Potsdam Institute for Climate Impact Research
PIK

ISIMIP
Inter-Sectoral Impact Model Intercomparison Project

Sponsored by the
Federal Ministry of Education and Research

Probabilistic assessment of impacts for low emission pathways – The potential of ISIMIP

Authors: K. Frieler, J. Schewe, C. Reyer, F. Zhao, L. Warszawski, S. Ostberg, F. Piontek

PIK RD II Climate Impacts and Vulnerabilities

DIVERSE WEATHER EVENTS AS DRIVERS OF SOCIO-ECONOMIC IMPACTS

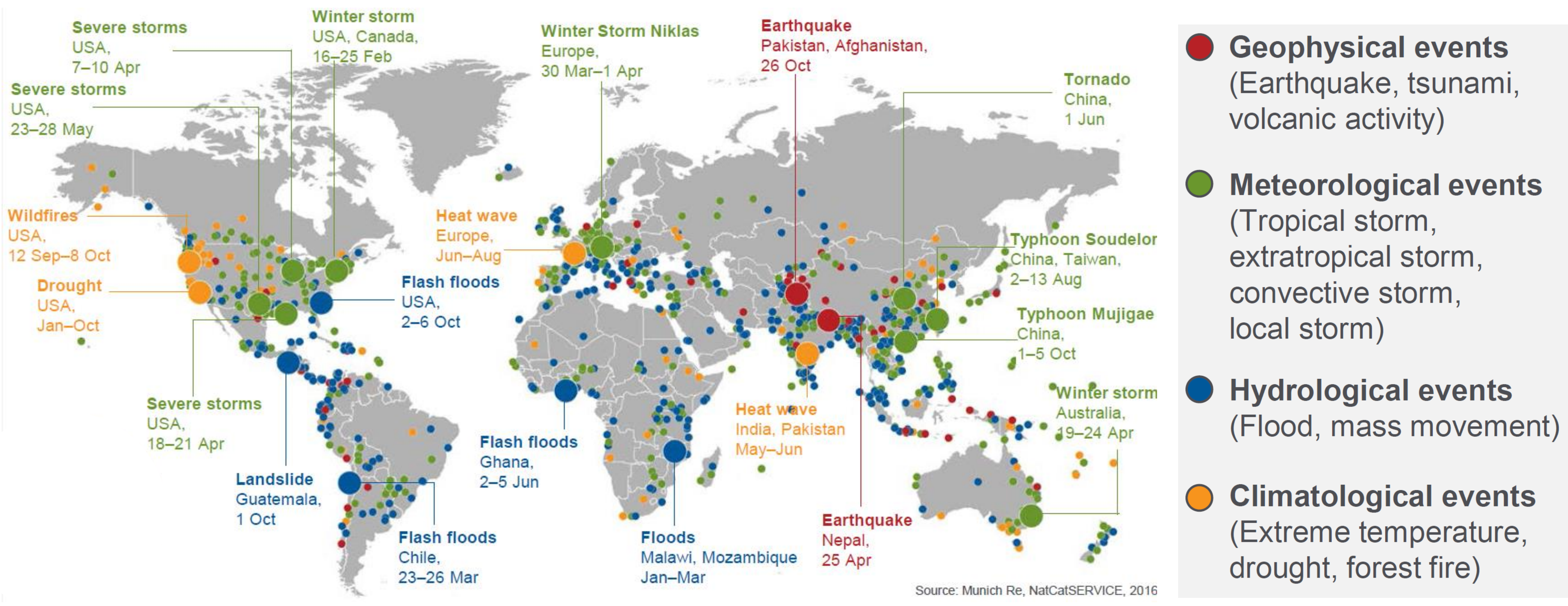

Fig 1: Global map of natural disasters for the year 2015 from MunichRe.

From 1980-2014 average physical damages due to weather-related disasters (excluding geophysical events) was ~95bn $US per year (NatCatSERVICE, MunichRe, 2015). From 2008 to 2015 an average number of 21.5 million people per year were displaced by weather events (Global Report on Internal Displacement 2016; IDMC, NRC, 2016).

