

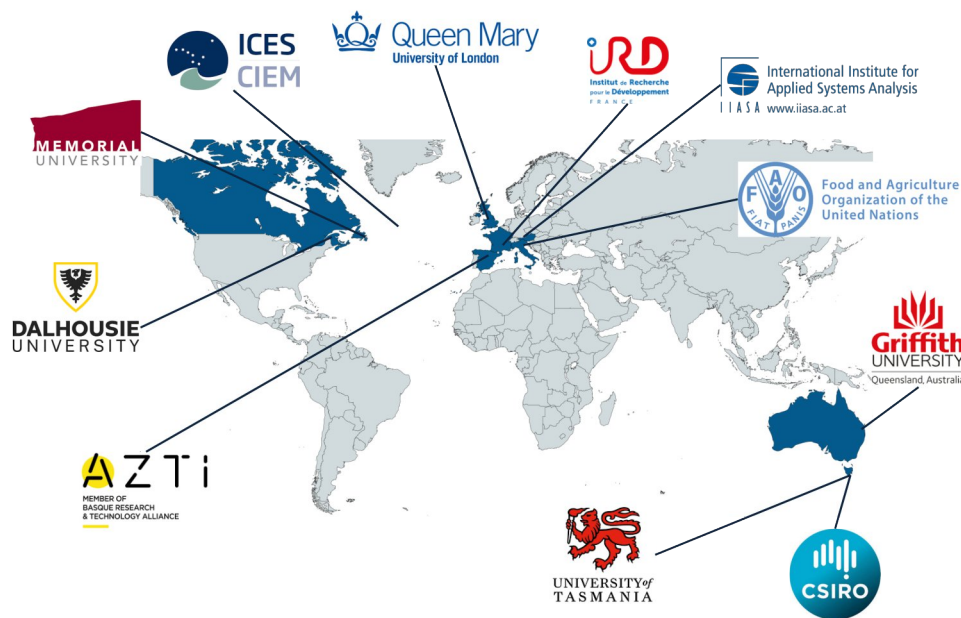
The Ocean System Pathways (OSPs)

A new scenario & simulation framework to investigate the future of the world fisheries

