



United Nations
Educational, Scientific and
Cultural Organization



International Centre
for Water Resources and Global Change
under the auspices of UNESCO



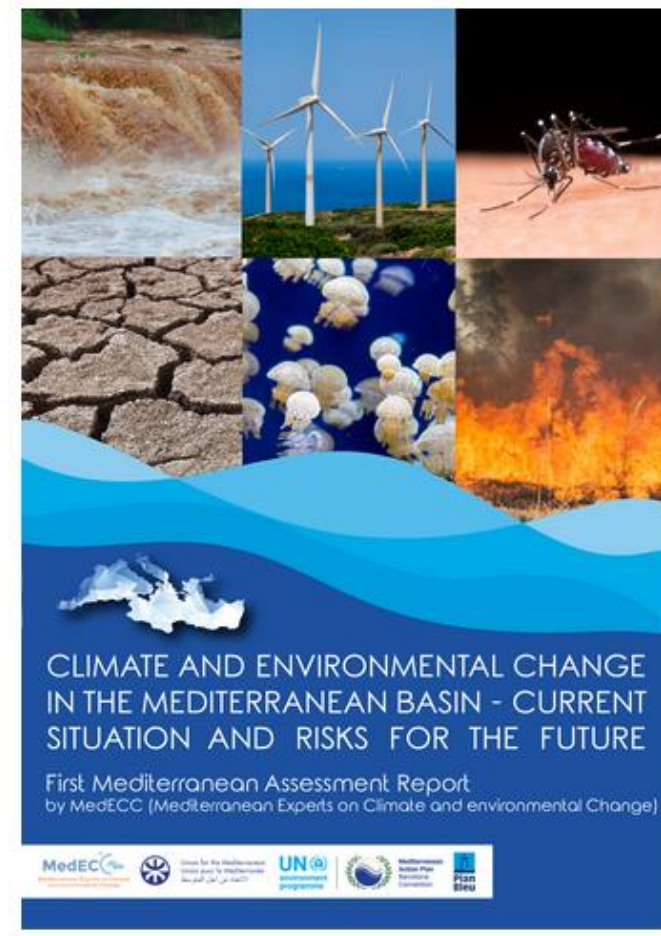
ICWRGC

Future water-related risks and management options in the Mediterranean basin

Marianela Fader, Giupponi C., Burak S., Dakhlaoui H., Koutroulis A., Lange M.A., Llasat M.C., Pulido-Velazquez D., Sanz-Cobeña A., Grillakis M., Mrabet, R., Saurí D., Savé R., Todorovic M., Trambly Y., Zwirgmaier V.

First Mediterranean Assessment Report

- Published online in November 2020 by the Mediterranean Experts on Climate and Environmental Change,
- by 190 authors, ~600 p.,
- based on published literature,
- with chapters on Water, Food, Energy, Ecosystems, Health, Development, Human Security ,
- Applying academic criteria, including peer-review,
- Summary for Policy Makers being discussed with various political bodies,
- “Policy-relevant but not policy-prescriptive”.
- February 2021: Council of Europe awards MedECC authors with the North South Prize



Report available at:

www.medecc.org/first-mediterranean-assessment-report-mar1



MedECC Report: Water Chapter

Key messages on water risks:

1.5-2°C global warming:

1. ↓ Precipitation, ↓ surface runoff
2. ↑ Drought
3. ↑ Crop water requirements
4. More frequent low flow and no flow events in summer
5. ↓ Groundwater recharge
6. ↓ Groundwater quality (salinization in coastal areas, pollution, etc.)
7. ↑ Conflicts among water users

