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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Maximum wind radius estimated by the 50 kt radius: improvement of storm surge forecasting over the Western North Pacific" *by* H. Takagi and W. Wu

Anonymous Referee #2

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The scope of this paper is clear and also the problem addressed.

What I do not understand fully is the methodology.

The authors consider tropical cyclones (TC) crossing south Japan and for reasons that are clearly explained they focus their attentions on 17 events that took place after 1990.Their objective is to find a better estimate of the parameter Rmax that is defined as the cyclone radius corresponding to the max sustained wind speed Vmax (definition given on page 2 of the paper). They claim that the present estimates based on correlations between Rmax and Pc (pressure at the cyclone center) and between Rmax and Vmax are poor with quite low value of correlation coefficients. Therefore they like

to propose a new method.

What is not clear to me is how they get the value Rmax. It is explained in section 2 (Methodology), but I have some doubts. I understand that for each of the 17 cyclones taken into account, the authors have data from JMA analyses: among others, these include TC center position, central pressure Pc and Vmax. These are given every three hours, and are interpolated to get hourly data. It seems that Rmax is not included in the list of the available data. Now a number of questions can be posed naturally.

First, it seems that Rmax is obtained through the formula (1) of page 7 through the method described at page 8. I'm not sure I interpreted it correctly. To me it seems that the method works as follow. For each hour, they know the position of the TC center, they select the closest meteorological station from a network of 10, they estimate the distance r of the station to the TC center, take the recorded value of the pressure P at the station, and finally after inserting the interpolated value of Pc in formula (1), they invert for Rmax. In this way they get hourly values of Rmax. If my interpretation is true, the authors should be aware that this is not an independent value of Rmax estimated from meteo observations giving the position of the TC center and the region of maximum wind. Instead, it is derived from formula (1) which is itself a model. A further question here. Why do they use the closest station within the radius of 100km? Why don't they use more stations if more stations fall within the selected circle?

Second, if the authors have hourly data (Pc, Vmax, Rmax), why do they use only a single set of three data for each TC? What is the criterion for this selection?

The authors claim that they are able to find a better correlation between Rmax and R50, where R50 is the radius of the sustained 50 knot wind. Indeed, the authors do not explain how they obtain R50. Are these data directly available from JMA forecasts? Can they be deduced from issued forecasts? And, like before, if one gets many values of R50 for each event, what is the value of R50 that is used in the correlation law?

Having found a satisfactory correlation law between Rmax and R50, the authors sug-

gest using this correlation and the model of formula (1) to provide better input data for storm surge numerical modelling. Indeed, even though this last correlation is good, what really matters is the lack of correlation between radiuses and pressure, that is shown in Figure 3. Therefore, if a given pressure low is associated to very many values of radius (925 hPa gives a radius range from 20 to 80 km) and to max winds in the order of 100 knots, it's unlikely that a better determination of Rmax can lead to more reliable simulations of ocean waves and more reliable estimates of their implications: the spread remains and is not cancelled by the method suggested by the authors.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 3, 6431, 2015.