

1 Research article for *Global Change Biology*

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3 **Coral reef suitability loss under climate change threatens tropical**
4 **biodiversity hotspots**

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6 Patrice Descombes, Mary S. Wisz, Fabien Leprieur, Valeriano Parravicini, Christian Heine,
7 Steffen Olsen, Didier Swingedouw, Michel Kulbicki, David Mouillot, Loïc Pellissier

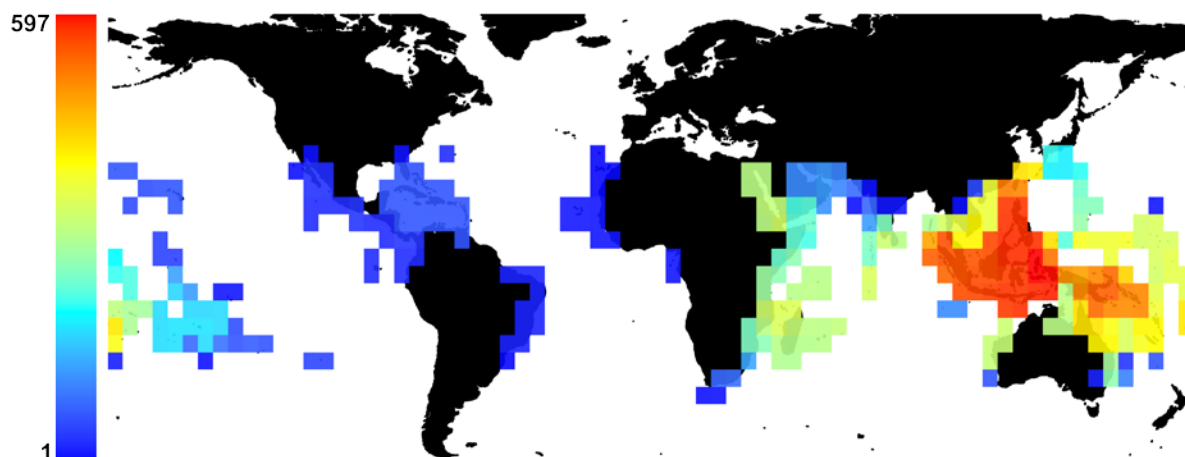
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9 **Supporting information**

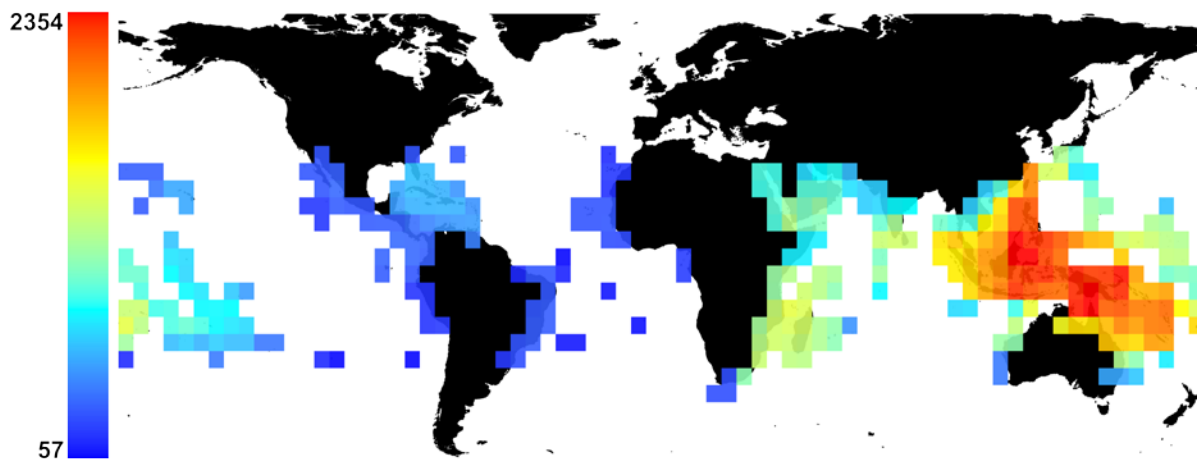
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(a)