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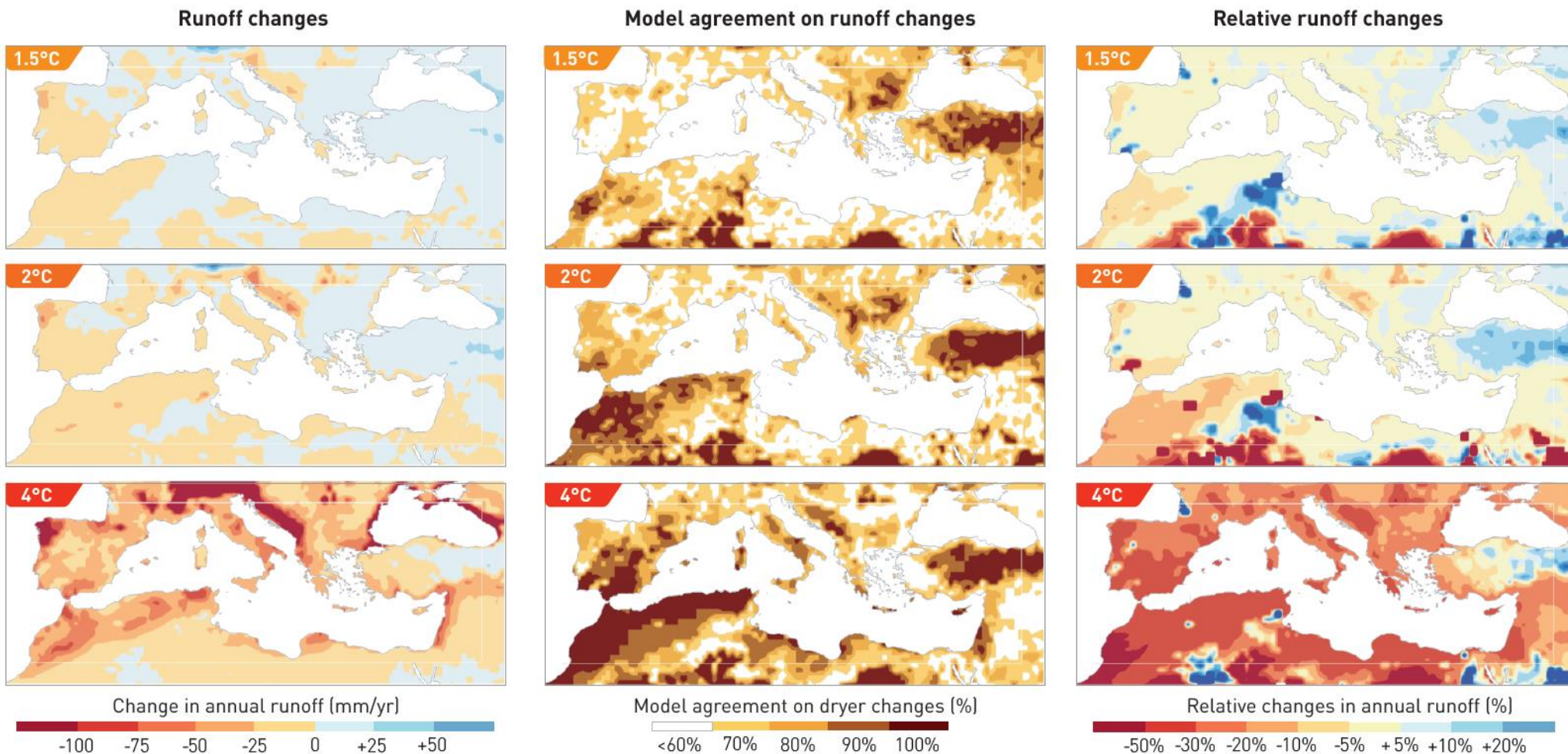
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Stronger effects at >2°C, e.g. annual runoff reduction up to 50%

Drivers of change: not only climate change but also other human interventions such as urbanization, land use change, overexploitation of groundwater, pollution, etc.

Change in annual runoff



Changes in mean annual runoff production (in absolute and relative values) at different warming levels and the corresponding degree of agreement towards a dryer change for a set of high resolution climate projections. (Papadimitriou et al. 2016; Wyser et al. 2016; Betts et al. 2018; Koutroulis et al. 2018).