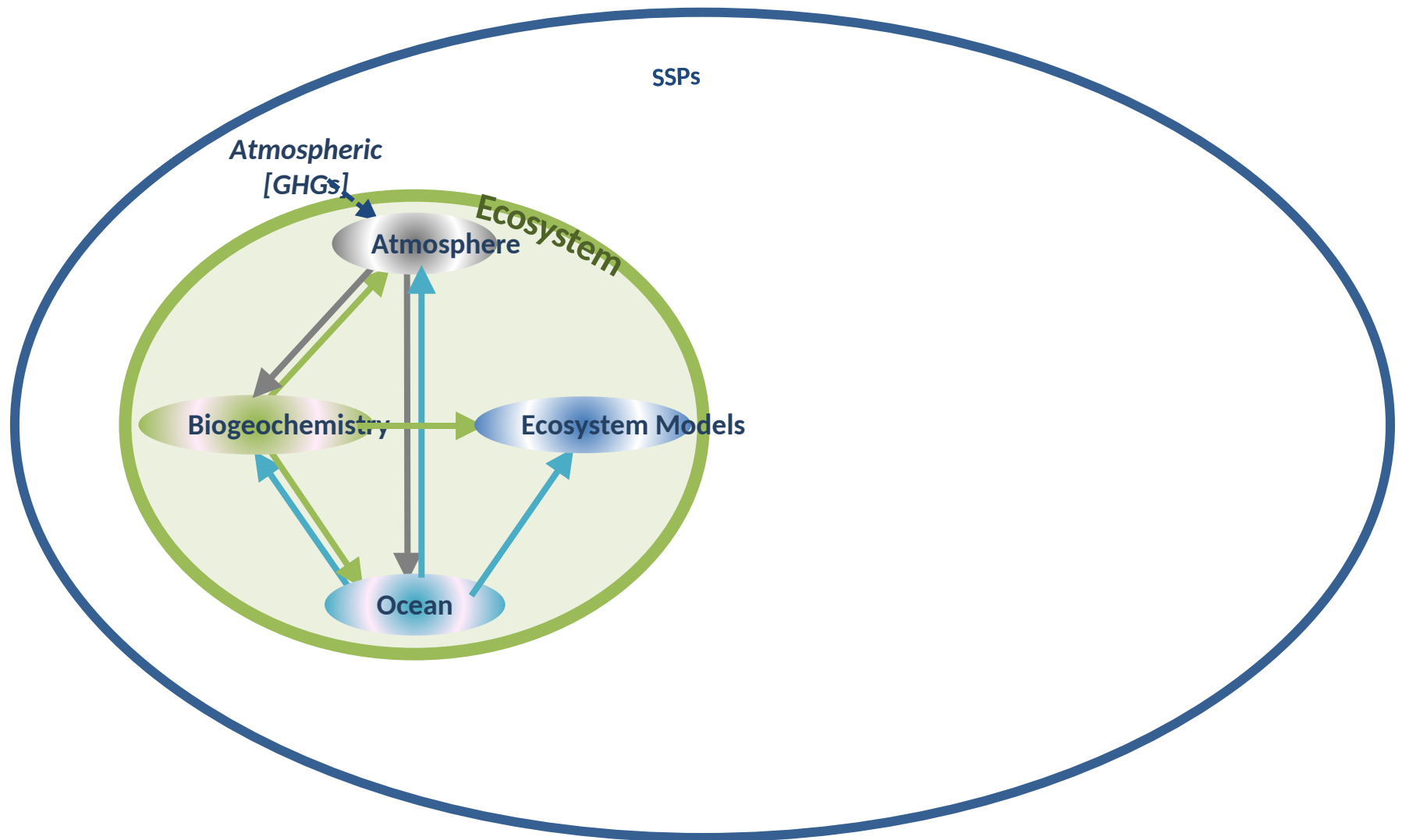
Olivier Maury, Derek Tittensor

Tarub Bahri, Julia Blanchard, Andrea Bryndum-Buchholz, Liam Campling, Tyler Eddy, Beth Fulton, Dorleta Garcia, Ryan Heneghan, Camilla Novaglio, Bas Van Ruijven

Nicolas Barrier, Patrice Guillotreau, Matthieu Lengaigne, Yunne-Jai Shin and Alexander Tidd

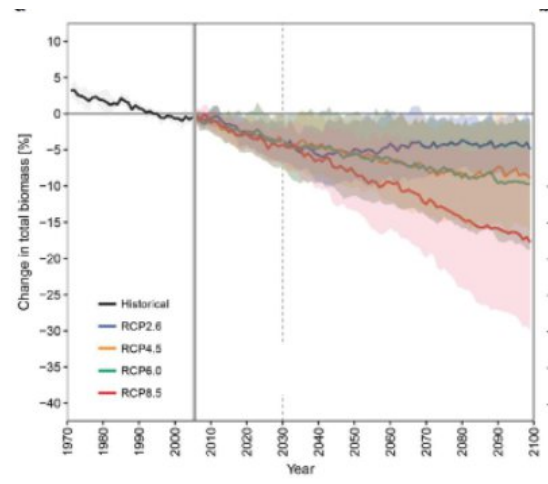
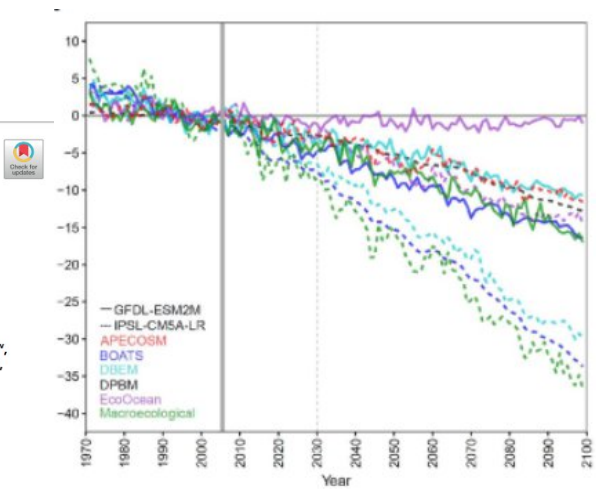


To date FishMIP has done mostly Ecosystem projections



Global ensemble projections reveal trophic amplification of ocean biomass declines with climate change

