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Nonlinear Processes in Geophysics
Discussions
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Interactive comment on "Parametrization of stochastic multiscale triads" *by* Jeroen Wouters et al.

Anonymous Referee #2

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This work compares the performance of two methods to derive the reduced dynamical equations of a more complex dynamical system, by applying these methods to ODEs which describe stochastically forced additive and multiplicative triads. The first method is the homogenization method, which is designed to work for systems with a pronounced time-scale separation between the (slow) variable of interest **x** and fast variables **y** whose detailed evolution need not be computed. The second method recently developed by the authors is the so-called weak coupling method that derives the approximate response of **x** subsystem to the **y** subsystem, and does not rely on the time-scale separation between the two subsystems, which corresponds much better to geophysical reality. The weak coupling approach results in models that outperform those derived using homogenization approach, at the expense of relative numerical efficiency.

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Discussion paper

This is a very nice, important work, and the paper is succinct and well written. I recommend publication and I am looking forward to the authors' applying their methodology to intermediate geophysical models.

Minor comments:

p. 1, title: Shouldn't this be "parameterization" ("e" after "t")?

p. 2, l. 7: . . .of corresponding to. . . –> remove 'of'

p. 2, ll. 21-23: there is nothing wrong with empirical parameterizations either!

p.3, ll. 24-25: remove extra parentheses

p. 15, l. 23: I think this comparison should at least be summarized in a sentence or two, then the reader should be referred to Majda's reference for further details

p. 16, l. 4: 'two reductions' –> two reduction methods

p. 16, btw ll. 17 and 18: Any words on work in progress/future work? Can this be applied to a system of intermediate complexity, with many simultaneous triad interactions?

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Discussion paper