- 1. The higher the warming, the stronger the reduction in runoff**
- 2. The higher the warming, the more model agreement towards drier conditions**

Key water supply and demand management measures:

1. ↑ water productivity
2. ↓ water loss
3. ↑ reuse ↔ ↑ acceptability of wastewater
4. ↑ seawater desalination ↔ env. impacts and energy requirements
5. Interbasin transfers ↔ avoid conflicts among regions and users; environmental impacts
6. ↑ dams ↔ env. and social impacts
7. Maintain or restore the Mediterranean diet



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Integrated Water Resources Management to build resilience, adapt to climate change and avoid trade-offs between water uses

And: Let's not forget the possibility of climate change mitigation



Comming soon at MedECC

Three special reports on:

- Coastal risks
- The climate-water-energy-food-ecosystems nexus
- Environmental change, conflict and human migration

Apply as an author! Deadline 15th May 2021

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Lorraine, France, August 2003, Photo: Wolfgang Cramer

Thank you for your attention!



espagne-la-betonisation-et-lurbanisation-du-littoral-est-dramatique



<https://phys.org/news/2020-07-french-forest-consumes-home-evacuations.html>



Cannes La Bocca, 3 Oct 2015, Photo: Philippe Farjon/VISUAL



image www.tokkoro.com/2941927-italy-coast-storm-waves-vernazza.html



Mediterranean Experts on Climate and Environmental Change initiative (MedECC)

- **Start:** 2016

- **Sponsors:**      

- **Members:** ~700 researchers from 35 countries

- **Main objective:** synthesize knowledge on climate change impacts and environmental degradation in the Mediterranean area based on published literature

- **Foundation Paper 2018:** Negative CC-impacts and environmental degradation have already happened

REVIEW ARTICLE

<https://doi.org/10.1038/s41558-018-0299-2>

nature
climate change

Climate change and interconnected risks to sustainable development in the Mediterranean

Wolfgang Cramer^{1*}, Joël Guiot², Marianela Fader³, Joaquim Garrabou^{4,5}, Jean-Pierre Gattuso^{6,7}, Ana Iglesias⁸, Manfred A. Lange⁹, Piero Lionello^{10,11}, Maria Carmen Llasat¹², Shlomit Paz¹³, Josep Peñuelas^{14,15}, Maria Snoussi¹⁶, Andrea Toret¹⁷, Michael N. Tsimplis¹⁸ and Elena Xoplaki¹⁹

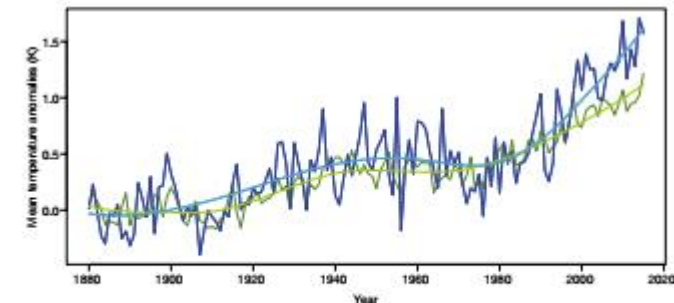


Fig. 1 | Historic warming of the atmosphere globally and in the Mediterranean Basin. Annual mean air temperature anomalies are shown with respect to the period 1880–1899, with the Mediterranean Basin (blue) and the globe (green) presented with (light curves) and without (dark curves) smoothing. Data from <http://berkeleyearth.org/>