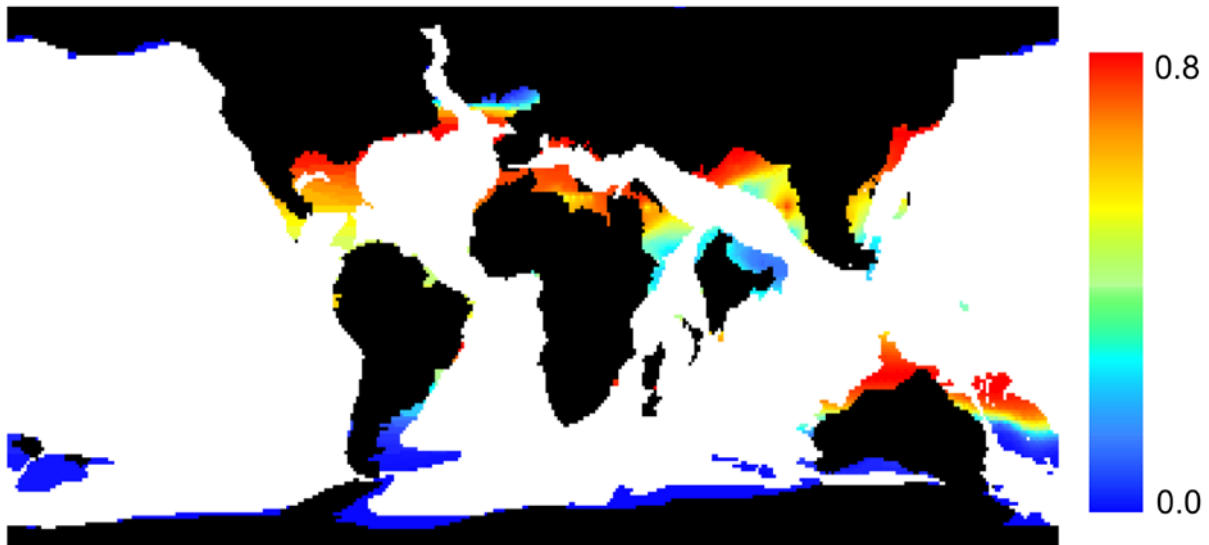
(b)



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13 **Figure S1.** Species richness maps for (a) coral species and (b) reef fishes species. The
14 richness of both groups peaks in the coral triangle, in the centre of the Indo-Pacific Ocean.

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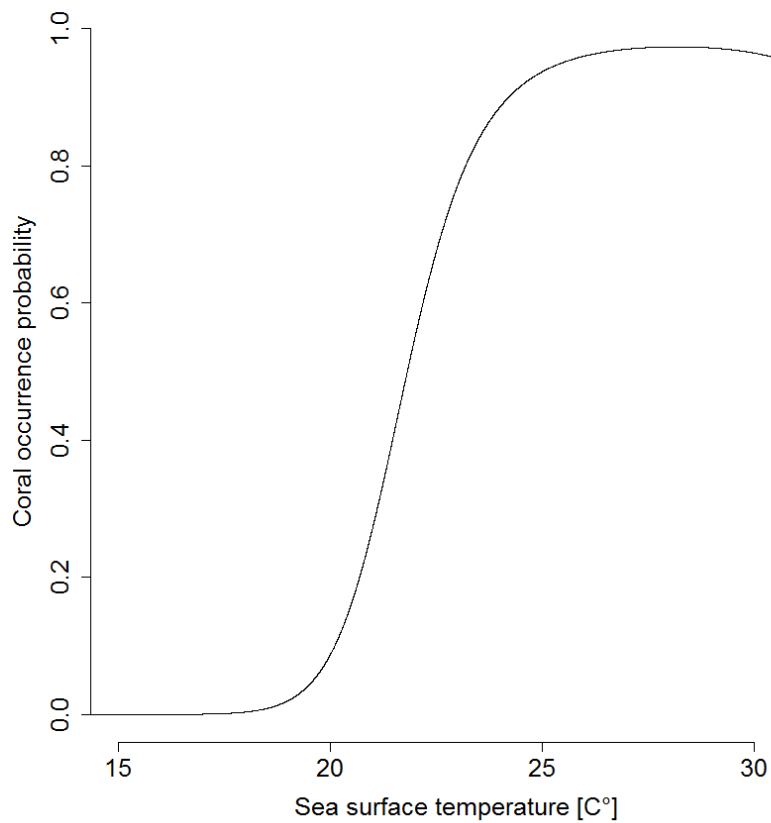
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18 **Figure S2.** Thermal suitability for coral reefs hindcasted for mid-Eocene from the niche-
19 based model. The colour gradient from blue to red corresponds to suitability for coral reefs.
20 Blue indicate low thermal suitability for coral reef while red indicate high suitability for coral
21 reef. Projected reef were limited to shallow water based on reconstructed shallow oceanic
22 regions from paleogeographic environment data for the middle Eocene (45 Ma; Smith *et al.*,
23 1994). Continents are shown in their absolute reconstructed position using plate rotations
24 based on Müller *et al.* (2008). Coral reefs reached latitudes of 50°N and 50°S during the
25 middle to late Eocene corresponding to previous fossil studies (Wallace & Rosen, 2006). The
26 projection also suggests that coral reefs were absent from the east Tethys sea. Highest
27 temperatures occurred in the eastern Tethys around the Indian subcontinent and on the eastern
28 side of Africa, up to North East Africa, while the western Tethys and paleo-Atlantic ocean
29 would be immersed in relatively cooler waters, as were southern latitudes near Australia
30 continent (Huber & Caballero, 2011).