Heike K. Lotze^{a,1}, Derek P. Tittensor^{a,b}, Andrea Bryndum-Buchholz^a, Tyler D. Eddy^{a,c}, William W. L. Cheung^c, Eric D. Galbraith^{d,e}, Manuel Barange^f, Nicolas Barrier^g, Daniele Bianchi^h, Julia L. Blanchard^{i,j}, Laurent Bopp^k, Matthias Büchner^l, Catherine M. Bulman^m, David A. Carozzaⁿ, Villy Christensen^o, Marta Coll^{p,q}, John P. Dunne^r, Elizabeth A. Fulton^{s,t}, Simon Jennings^{u,v}, Miranda C. Jones^w, Steve Mackinson^x, Olivier Maury^{y,z}, Susa Niranen^{aa}, Ricardo Oliveros-Ramos^{ab}, Tilla Roy^{ac}, José A. Fernandes^{ad,ae}, Jacob Schewe^{af}, Yunne-Jai Shin^{ag,ah}, Tiago A. M. Silva^{ai}, Jeroen Steenbeek^{aj}, Charles A. Stock^{ak}, Philippe Verley^{al}, Jan Volkholz^{am}, Nicola D. Walker^{an}, and Boris Worm^a



nature
climate change

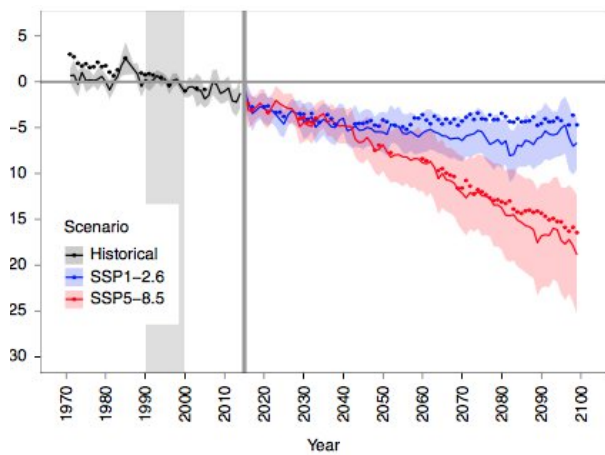
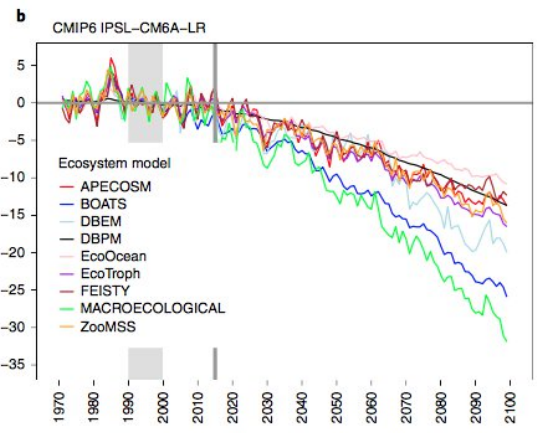
ARTICLES

<https://doi.org/10.1038/s41558-021-01173-9>

Check for updates

Next-generation ensemble projections reveal higher climate risks for marine ecosystems

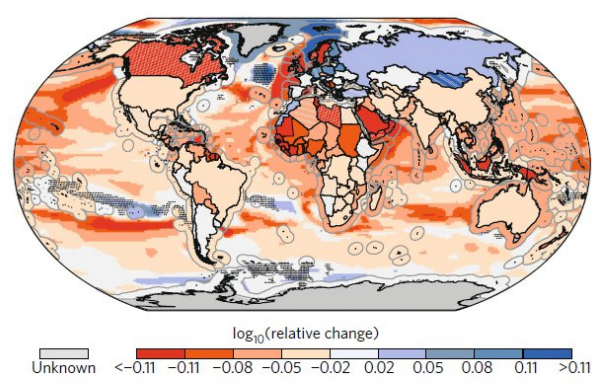
Derek P. Tittensor^{1,2,25}, Camilla Novaglio^{3,4}, Cheryl S. Harrison^{5,6}, Ryan F. Heneghan⁷, Nicolas Barrier⁸, Daniele Bianchi⁹, Laurent Bopp¹⁰, Andrea Bryndum-Buchholz¹, Gregory L. Britten¹¹, Matthias Büchner¹², William W. L. Cheung¹³, Villy Christensen¹³, Marta Coll^{14,15}, John P. Dunne¹⁶, Tyler D. Eddy¹⁷, Jason D. Everett^{18,19,20}, Jose A. Fernandes-Salvador²¹, Elizabeth A. Fulton^{4,22}, Eric D. Galbraith²³, Didier Gascuel²⁴, Jerome Guiet⁹, Jasmin G. John¹⁶, Jason S. Link²⁵, Heike K. Lotze¹, Olivier Maury⁸, Kelly Ortega-Cisneros²⁶, Julian Palacios-Abrantes^{13,27}, Colleen M. Petrik²⁸, Hubert du Pontavice^{24,29}, Jonathan Rault⁸, Anthony J. Richardson^{18,19}, Lynne Shannon²⁶, Yunne-Jai Shin⁸, Jeroen Steenbeek¹⁵, Charles A. Stock¹⁶ and Julia L. Blanchard^{3,4}