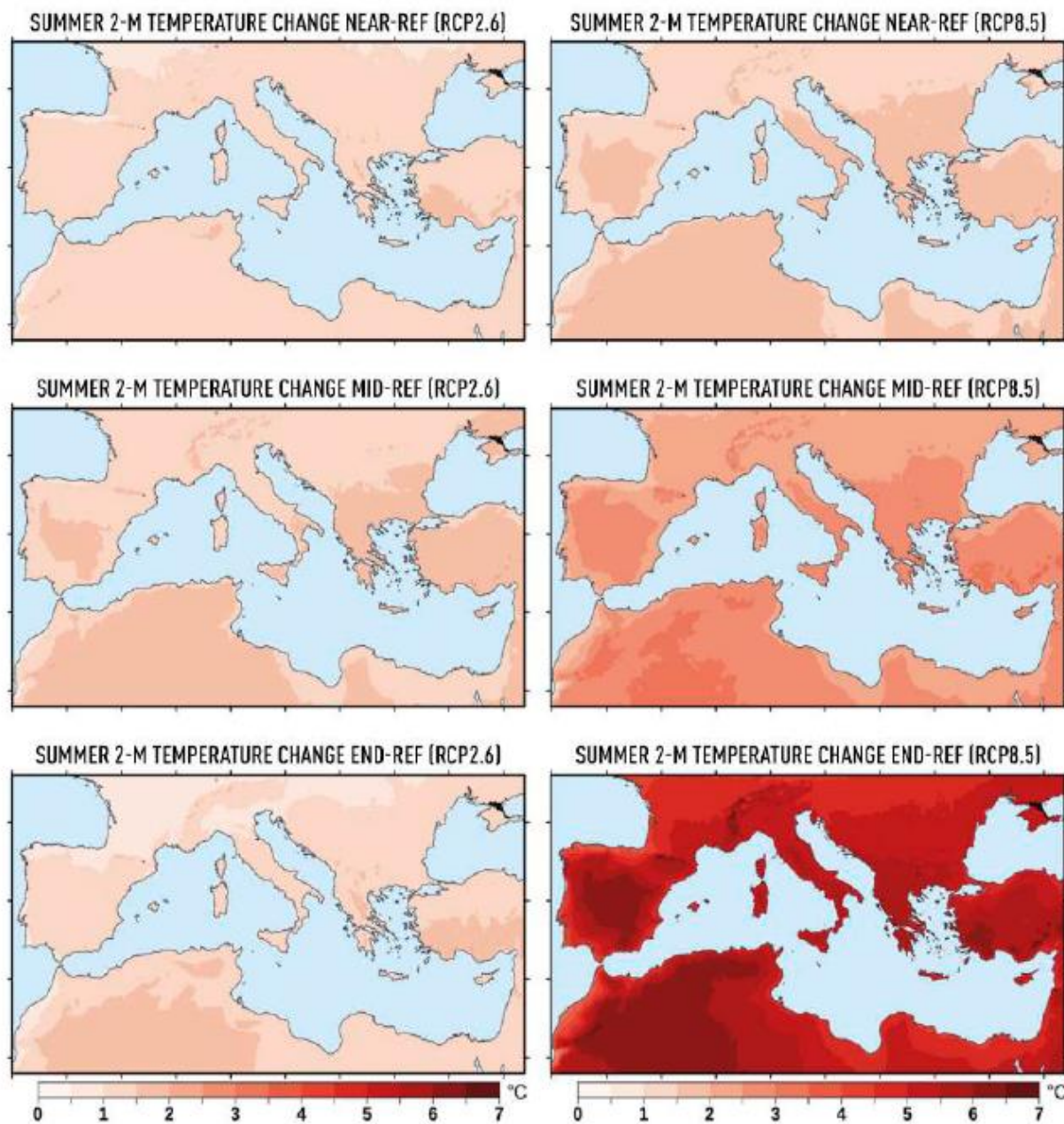


Figure B.3 | Projected changes in summer (June, July, August) precipitation between the recent past reference period (REF: 1980-1999) and three future sub-periods (NEAR: 2020-2039, MID: 2040-2059, END: 2080-2099), based on the ensemble mean results of the EURO-CORDEX high-resolution simulations for pathways RCP2.6 (left panels) and RCP8.5 (right panels).

Zittis G, Somot S, Giorgi F 2020 Appendix B – Maps of seasonal temperature and precipitation changes for the Mediterranean Basin. In: Climate and Environmental Change in the Mediterranean Basin – Current Situation and Risks for the Future. First Mediterranean Assessment Report [Cramer W, Guiot J, Marini K (eds.)] Union for the Mediterranean, Plan Bleu, UNEP/MAP, Marseille, France, 13pp. https://www.medecc.org/wp-content/uploads/2021/04/MedECC_Atlas-of-maps.pdf

