variations initiated by the canonical ENSO cycle 1986–1989. This study contributes to the survey on ENSO signal in the stratosphere, which becomes a more and more important topic. This is a good paper at the forefront of the study of the troposphere and stratosphere coupling through wave - mean flow interaction. It may be published after some substantial revisions.

#### Specific comments

1. In the part devoted to the nonzonal patterns in stratospheric temperature and geopotential height the authors consider only the differences between 1987 and 1989 (Fig.

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4). I think that first the results of simulation for each year have to be compared with “observation” (ERA-40) with especial attention to the large-scale longitudinal variations. These quasi-steady wave-like structures (stationary planetary waves - SPW) play an important role in the interaction between the troposphere and stratosphere and we have to be sure that SOCOL is capable of reproducing their propagation correctly. I presume that relatively small (in comparison with ERA-40) differences between 1987 and 1989 in the stratosphere obtained in the case of S1 and S2 are conditioned by the fact that SOCOL underestimates the SPW amplitudes in the stratosphere.

2. 1987 and 1989 correspond to the low and high levels of solar activity respectively. This subject has not been addressed in the paper. What level of solar activity was specified in the model simulations? How did solar activity level impact on polar vortex weakness, Brewer-Dobson circulation and troposphere-stratosphere coupling compared to ENSO effect?

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