Contribution to IPCC, IPBES & FAO major reports

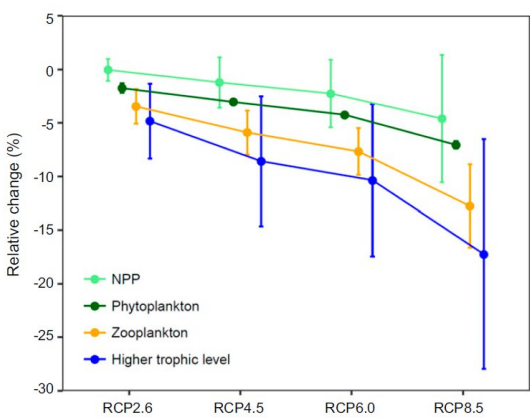


Food security & climate change



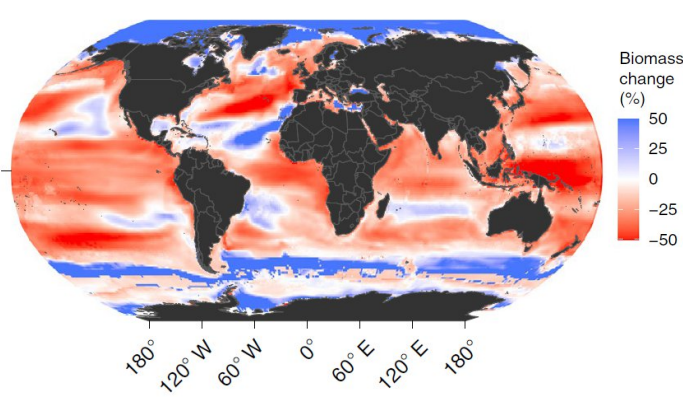
Blanchard et al. (2017), Nat. Ecol. Evol.

