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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "The Effects of Changing Climate on Estuarine Water Levels: A United States Pacific Northwest Case Study" *by* Kai Parker et al.

Anonymous Referee #1

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The authors have proposed a modeling framework to quantify the extreme estuarine water levels (WL) under climate change. Their framework, taking oceanic, atmospheric and hydrologic processes into account estimates extreme water levels in two estuaries of US Pacific Northwest. The idea of integrated modeling that couples processes across scales to estimate extreme estuarine water levels is interesting, and I believe this idea deserves publishing in NHESS, however after a major revision. There are a few issues with this version that I explain below:

Major: - First one, which the authors themselves have briefly mentioned, the climate and sea level rise projections used here are relatively old-dated! Publishing research

based on 4th IPCC assessment report, while IPCC 5th has been around for years and IPCC 6th is coming out soon, needs a valid justification. To me, saying "was the only climate product, at the start of this project" is not enough. I expect a good justification that the current results are still useful for the audience.

- At the end of section 4 (Lines 1-9 in Page 9), the non-linear interactions between SLR and tide/surge (i.e. Wahl, 2017, Sea-level rise and storm surges, relationship status: complicated!, Environ. Res. Lett., https://doi.org/10.1088/1748-9326/aa8eba ; Devlin et al., 2017, Coupling of sea level and tidal range changes, with implications for future water levels, Scientific Reports, vol 7, 17021) should be highlighted that are missed here. Also, other alternatives for non-stationary frequency analysis should be explained as well for interested readers (i.e. Cheng L., AghaKouchak A., Gilleland E., Katz R.W., 2014, Non-stationary Extreme Value Analysis in a Changing Climate, Climatic Change, 127(2), 353-369, doi: 10.1007/s10584-014-1254-5.).

- Page 4, L9-10: the hindcast and forecast periods are not the same length. This makes them incomparable, right?

Minor: Page 1, L 31-32: There are some studies to be cited here, i.e. Jay et al., 2016, Tidal-Fluvial and Estuarine Processes in the Lower Columbia River: II. Water Level Models, Floodplain Wetland Inundation, and System Zones, Estuaries and Coasts, Volume 39, Issue 5, pp 1299–1324; and the references therein.

Page 2, L18: a relevant recent citation Gallien, et al., 2018, Coastal Flood Modeling Challenges in Defended Urban Backshores, Geosciences 2018, 8(12), 450; https://doi.org/10.3390/geosciences8120450.

Page 6, L4: Please provide more details about the quantile mapping technique used here.

Best of luck,

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