

Is it worthwhile to invest in an Early Warning System for Climate Impacts?

Comments to a proposal of Klaus Keller

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A simple decision analysis

Without an Early Warning System (EWS)

Low sensitivity	$D_L - M_L$	$- D_L$	$M_L < M_H$
High sensitivity	$D_H - M_H$	$- D_H$	$D_L < D_H$
	Mitigation	No Mitigation	

M = Mitigation Costs

D = Damages



A simple decision analysis

With an Early Warning System (EWS)

Low sensitivity	$d_L - C - m_L$	$- C - d_L$	$m_L < M_H$
High sensitivity	$d_H - C - m_H$	$- C - d_H$	$d_L < D_H$
	Mitigation	No Mitigation	

m = Mitigation costs with EWS C = Costs of a Warning System

d = damages with EWS



A simple decision analysis

With an Early Warning System (EWS)

Optimist

Low sensitivity

$$d_L - C - m_L$$

$$- C - d_L$$

High sensitivity

$$d_H - C - m_H$$

$$- C - d_H$$

Mitigation

No Mitigation

m = net Costs of mitigation

C = Costs of a Warning System

d = damages without mitigation



A simple decision analysis

With an Early Warning System (EWS)

Low sensitivity	$d_L - C - m_L$	$- C - d_L$
High sensitivity	$d_H - C - m_H$	$- C - d_H$
	Mitigation	No Mitigation

Pessimist

m = net Costs of mitigation

C = Costs of a Warning System

d = damages without mitigation



Net value of EWS

- The Optimist

$$D_L - d_L - C - M_L - m_L \quad \text{if } M_L - m_L < D_L - d_L$$

$$- C - D_L + d_L \quad \text{if } M_L - m_L > D_L - d_L$$

- The Pessimist

$$D_H - d_H - C - M_H - m_H \quad \text{if } M_H - m_H < D_H - d_H$$

$$- C - D_H + d_H \quad \text{if } M_H - m_H > D_H - d_H$$



Net Value of EWS depends on...

- Mitigation cost function
- Damage function
- The world view (decision rules)
- Uncertainty about the impacts



It seems that the result depends on...

the implicit assumption of the DICE model in which the net value of an EWS because the optimist (about the state of nature) is quite pessimistic about the economy:

$$M_L - m_L \gg 0$$



...therefore it seems worthwhile to assess

- the net value EWS in models which incorporate ETC and ITC (which are more optimistic about the economy)
- EWS in models with more realistic damage functions (which are more pessimistic about „nature“)
- Other decision rules
- Sensitivity analysis

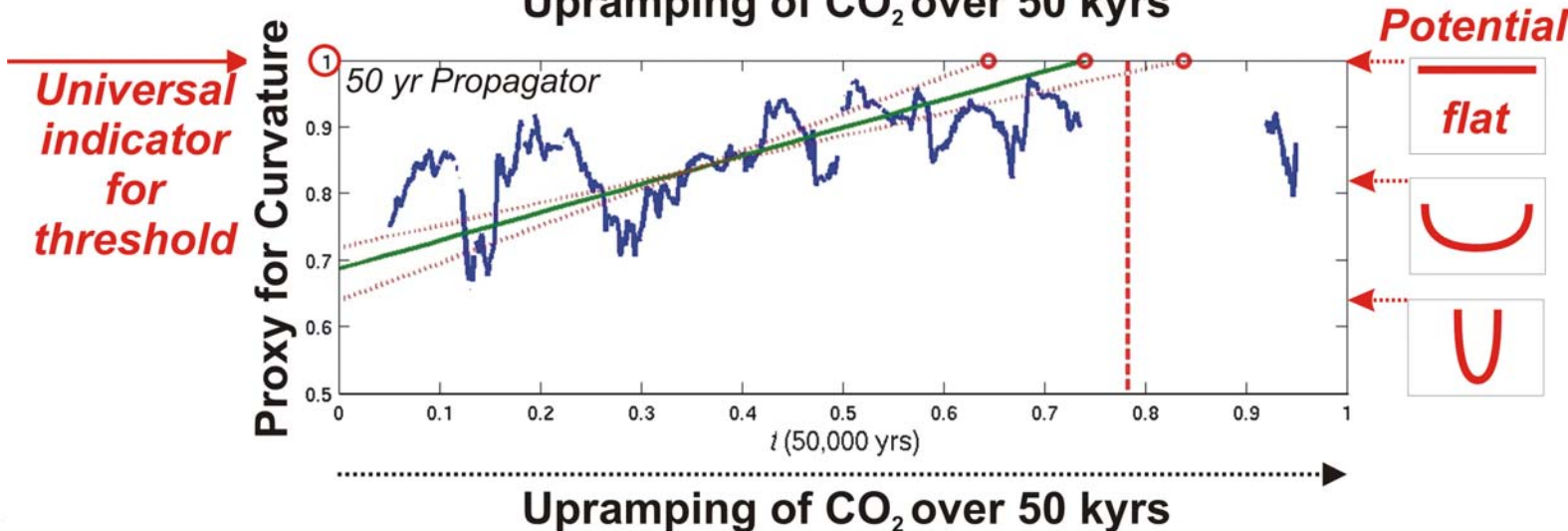
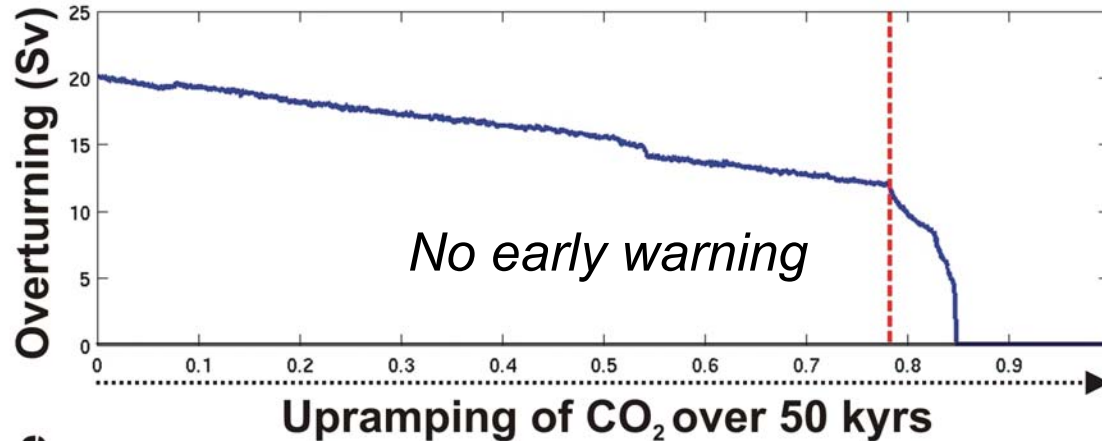


Can uncertainty be further reduced?



Application for Shutdown of North Atlantic Thermohaline Circulation in CLIMBER-2

Held &
 Kleinen,
 GRL,
 2004



Universal
 indicator
 for
 threshold



The proposal of EWS...

- Launches an important debate how information about impact may change the portfolio of mitigation and adaptation options.
- Therefore, we need a better understanding of impacts having the potential to change this portfolio.



We need a Differential Diagnostic Tool for Impacts (DDTI)

- DDTI could detect impacts with a huge potential for changing the optimal mix between adaptation and mitigation.
- Improving the understanding of impacts and adaptive capacity.
- EWS could be a promising starting point