Trophic amplification of impacts



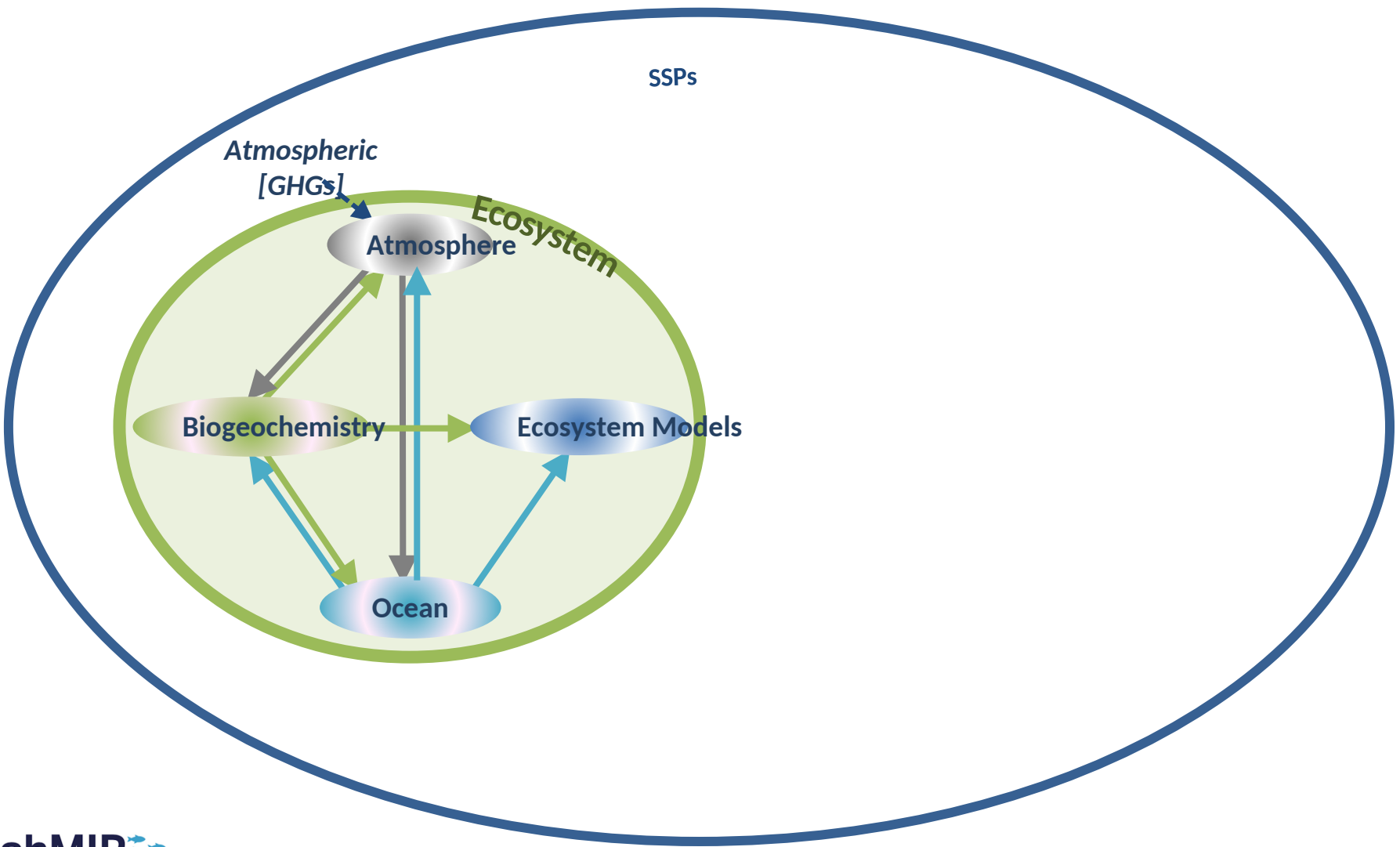
Lotze et al. (2019), PNAS

Climate risks for ecosystems

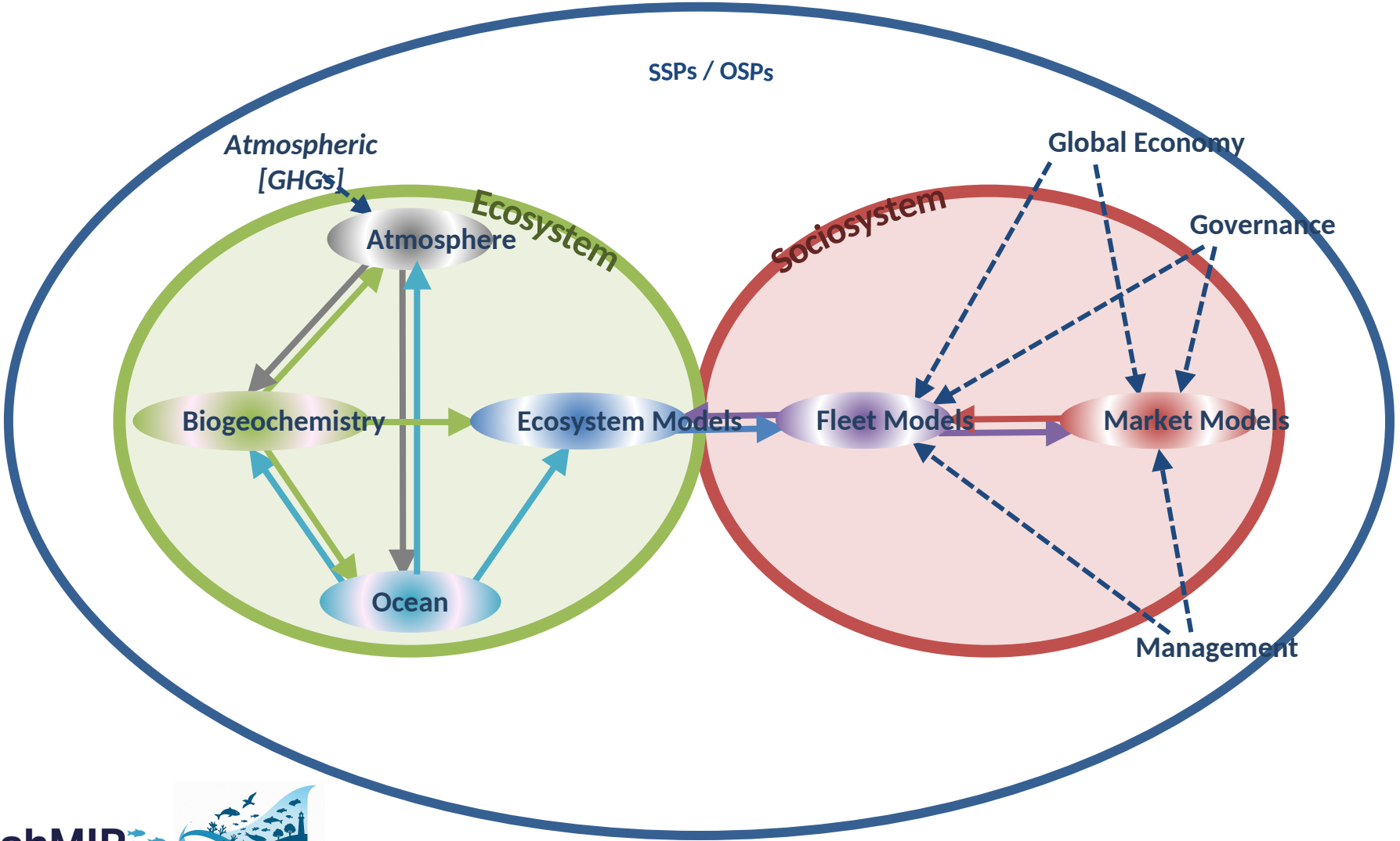


Tittensor et al. (2021), Nat. Clim. Change

Projecting fisheries requires moving from Ecosystems



Projecting fisheries requires moving from Ecosystem to Socio-ecosystems





Earth’s Future

RESEARCH ARTICLE

10.1029/2024EF004851

Special Collection:

Past and Future of Marine
Ecosystems

Key Points:

- We present new scenarios and models for simulating fisheries and marine

The Ocean System Pathways (OSPs): A New Scenario and Simulation Framework to Investigate the Future of the World Fisheries