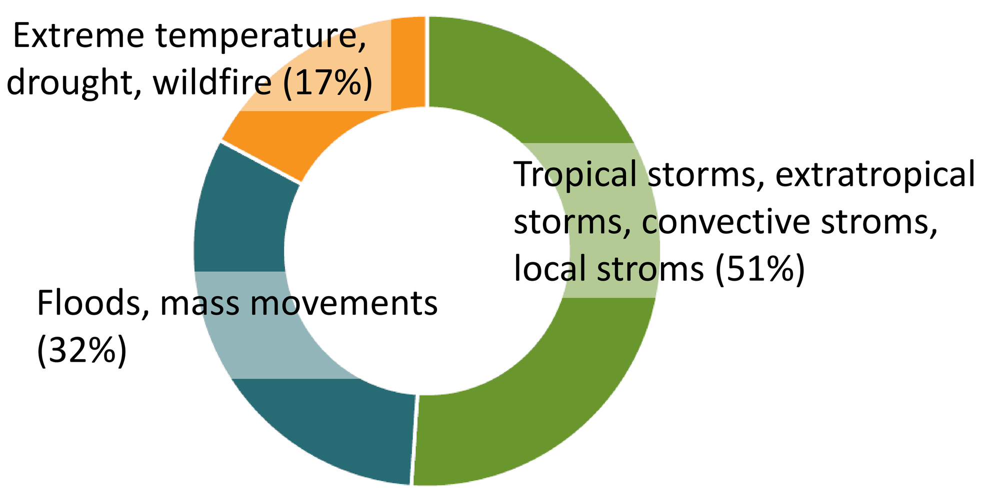

Fig 2: Average contribution to global physical damages (1980-2014)

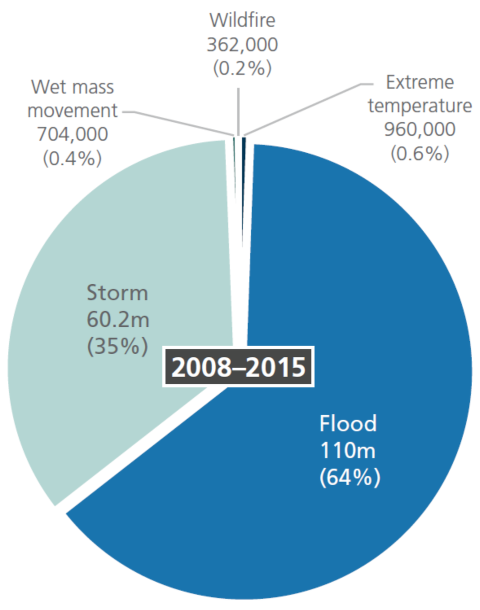

Fig 3: Average contributions to displacement (2008-2015); indirect effects of rainfall deficits and agricultural droughts are not captured

The underlying physical drivers such as patterns, intensity, and frequency of high or low precipitation, high temperatures and storms are expected to change under global warming.

RISKS IN A 1.5°C AND 2°C WORLD

To get an understanding of the risks associated with 1.5°C or 2°C of global warming projected changes in weather patterns have to be translated into (bio-)physical and social impacts such as fluctuations in crop yields, water scarcity, people affected by flooding, health impacts etc.. The associated knowledge is represented in a wide range of diverse impact models (e.g. crop models, hydrological models, coastal infrastructure models, see Fig. 4). To allow for an aggregation of the effects under accounting for potential interactions all these models have to be forced by the same climate projections.

THE INTER-SECTORAL IMPACT MODEL INTERCOMPARISON PROJECT (ISIMIP)

ISIMIP is designed to provide these consistent impact projections across different sectors in an open repository (esg.pik-potsdam.de) and to support the translation into socio-economically relevant indicators such as aggregated nation-wide economic damages or "number of people under risk of displacement". First phase has already fullfilled its mission to provide consistent impact projections for the IPCC AR5.