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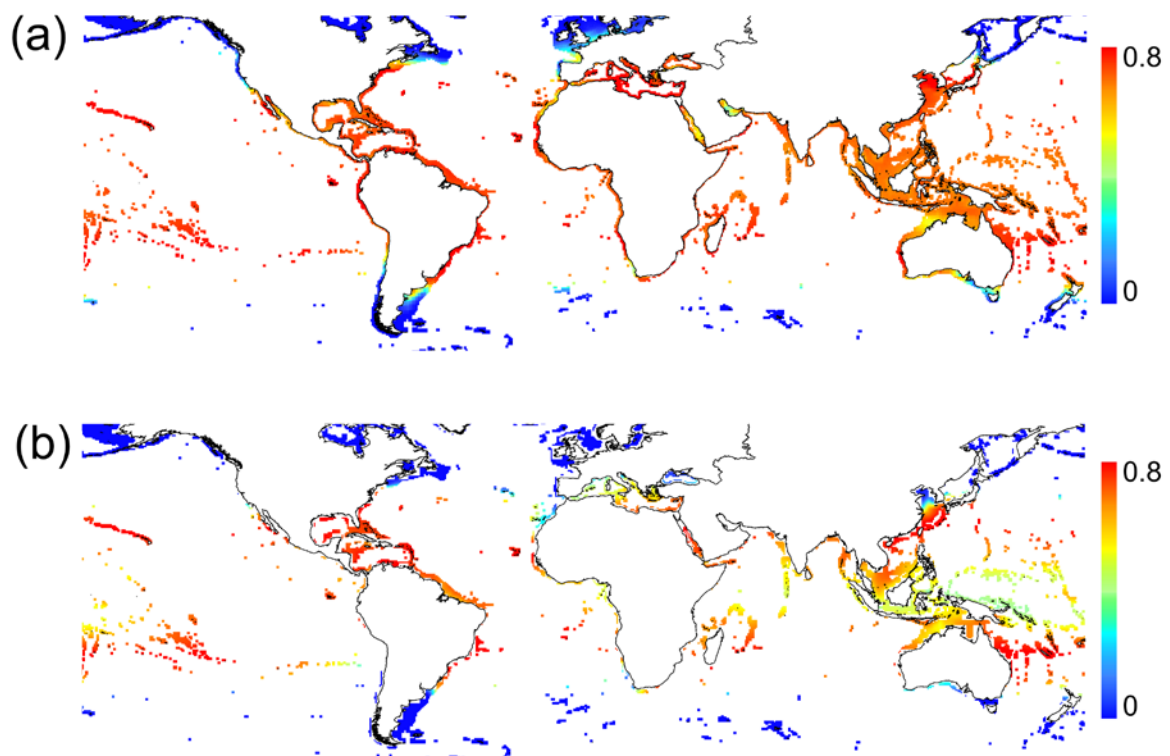


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35 **Figure S3.** Response curve of the model in relation to sea surface temperature when
36 calibrated on current species occurrences and mean annual sea surface temperatures. The
37 modern model shows a truncated response curve limiting forecasts under climate change.
38 When the niche-based model was calibrated using current species occurrences, the response
39 curve was truncated limiting inferences beyond a threshold of 30°C corresponding to the
40 maximum modern yearly average temperature. In contrast, when the model was calibrated
41 using both current occurrences and fossil records spanning the broader combined SST
42 gradient, the niche-based model calibrated a full hump-shaped response curve (Fig. 1).

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46 **Figure S4.** Coral reef suitability forecasted under (a) EC-earth RCP8.5 and (b) ISPL RCP8.5
 47 climate change scenarios for the end of the century (2090-2100). Red values indicate high
 48 suitability for coral reef while blue values indicate low suitability.

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50 **References**

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