O. Maury¹ , D. P. Tittensor², T. D. Eddy³ , E. H. Allison^{4,5}, T. Bahri⁶, N. Barrier¹ , L. Campling⁷, W. W. L. Cheung⁸ , K. Frieler⁹ , E. A. Fulton^{10,11} , P. Guillotreau¹, R. F. Heneghan^{12,13}, V. W. Y. Lam⁸, D. Leclère¹⁴, M. Lengaigne¹ , H. Lotze-Campen^{9,15} , C. Novaglio^{6,16} , K. Ortega-Cisneros¹⁷ , J. Rault¹⁸, J. Schewe⁹ , Y.-J. Shin¹, H. Sloterdijk¹⁹ , D. Squires²⁰, U. R. Sumaila^{8,21}, A. N. Tidd¹, B. van Ruijven¹⁴, and J. Blanchard¹⁶ 

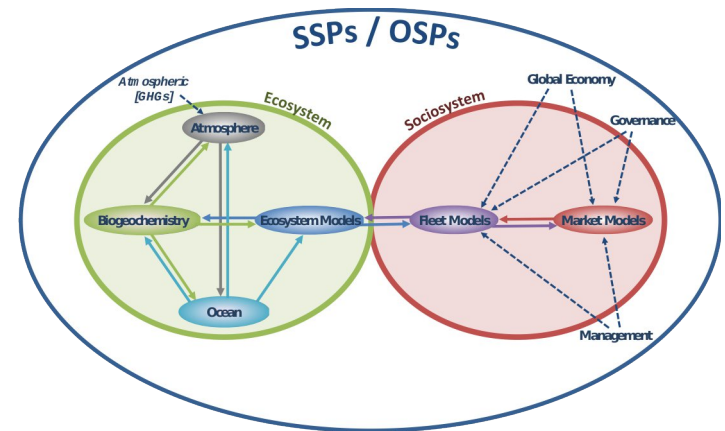
A collaborative research strategy for FISHMIP

➔ 5 SSP-based OSP storylines considering artisanal & industrial fleet

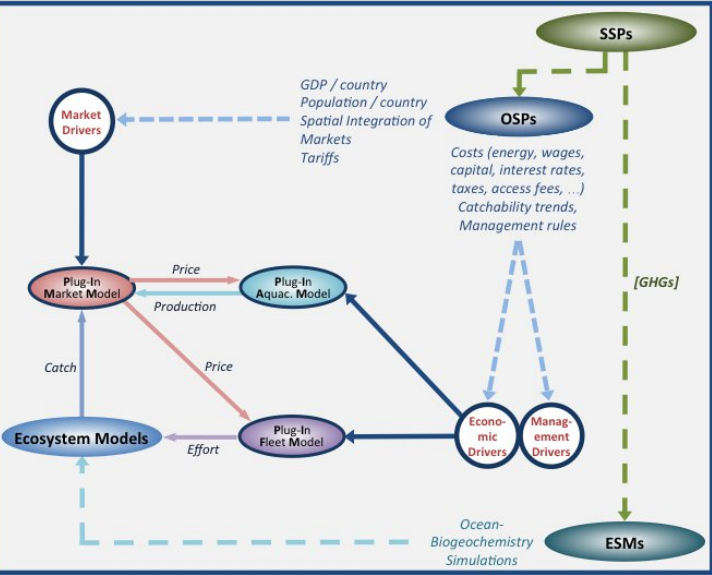
- Oceanic fisheries
- Demersal & benthic fisheries
- Small pelagic fisheries
- Emerging fisheries
- Aquaculture



