We thank the two reviewers for their comments that contribute all to the clarity of the paper.

Reply to reviewer 1

Removed in abstract : "We select the copulas with the same tail dependence as data. In the event of an opposite tail dependence structure, we resort to the survival copula."

In abstract, the choice of copula is described before the estimation of the copula parameters.

The Defra method is now mentioned in Introduction L34.

The introduction is largely changed taking into account the pertinent remarks of the reviewer.

Minor Comments

The term "normal" with copula is removed in the text.

- "global warming" is changed with "climate change" in L5.
- L43 "all the pairs" is replaced by the "set of pairs".
- L56: we add this model is referred to as a "conditional extreme model" in Tiloy et al. (2020).
- L60 : we add "they show that the fully nested method of creating hierarchical copulas provides the best results for their case study "compared to Chakak and Koehler (1995) and conditional mixture".
- L76: "Isovalue lines" is replaced by "contours of equal joint exceedance probability".
- L116: References are added to confirm the use of the assumption : "The independence assumption is not completely valid when two tuples per day are selected but that is an approximation commonly used".
- L135: "minimum error" is replaced by "minimum mean error".
- Word "tum" is suppressed.
- Equation 35: we add "for cumulative distribution functions U_1 and U_2"
- Table 1. : Joe copula and Gumbel copula are corrected.
- L303. "The simplified Defra method refers to univariate survival functions $\bar{F}H$ and $\bar{F}\,S$ of wave height and storm surge. The reason is that coastal engineers usually work with exceedance probability rather than with non-exceedance probability" is replaced by "The simplified Defra method refers to univariate survival functions $\bar{F}H$ and $\bar{F}\,S$ rather than cumulative distribution functions of wave height and storm surge as coastal engineers usually work with exceedance probability rather than with non-exceedance probability".
- L308. The sentence is changed : "The bivariate survival functions $\bar{F}_{HS}$ of table 4.15 of Rock Manual (Ciria et al., 2007) are determined with equation (41)".
- In Table 2 the copulas with the same type of tail dependence as the sample and therefore candidates to model the dataset are highlighted and the following text is added :"In bold in Table 2 are presented the copulas with a lower tail dependence: Clayton, survival Gumbel and AMH when copula parameter is close to 1. We will come back later to this special property of AMH copula. The Gauss copula has a relatively large likelihood. However, it does not have a correct tail dependence and cannot therefore correctly represent the tail dependence."
- After Table 4, a Figure 9 is added with the text "We show in Figure 9 that there is a coastal area with a maximal dependence from Concarneau to Port-Bloc (in grey in the figure). There are areas that are the most exposed to wind that comes mainly from the West direction along the French Atlantic Coast."

- → One part of section 4.1 is placed in introduction and the section 4.1 is renamed “methodology”.
- → L494: “limit” is replaced by “limitations”
- → Three proposed references are added :

Jane, R., Cadavid, L., Obeysekera, J., and Wahl, T.: Multivariate statistical modelling of the drivers of compound flood events in South Florida, Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2020-82, in review, 2020.
Tilloy, A., Malamud, B. D., Winter, H., and Joly-Laugel, A.: Evaluating the efficacy of bivariate extreme modelling approaches for multi-hazard scenarios, Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2020-28, in review, 2020.
Caillault, C., Guegan, D.: Empirical estimation of tail dependence using copulas. Application to Asian markets. Quantitative Finance, Taylor & Francis (Routledge), 5, 489 – 501, 2005.

Reply to reviewer 2

In section 2 and 2.4: the return period T_AND and probability of joint exceedance are defined with a reference to appendix A. Similarly, this probability is defined in section 2.4.

In section 2.1, the description of the constitution of the sample from the time series is completed following the plan proposed by the reviewer. We have removed the mention to the database Candhis that was used to calibrate the database Anemoc in order to avoid a confusion.

In section 4.2, we add : “with the fully nested hierarchical copula method”.

In section 3.1, we add : the method that is proposed here for assessing the sample dependence refers to lower tail dependence. Other methods exist such as the chi-plot proposed by Fisher and Switzer (1985, 2001) and used in coastal analyses by Mazas (2017) for instance.

Concerning the use of the wrong tail, we have clarified the notations and changed the text in subsection 3.3. We have kept the notation of survival copula $\bar{C}$ and survival function $\bar{u}$. We had removed the bar in order to simplify the notations but we consider now that we must keep it in order to clarify the reading of the paper.

In section 3.1, we add : “This threshold of one meter that is used for filtering wave height excludes the swells and leaves only a very homogeneous population of pure wind waves. This treatment removes long wave periods and increases the dependence between wave height and wave period.

In section 4.3, we add : “Wave height and wave period are the most correlated variables. This result is not surprising all the more since we deal with pure wind waves after we have removed the swell.”

In Table 1, we add: “Ali-Mikhail-Haq will be noted AMH in what follows”.