POTSDAM INSTITUTE FOR CLIMATE IMPACT RESEARCH

What does non-alignment with "Paris" mean?

Climate change impacts at different levels of warming

Dr. Jacob Schewe

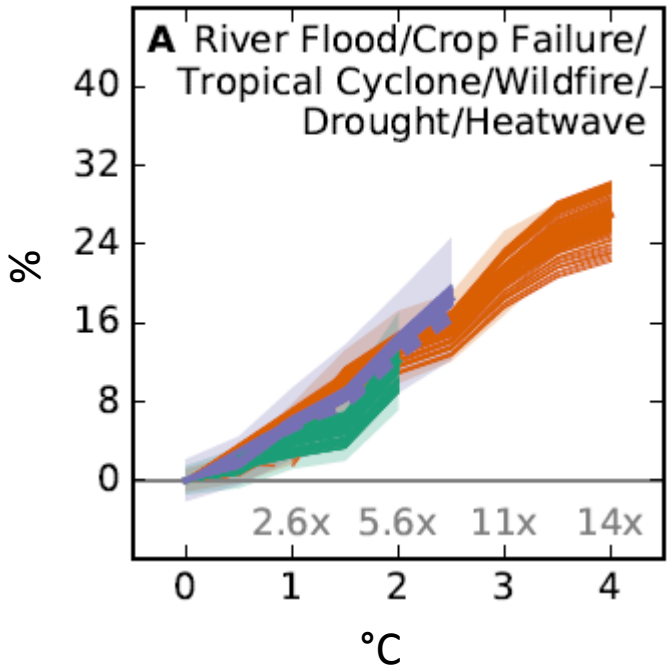
Member of Leibniz Association

NEW DISPLACEMENT BY CONFLICT AND DISASTERS IN 2017

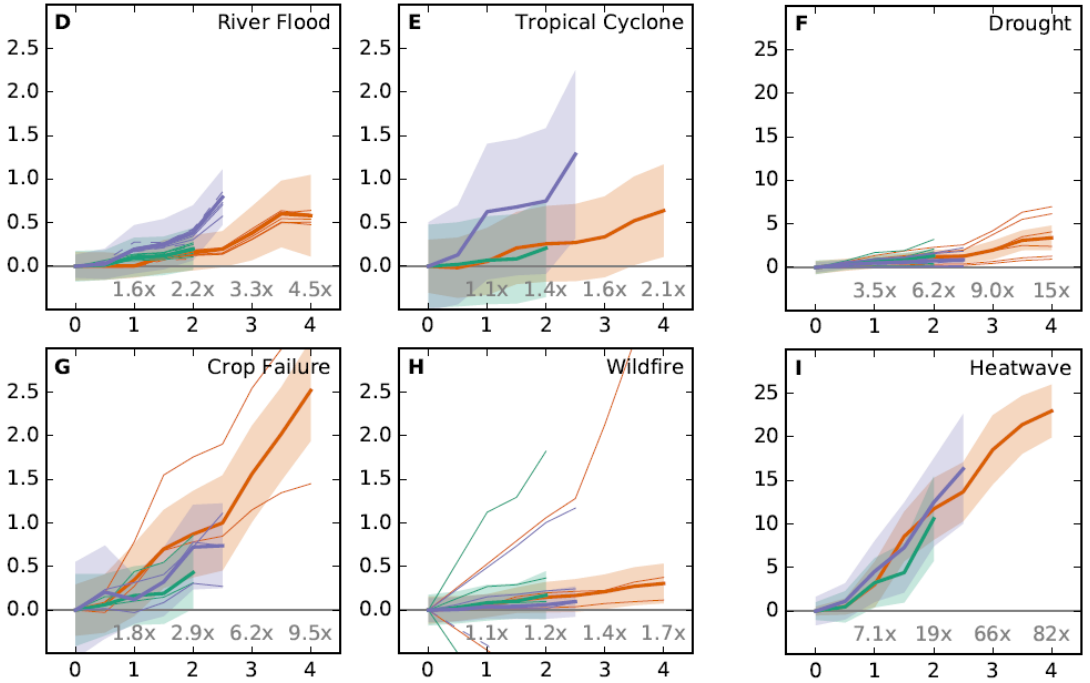
- Extreme weather events displace millions every year
- …and cause losses of life, health, and assets
- Global warming makes these events more likely
  - *warmer atmosphere = stronger heatwaves*
  - *more evaporative demand = protracted droughts*
  - *heat + drought = fuel for wildfires*
  - *higher humidity = heavier rainfall*
  - *warmer sea surface = more intense cyclones*
  - *higher sea level = larger storm surges*
  - *plus dynamical changes (jet stream…)*
- …by how much?