➔ Consider the **dynamical interactions** between the marine ecosystem & sociosystem

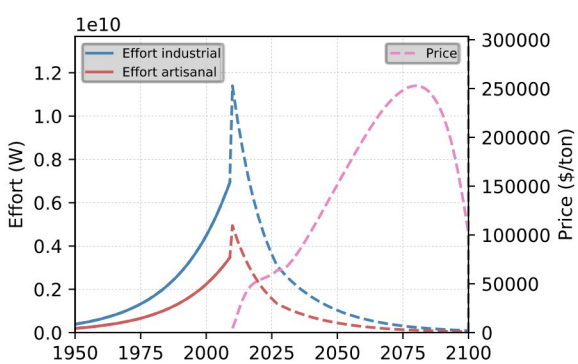
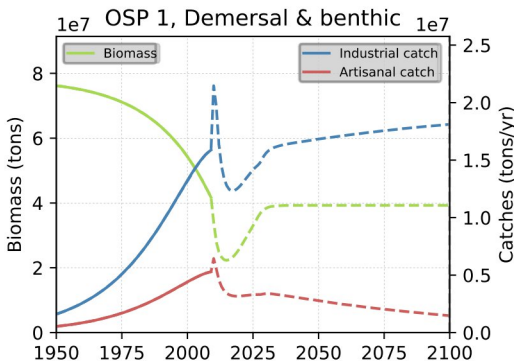


OSP-based simulation framework and policy-targeted protocols



1958-2014
Historical simulations

2015-2100
OSP-based projections



OSP1

3 NFF alternatives



- Biodiversity
- Ecosystem services

OSP2

Management alternatives



Food security

OSP3



Impacts of CC & socio-economy

- Fishing,
- N/S equity issues,
- Loss & damages
- food security

OSP4

OSP5

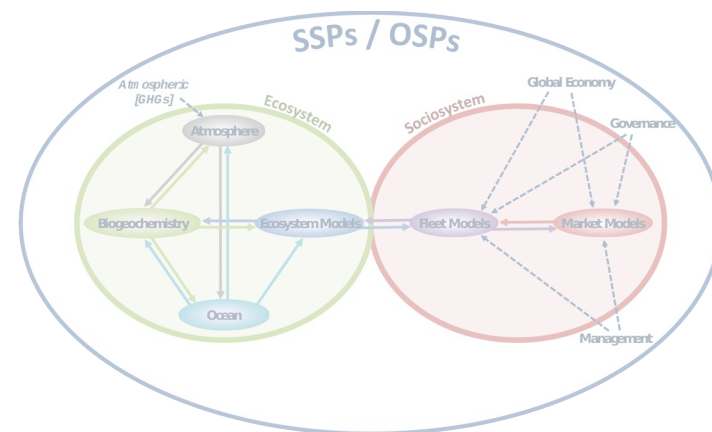
The FishMIP-OSP project will organise ensemble fisheries projections

➔ 5 SSP-based OSP storylines considering **artisanal & industrial fleet**

- Oceanic fisheries
- Demersal & benthic fisheries
- Small pelagic fisheries
- Emerging fisheries
- Aquaculture



➔ Consider the **dynamical interactions** between the marine ecosystem & **sociosystem**



➔ Provide a **simulation & a data-based evaluation framework** to the international scientific community to undertake **policy-targeted** ensemble fisheries projections from **national to global scale**





