

Interactive comment on “King Tide floods in Tuvalu” by C.-C. Lin et al.

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Dear Referee #1

We really appreciate of your detailed suggestions and comments. We will integrate them in the revision according to your suggestions and to the other comments we might be receiving in the remaining of the discussion process.

Regarding to your suggestion of adding a graph to interpret the inundation caused by King Tide, we make a terrain profile (Figure 1) of Tuvalu based on the terrain framework of Yamano et al. (2007) to understand how the tidal variation effects on regional flooding. The threshold of King Tide, 3.2 m, is defined as the average elevation of the island land; meanwhile, the average of regular spring tide of 19 years (1993-2012) is 2.7 m only. The difference of 0.5 m sea-level variation demonstrates the significant

C576

effects of King Tide on sea-level fluctuation. This figure is added in our revision. Besides, due to the characteristics of coral atoll composed of non-solid object and easily being washed away by wind and wave, water can ooze out of the coral ground once the sea-level rising over than the average elevation or the so-called King Tide threshold. The permeable stratum makes the coral island more vulnerable and easily flooded by ocean fluctuation. Figure 2 provides a simple image to explain the inundation in coral island.

As you mentioned, regional flooding is a local issue. However, it might be caused by locally intense storm, seasonal precipitation, ENSO or long term effects of global warming. The term “King Tide” may easily been simplified as the highest spring tide, just like the Tuvaluan misunderstood the flooding which is caused by tidal variation only. King Tide, originated in Australia, New Zealand and other Pacific nations, is always related to regional flooding in Pacific. This study decomposed and analyzed the cause of regional floods in Tuvalu, and indicated that tidal variation is the major factor of regional floods, but not the only one. Here we sincerely accept your suggestion to change the title to exclude the term “King Tide”. The title could be “Interpretation and decomposition of regional floods in Tuvalu”.

Referring to your suggestion of large data but less interpretation on Figure 4 of the original discussion paper, we delete it and replace by an example image which also presents the significant effects of warm water mass on sea surface height anomaly. The figure of 28 King Tide events is removed to the supplement.

Some of the wrong spelling or abbreviations have been removed and revised. The language will be edited on the process of revision also. Again, thank you so much. We greatly appreciate your efforts to make the paper better. With best regards.

Please also note the supplement to this comment:

<http://www.nat-hazards-earth-syst-sci-discuss.net/1/C576/2013/nhessd-1-C576-2013-supplement.zip>

C577

C578

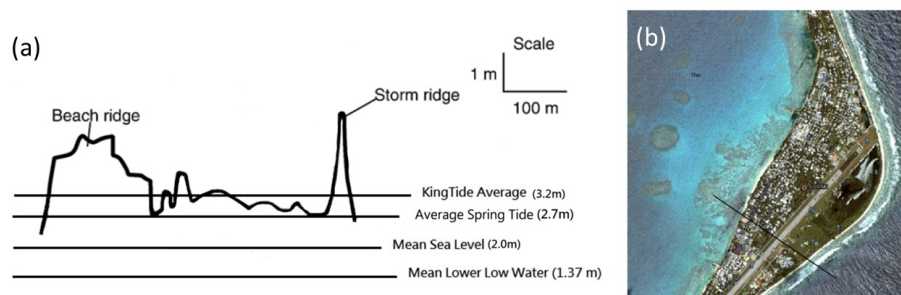


Fig. 1. The terrain profile of Fongafale, Tuvalu. The framework (a) is accessed from Yamano et al. (2007), which is drawn by the profile of black line in the Google image (b).

C579

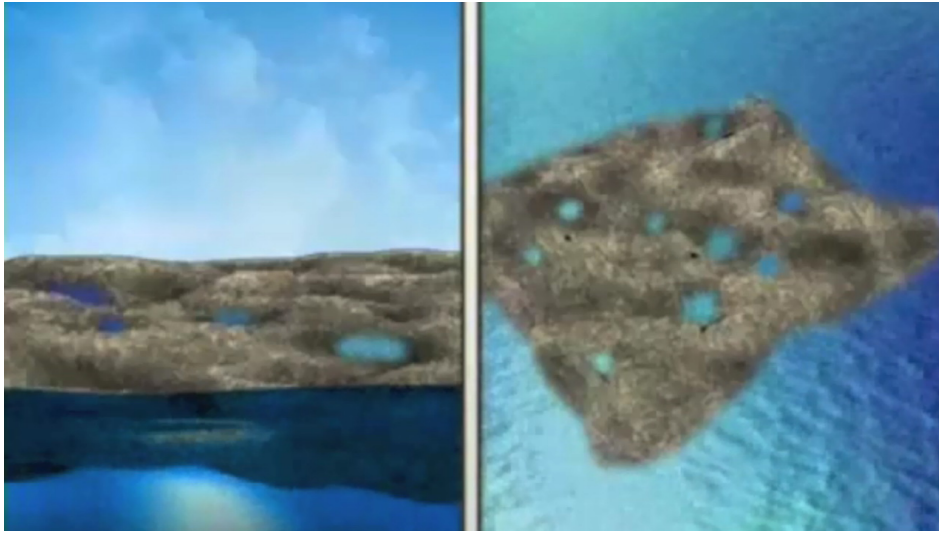


Fig. 2. Two simple images explain the inundation in coral island. The images are derived from TITV weekly news (<http://www.youtube.com/watch?v=RqB23kxV5Aw>).