European heatwave & drought

Exposure to impact events: Scaling with temperature



Additional % of world population exposed annually



- Monotonic increase in impacts with global warming
- Every tenth-degree makes a difference
- It is clear that impacts will be more severe at 2°C than at 1.5°C – but even more severe at higher temps

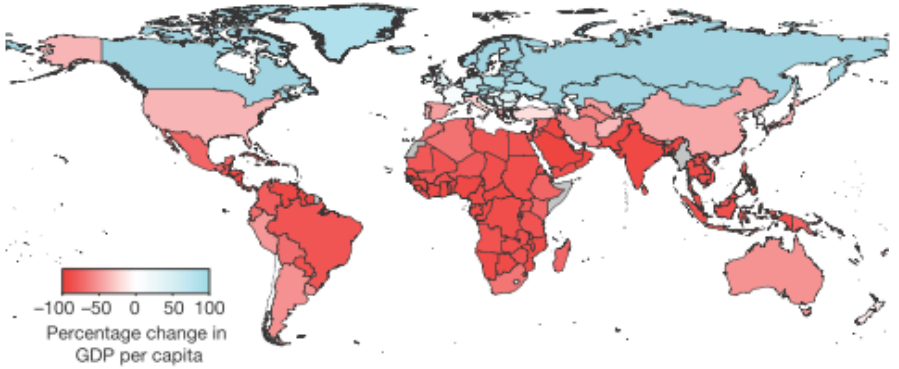
S. Lange et al., *in preparation*

Beyond two degrees

Societies under pressure

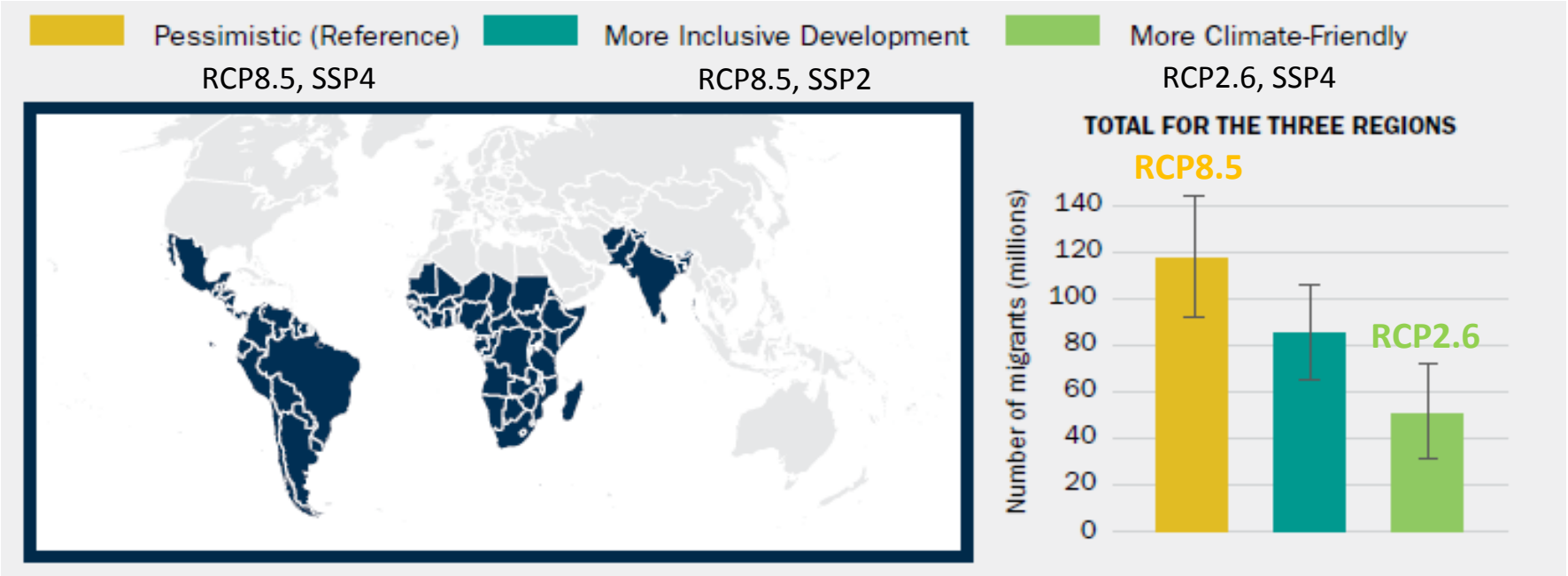
Beyond two degrees, climate change may emerge as a major driver of migration, poverty, and inequality