Earth's Future

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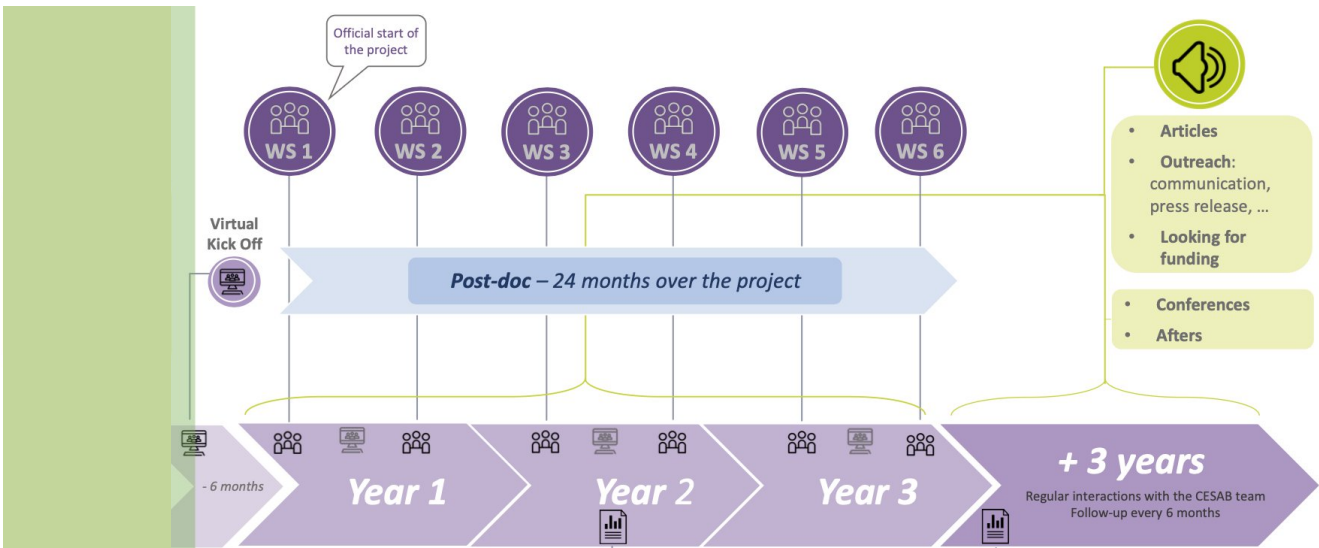
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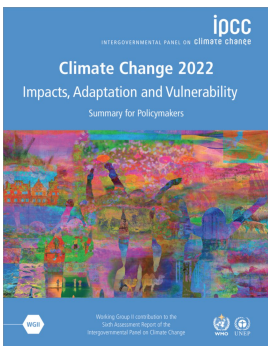
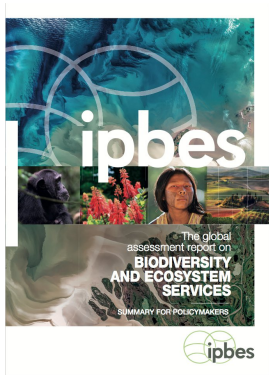
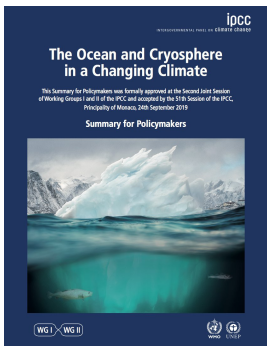
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A collaborative project to support its implementation



Conclusion

➔ FishMIP has coordinated global MEMs intercomparisons

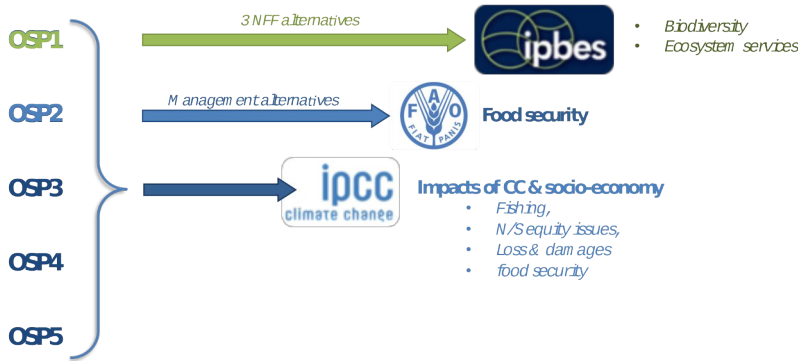


➔ We now extend these SSP-based ecosystem projections to include fisheries @ OSP scenarios

- Storylines, quantitative drivers & plugin-models
- From national to global scale
- Artisanal & industrial fisheries + aquaculture
- Economy, governance & management



➔ To come in 2026-2028: model **skill-assessment** based on historical & OSP-driven fisheries projection envelopes



FishMIP
Fisheries & Marine Ecosystem
Model Intercomparison Project