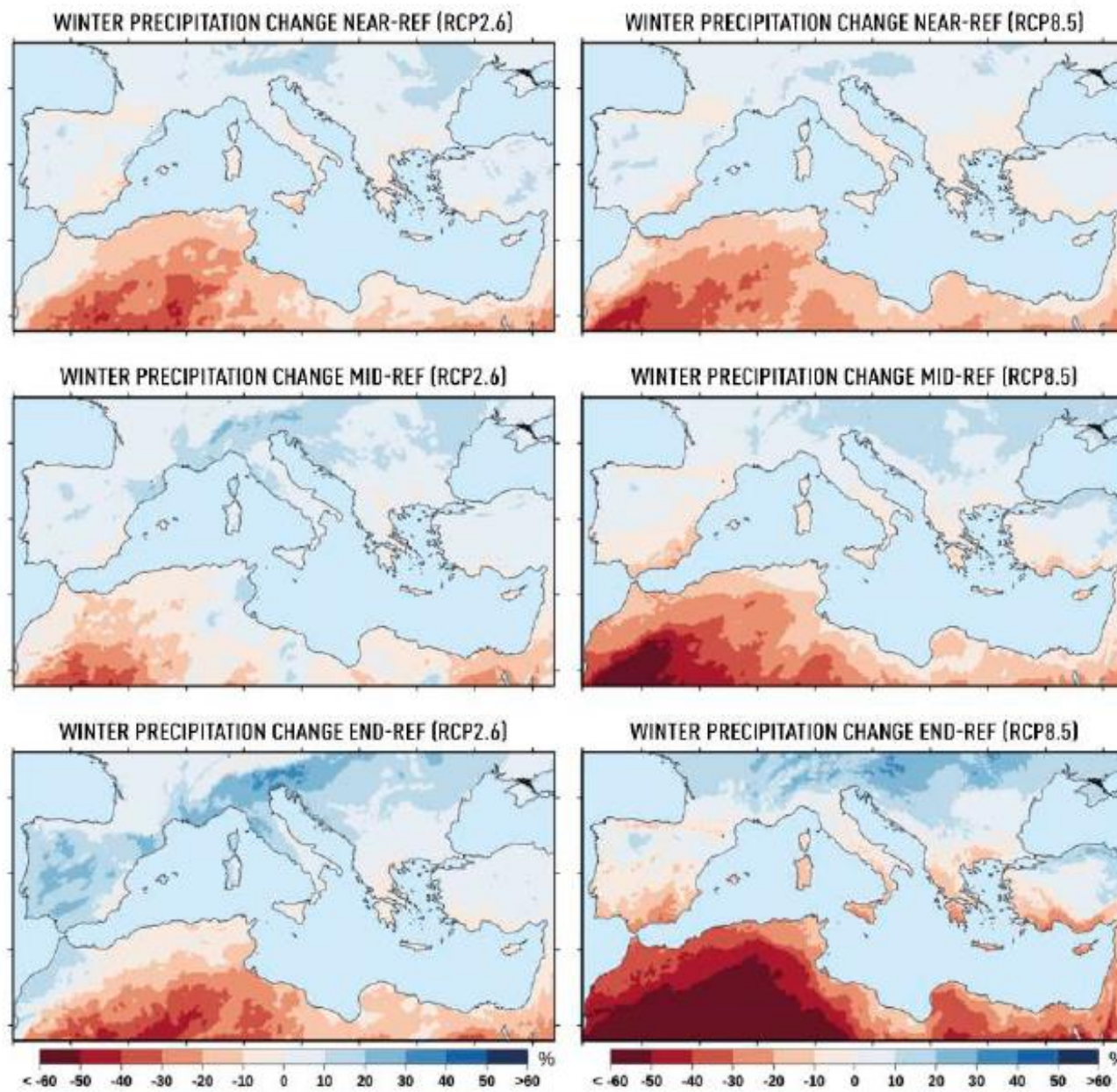


Figure B.5 | Projected changes in winter (December, January, February) precipitation between the recent past reference period (REF: 1980-1999) and three future sub-periods (NEAR: 2020-2039, MID: 2040-2059, END: 2080-2099), based on the ensemble mean results of the EURO-CORDEX high-resolution simulations for pathways RCP2.6 (left panels) and RCP8.5 (right panels).

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