

Answers to major comments:

1. We agree. Changes in the manuscript:

An opportunity can arise, for example, for specific bird species populations in a warmer environment (e.g. Gregory et al., 2009).

2. We agree. Changes in the manuscript:

where $v(x)$ is the exceedance frequency of impact x , $T(x)$ its equivalent return period and h the hazard intensity. $p(h|E_{\bar{t}})$ is the probability density function of h given that the historical event $E_{\bar{t}}$ took place, and is computed using the event's ensemble members. The probability of exceeding an impact value given intensity h , $P(X > x|h)$, is computed using the exposures values and their impact functions (Eq. (3)). We assume that the impacts of an event at different exposures are independent. Following these definitions, a stakeholder interested in impacts with 300 years return period can define the PMI as x such that $v(x) = \frac{1}{300} 1/\text{years}$.

3. This motivation is reflected in the results shown in Table 3 and Figure 6. The text already mentions the impacts per mainland power shown in Figure 6. Additionally, we have added another sentence to interpret Table 3 results at mainland level:

The metrics per mainland power are also shown. After Irma's crisis the Foreign Affairs Committee of the House of Commons recognized the vulnerability to natural disasters of their Overseas Territories and the need to address it (Foreign Affairs Committee; House of Commons, 2018). The results per mainland presented here account for the probability of several Overseas Territories being hit by the same event, and the accumulated damage that might arise. These metrics can therefore help mainlands to define natural disaster response strategies able to cope with all expected impacts, as well as long-term cost-effective resilience measures.

4. The black marble methodology has been used in previous studies performed with CLIMADA's MATLAB version (see the cited Gettelman et al. 2017). We therefore think that a general description of the implemented version in CLIMADA Python is enough.

5. Sentence removed. Added sentence in paragraph to explain the motivation of the comparison with GAR 2015 values:

The GAR 2015 models (de Bono and Chatenoux, 2014) are also presented since they are used in Cardona et al. 2017 to compute Irma's damage with CAPRA.

6. Equation added:

In this function the property damage starts above a threshold v_{thresh} equal to 25.7 m/s and increases as the cubic power of the wind speed as follows:

$$f_{ij} = \frac{v_{ij}^3}{1+v_{ij}^3}, \quad v_{ij} = \frac{\max(v_{ij}-v_{thresh},0)}{v_{half}-v_{thresh}} \quad (1)$$

where v_{half} is the wind gust where half of the property is damaged and v_{ij} is the maximum wind gust at centroid i due to event j . Following the findings of Sealy and Strobl 2017 for the Bahamas, we consider $v_{half} = 74.7$ m/s.

7. Caption adjusted.

8. The aim of the analysis presented here is to show how sensitivity analyses can be easily performed and communicated following a Monte Carlo approach. The sensitivity to changing parameters in the impact function and its impact to damage estimates is represented in figure 3.5. It is true that surge-related losses can be substantial. During Irma significant storm surges occurred in the U.S Virgin Islands. However, specific inundation amounts are not available (Cangialosi et al 2018). An additional difficulty to model surges is to distinguish between damages generated by rainfall, surge or wind. Therefore, the model presented here aims to account for all the damage sources and is shown to work well for hurricanes like Irma. Introducing a surge model (as mentioned in the conclusions as further work) can allow to perform further sensitivity analyses, but is out of the scope of this paper.

Changes in the manuscript:

- Added perturbation in impact functions detailed explanation:

modifying 10% the shape of the impact function by uniformly sampling from its parameters of Eq. (12): $v_{half} + \varepsilon_{half}$ and $v_{thresh} + \varepsilon_{thresh}$, where $\varepsilon \in [-0.1v, 0.1v]$.

- Added explanation in cited paragraph:

The highest uncertainty range is obtained for extremely rare events (once every 3,400 years events), which produce a total damage in the region between 12.5 and 21 billion dollars.

Other sources of uncertainty can originate from modelling tropical cyclone damages based only on their wind gusts. Even if the model works fine for regular hurricanes like Irma (Section 3.3), rainfall and storm surges can account for high damages also in less windy storms (e.g. hurricane Sandy in 2012) that are not completely captured.

9. Following the procedure explained in Section 3.2.2., we base our analysis on all the historical tracks that occurred between 1950 and 2017 (68 years) and an ensemble of 50 members per historical event. Setting an equal probability of occurrence per year, each event (historical and synthetic) has a period of $68 \times 50 = 3'400$ years. This is the highest return period observed in Fig 6, which has been obtained using Eq. 6. These event frequencies will appear from factors $p(h|E_i)$ and $F(E_i)$ after discretization of Eq. 6, similarly as in eq. 4.

The fact that a tropical cyclone affects several islands is fully dealt with by the model and therefore well represented in Fig 6. The metrics per mainland power contain this information, and other questions like the likelihood of exceedance of damage on one island given that another has been impacted before can be addressed as well.

The assumption of independence of impacts over exposures, allows to consider any collection of exposures for discretization of Eq. 6. The question of compound events (correlated occurrence of events) cannot be addressed following Eqs. 4-9, since independence of events is assumed when adding over events. Moreover, we assign the same probability of occurrence ($F(E_i)$) to all events.

Changes in the manuscript:

- Added clarification in Section 2.2.3 on assumed independence of events (independence of exposures was already explicitly stated).
- Added events' frequency (1/50/68) in Section 3.2.2.
- Added explanation in cited paragraph:

We notice that the assumption of independent events in Eq. (6) does not allow to study compound events. Fig. 3.4 provides therefore the probability of exceedance of an impact caused by a single tropical cyclone; the occurrence of correlated events is not fully addressed.

Answer to minor comments:

All minor issues have been addressed, but number 7. Implementing number 7 would cause a table which would be too wide and not add key information.