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Biogeosciences Discussions

Interactive comment on "Effects of storms on primary productivity and air-sea CO_2 exchange inthe subarctic western North Pacific: a modeling study" *by* M. Fujii and Y. Yamanaka

M. Fujii and Y. Yamanaka

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First of all, the authors greatly appreciate the constructive review on our manuscript. We have revised our manuscript, basically according to the reviewer’s comments in such ways as described below.

(1) The model is one dimensional, as the reviewer points out. The authors have clarified this point in the revised manuscript by revising the corresponding sentence as follows: “We use a 16-compartment marine ecosystem model coupled with a one-dimensional physical model”

(2) To clarify that the ecosystem model used in this study is originated from NEMURO, the authors have added a sentence “The ecosystem model is based on NE-

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MURO (North Pacific Ecosystem Model for Understanding Regional Oceanography; e.g. Kishi et al., 2007).” in the revised manuscript. A paper (Kishi et al., Ecol. Modell., 202, 12-25, 2007) from Ecol. Modell. NEMURO special issue has been introduced for reference in the revised manuscript. as well as Fujii et al. (2007) which has already been included in the previous manuscript.

(3) Following the reviewer’s useful comment, Table 1 has been modified (the numbers have also slightly modified) and a figure has been newly added to the revised manuscript. The total number of days on which the wind speed was more than 2sigma and 3sigma values are 249 and 34, respectively. The new figure shows that for $>$2sigma the duration is 1day for 156 storms, 2 days for 34 storms, 3 days for 7 storms, and 4 days for 1 storm. For $>$3sigma, the duration is 1day for 23 storms, 2 days for 4 storms, and 3 days for 1 storm.

(4) The western North Pacific is known as the oceanic region of highest incidence rate of explosively developing extratropical cyclones (e.g. Roebber, Mon. Wea. Rev., 1984). Although previous studies on the cyclones are relatively fewer than those on hurricanes, such cyclones rapidly decrease the air pressure, sometimes as low as hurricanes and also possibly enhance abrupt physical processes in the ocean. In the revised manuscript, the authors have referred to the explosively developing extratropical cyclones with frequency of occurrence (in Introduction). Some previous studies on the explosively developing extratropical cyclones (e.g. Yoshida and Asuma, Mon. Wea. Rev., 2004) have been referred to as well.

(5) The difference between w/ and w/o storm cases in July and August (Figure 2 (c) and (f)): As the reviewer points out, the physical condition is very similar in both cases during the months. This is the reason why the authors consider the lower sea-to-air CO2 efflux the w/ storm case is caused by the higher primary production. More exactly, the efflux increases due to higher wind speed and water temperature from June to August, but the increase is partly set off by higher primary production in the w/ storm case. The authors have added this description to the revised manuscript.

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