

## ***Interactive comment on “Critical Assessment of Geoengineering Strategies using Response Theory” by Tamás Bódai et al.***

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We are surprised by the referee’s comments and verdict. Those comments that form the basis of the referee’s recommendation against publication seems to overlook content of the manuscript and key parts of the discussion between referee #1 and ourselves.

It is suggested that our paper is not suitable for publication for two reasons. Both of them can be discounted as follows.

1. Instead of a schematic for Fig. 1 we are required to present a diagram representing “actual data”. It is unclear what is meant by “actual data”. Surely it cannot be observational data because no geoengineering is practiced presently and in the recent past. In

C1

the context of our model PlaSim, Figs. 4, 7, 8, 9, 10, 11, 12, 14 all present side-effects of geoengineering – what Fig. 1 is meant to give a first idea of.

2. The solution for the required solar forcing of the inverse problem, given a ramp CO<sub>2</sub> forcing, is rather trivial, so the methodology that we are proposing (point (I) of the abstract) is unnecessary. The referee does not realise that – as we emphasized this in Sec. 1.2 – cancelling the global mean temperature is just one of the possible choices for a combination of an observable to control & a desired outcome. For other choices, which are not necessarily unrealistic, the solution could be nontrivial. Examples may be the average temperature where people live, or, where the country of an influential nation is located.

Regarding point 2. above, the referee outlines the way the required solar forcing can be determined for our ramp CO<sub>2</sub> forcing, involving an iterative determination of the constant-in-time solar forcing of the plateau, after the ramp. This is exactly what we wrote starting on line 15 on page 24 of the original submission.

The following statement from the referee report likely pertains to the same issue.

“the real problem with geoengineering is that you can’t exactly cancel the CO<sub>2</sub>-forced climate change at all points using a single means of controlling the solar cycle, and this paper provides no help in achieving that more thorough cancellation, nor in documenting the already well-known difficulty.”

The said “problem” is what our original submission meant to exposit (starting with Fig. 1!), and referee #1 pointed out to be the most obvious thing about geoengineering and already thoroughly addressed. This has been acknowledged by us, and the paper had been revised.

We find the following four points of the referee also surprising, and we respond to them as follows. 1) Using the term “identification forcing” systematically, and explaining how via such a forcing the Green’s function is determined, having already explained what

C2

the Green's function is needed for, we are satisfied that our intended message can be understood by a devoted reader. A "comprehensive" description of "system identification" appears to us a subjective concept, and, again, it's not clear to us how our message or exposition would be strengthened by further details on system identification in general. 2) We wish not to remove this comment. Regarding the clarity of our meaning, we had removed a footnote in the revision, as a result of the criticism by referee #1. In that we distinguished between societal challenges of diplomatic and technological nature. 3) The referee will find many papers in prestigious journals which adopt as much detail from published papers as we did. He/she will find examples among the references cited by us. The liking of expressions "of course" and "obvious" is subjective. In our case we think that it does not obstruct the understanding and neither are they misleading. We assume when using these expressions a degree of dedication of the reader. 4) Although the expression "asymptotic time" is not defined, we think that the second part of the sentence "the discrepancy emerges transiently only" makes the meaning clear enough, provided that the reader know the meaning of "transient".

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