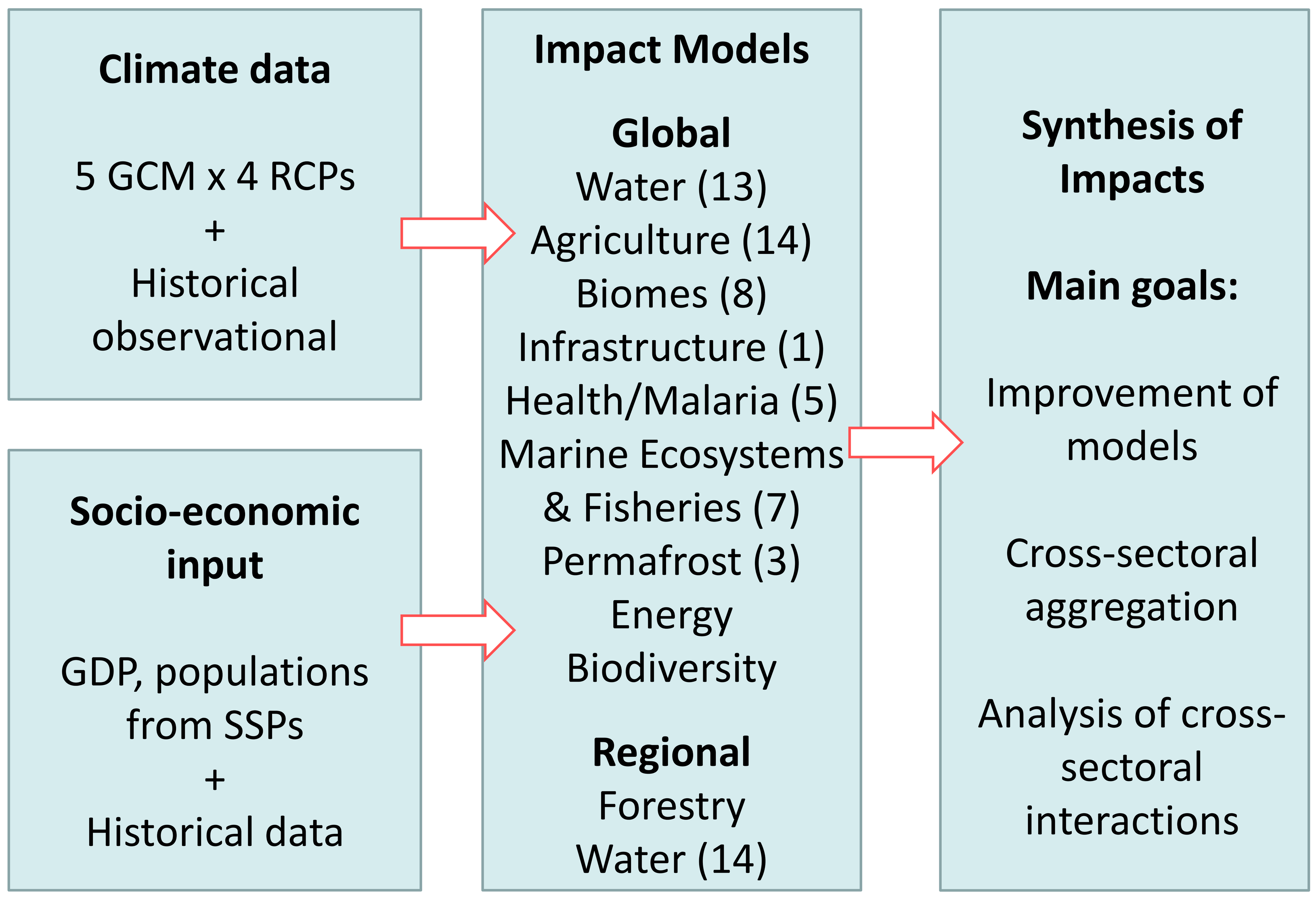

***Fig. 4** Illustration of the ISIMIP concept. All simulations (numbers of models in brackets) are forced by the same climate input based on the same socio-economic story line.*

