

## ***Interactive comment on “Horizontal versus vertical plate motions” by M. Cuffaro et al.***

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### General comments

In my opinion this manuscript has surely the merit to be free from any aprioristic idea about the driving force of plate tectonics. This is an appreciable scientific approach aiming to open discussions on this “hot topic”. The background question is: are current models of plate driving forces reconciling with different types of geophysical/geological observations?

The authors list a lot of situations in which nor one model neither the other are able to address completely the question, and I believe the readers will honestly agree with this conclusion.

The observation that horizontal motions are about 1 or 2 orders of magnitude faster than the vertical ones, may assume relevant consequences in peculiar tectonic contexts (page 69 lines 5-7; page 71, lines 1-4), thus suggesting the need of unified mod-

els taking into account all the possible forces acting on the plates, that should be in balance, since a steady state of motion is currently displayed by space geodesy (excluding deformation zones).

The authors suggest a possible role of tidal and rotational drags in plate driving mechanism; from a purely kinematic point of view this idea may be supported by the existence of the global westward drift of lithosphere, proven in numerous papers that would be generated by the contribution of external ordered forces acting at global scale.

However these ideas are not focused into a model, but this is probably out from the present aims of the authors.

In conclusion, I find interesting the questions posed with passion by the authors, but the present form of the manuscript seems a bit laborious to read.

#### Minor comments

- 1) page 65 line 1, the term measuring is not appropriate, I suggest analyzing
- 2) the rms provided by the NASA solution are at hundredth of millimetre level, although one may object about the claimed level of accuracy of this dataset, this does not constitute an obstacle because not influent on the questions analyzed in the manuscript; anyway, I think that a model based on these observations (REVEL) cannot have a higher level of accuracy; consequently I suggest to round all the velocities maximum at hundredth of millimetres (Table 1 and text)

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