Unequal **macroeconomic** impacts of warming



Burke et al. (2015)

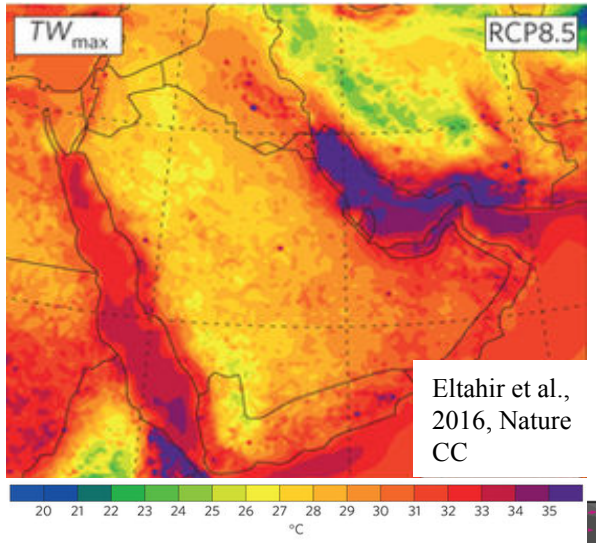
Internal **migration** due to climate change, 2020-2050



World Bank, Kumari et al., 2018

Beyond two degrees

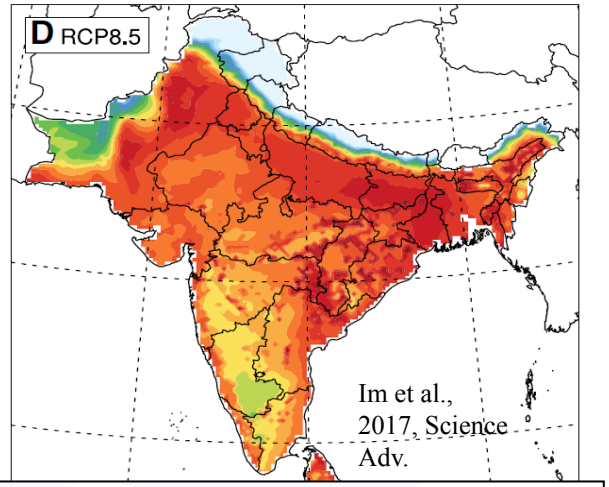
Limits and thresholds



Eltahir et al., 2016, Nature CC

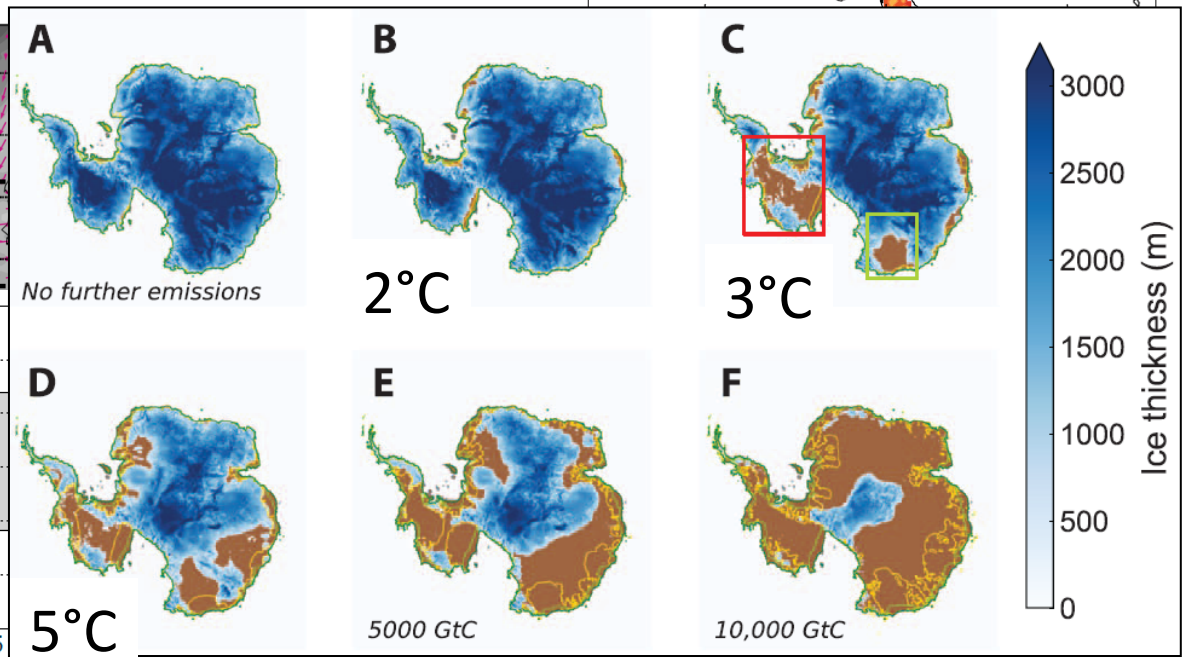
Exceedance of survivability limit

Deadly heat waves



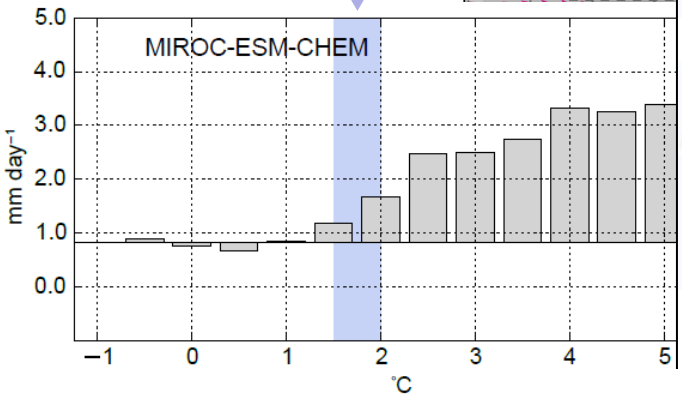
Im et al., 2017, Science Adv.

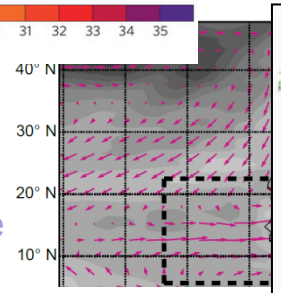
Irreversible loss of ice sheets



"Switch-on" of Sahel monsoon

Paris range





Winkelmann et al., 2015

Key points

- Today's 1°C of warming is causing massive damage and hardship
- Impacts increase monotonically with warming – any increase in mitigation ambition will avoid substantial impacts
- Stabilizing below 2°C may avoid some (though not all) physical and biological thresholds