TAILORED INPUT FOR THE 1.5°C SPECIAL REPORT

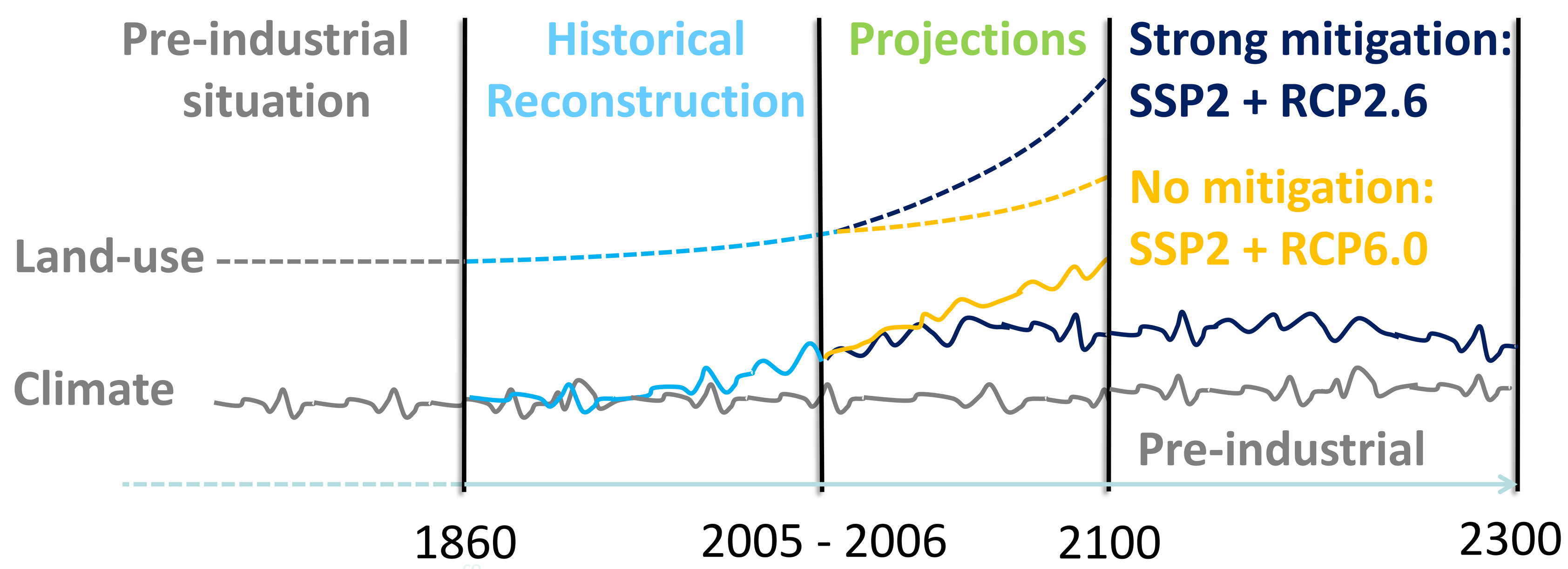

***Fig. 5** Illustration of the planned simulation exercises. Protocol under development.*

Motivation of scenario design:

i) **Pre-industrial reference:** Quantification of differential impacts for the full range of warming from pre-industrial levels to 1.5°C or 2°C.

ii) **Long term impacts**: Impacts of low levels of warming up to 2300.

iii) **Mitigation trade-offs**: Quantification of impacts of mitigation measures such as land use changes due to increased bioenergy production in comparison to impacts under a "no mitigation scenario".

MAIN GOALS REGARDING THE SYNTHESIS OF IMPACTS

i) **Provision of socially relevant indicators** such as "number of people exposed to flooding" allowing for an assessment of the risks of displacement.

ii) **Translation into economic damages** and potential risks for long term economic growth to update estimates of social costs of carbon

iii) **Identification of hot spots** subject to multiple risks, identification of "dominant risks" to inform national adaptation plans

First systematic cross-sectoral quantification of impacts at 1.5°C and 2°C: Schleussner et al., ESD, 2016

Contact K. Frieler
Telegraphenberg A56 | 14473 Potsdam
Katja.frieler@pik-potsdam.de

Member of Leibniz Association