

**Nonlinear Processes in Geophysics Discussion. Authors: Zhe An, Daniel Rey, JingXin Ye and Henry D.I. Abarbanel**

22 July, 2016

Title: *Estimating the State of a Geophysical System with Sparse Observations : Time Delay Methods to Achieve Accurate Initial States for Prediction*

Recommendation: **Minor Revision**

**General Comment**

I think the authors have overall well addressed my original concerns and have indeed substantially modified and improved the manuscript also in the light of the other Reviewer' comments.

I have only a few additional minor remarks for the Authors to address before acceptance. The comments that follow refer to the last Authors' reply and the numbering is made accordingly.

**Specific Comment**

• **Abstract.**

I understand that  $L_s$  is a lower boundary, so that synchronization is achieved when  $L \geq L_s$ . If so please add this piece of information in the text since the name critical number does not fully explain that it is also a minimum number. Also, please explain what the authors mean by synchronization here; a word explanation will suffice.

• **On point (4).**

The paper is still wrongly cited, as Pazo (2016) instead of Pazo *et al.* (2016), in line 7 page 6.

• **On point (18).**

I could not find where these statements are given in the current version of the manuscript. Maybe they have been removed, which is fine with me. Please clarify this and point the exact portion of the text. If the authors refer to the sentences between lines 4-7 at page 9, those are fine with me but I do not straightforwardly see how they relate to the statements originally under discussion.

• **On point (19).**

Here as well, I have problems to identify how and where in the text the authors have introduced modifications, if wished, to address my points. For instance, the current Section 5.1 does not seem to be related to the original Section 5.1, instead this seems to be the current Section 5.4. This makes me difficult to judge the changes. Regarding points (1) and (2), I could not find the equations in the current version of the manuscript. Are they still shown somewhere? As for my point (3), I referred to an apparent inconsistency between the type of observations you used. From everywhere in the text is clear you are working with height measurements, but from the equation in the original Section 5.1, it seemed you also create synthetic observations of the velocity. This issue does not seem to be present anymore in the current version (Section 5.4). Please indicate where in the text are placed the corrections mentioned in points (4) and (5).

• **On point (23).**

Please provide information on which actions, if any, you have taken to address this remark. By looking at the current version of the conclusion, it seems that all discussion on equivalence with the smoothers has been removed. Has it been placed elsewhere or modified somehow? Please clarify.