

Bistability of the Atlantic Meridional Overturning Circulation: from box-models to AOGCMs

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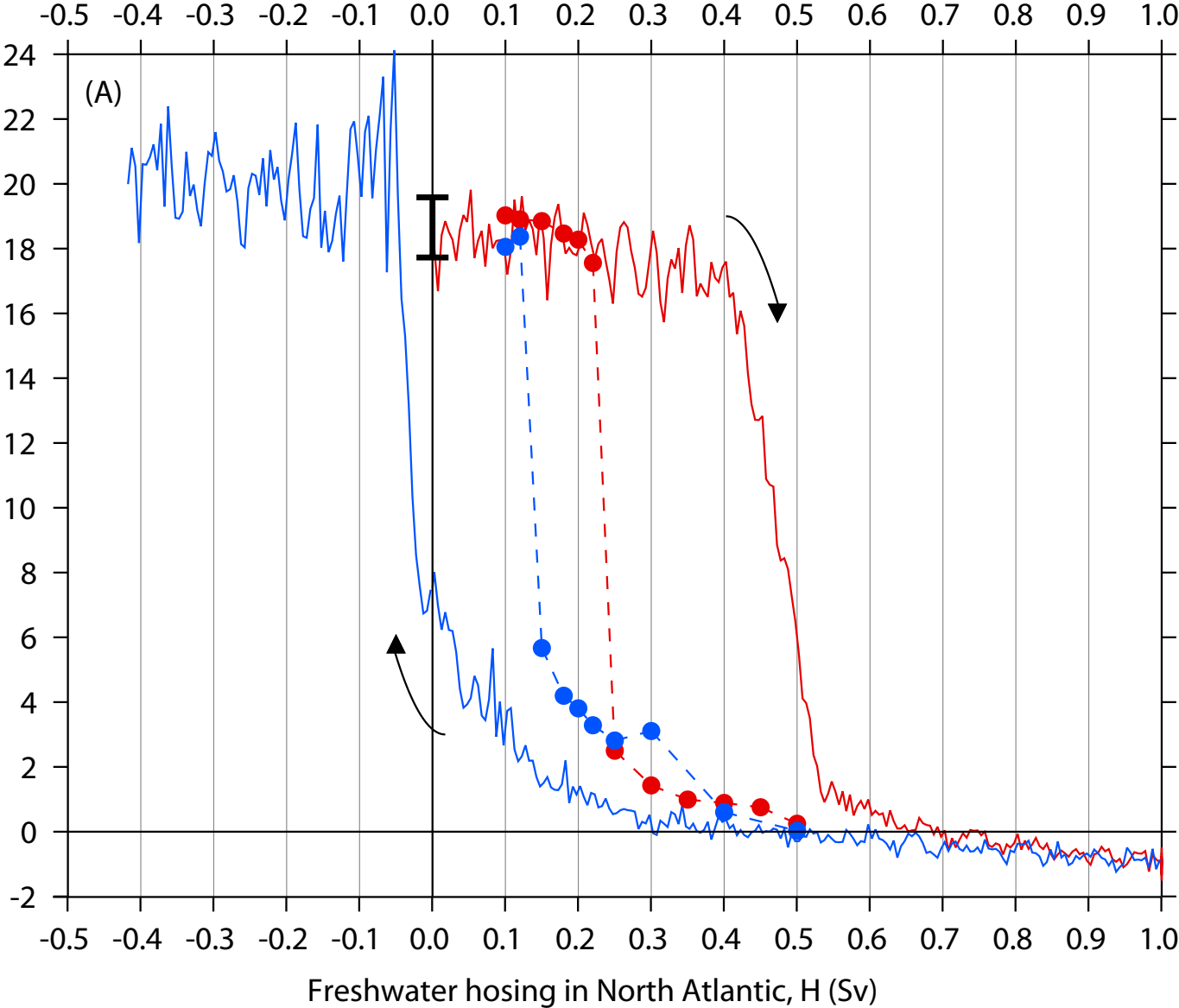
**National Centre for
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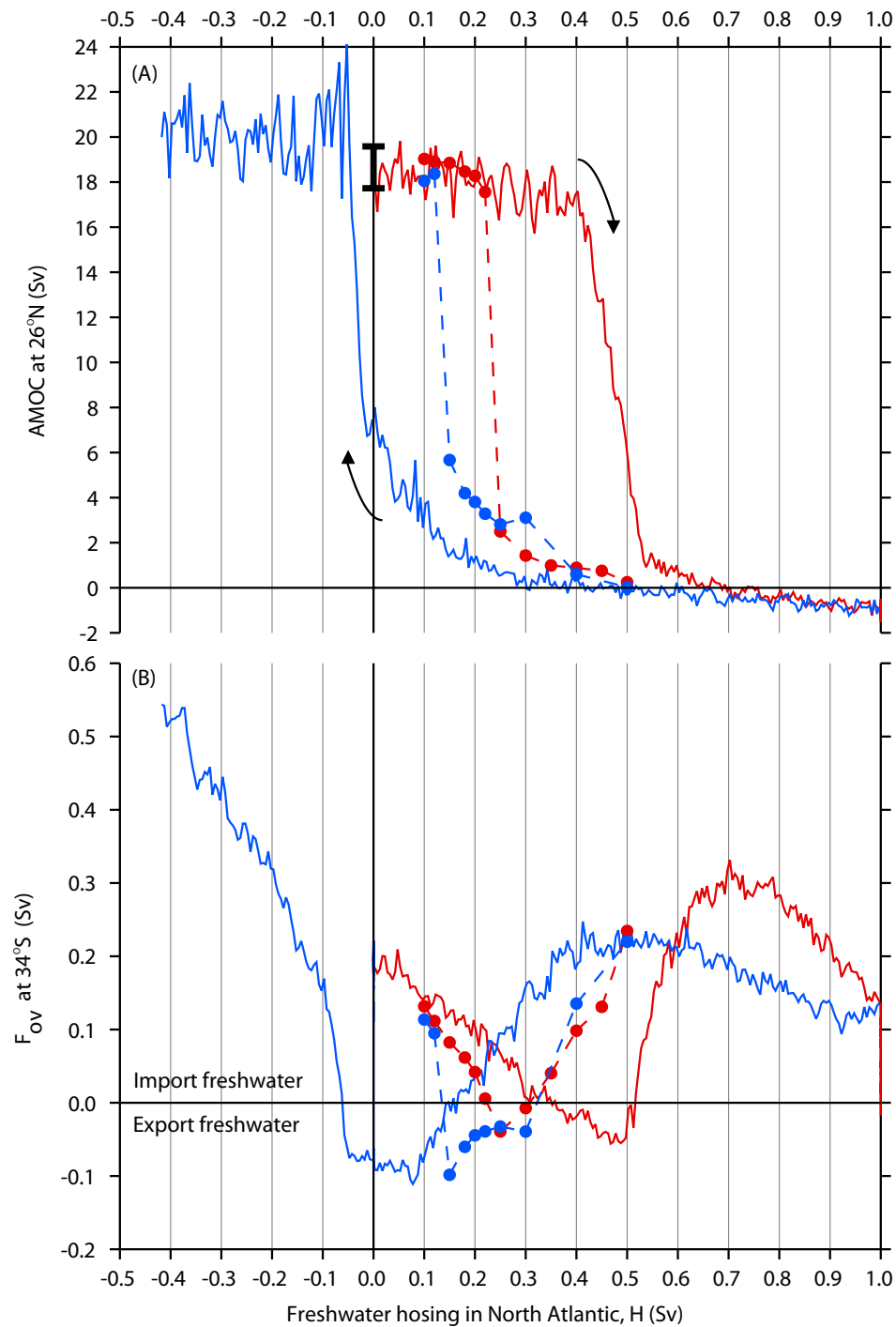
- ① AMOC bistability (as opposed to forced collapse) based on simple models (Stommel 69, resurgence in 80s/90s)
- ① until recently not found in “modern”, GCM-complexity coupled models
- ① feedback theories simply not valid in complex models?
- ① not running the GCMs for long enough? Or in the right parameter space (tuned for stability?)
- ① what about reality? is the concept useful?

AMOC Hysteresis FAMOL



Hawkins et al. 2001

South Atlantic freshwater import in FAMOUS



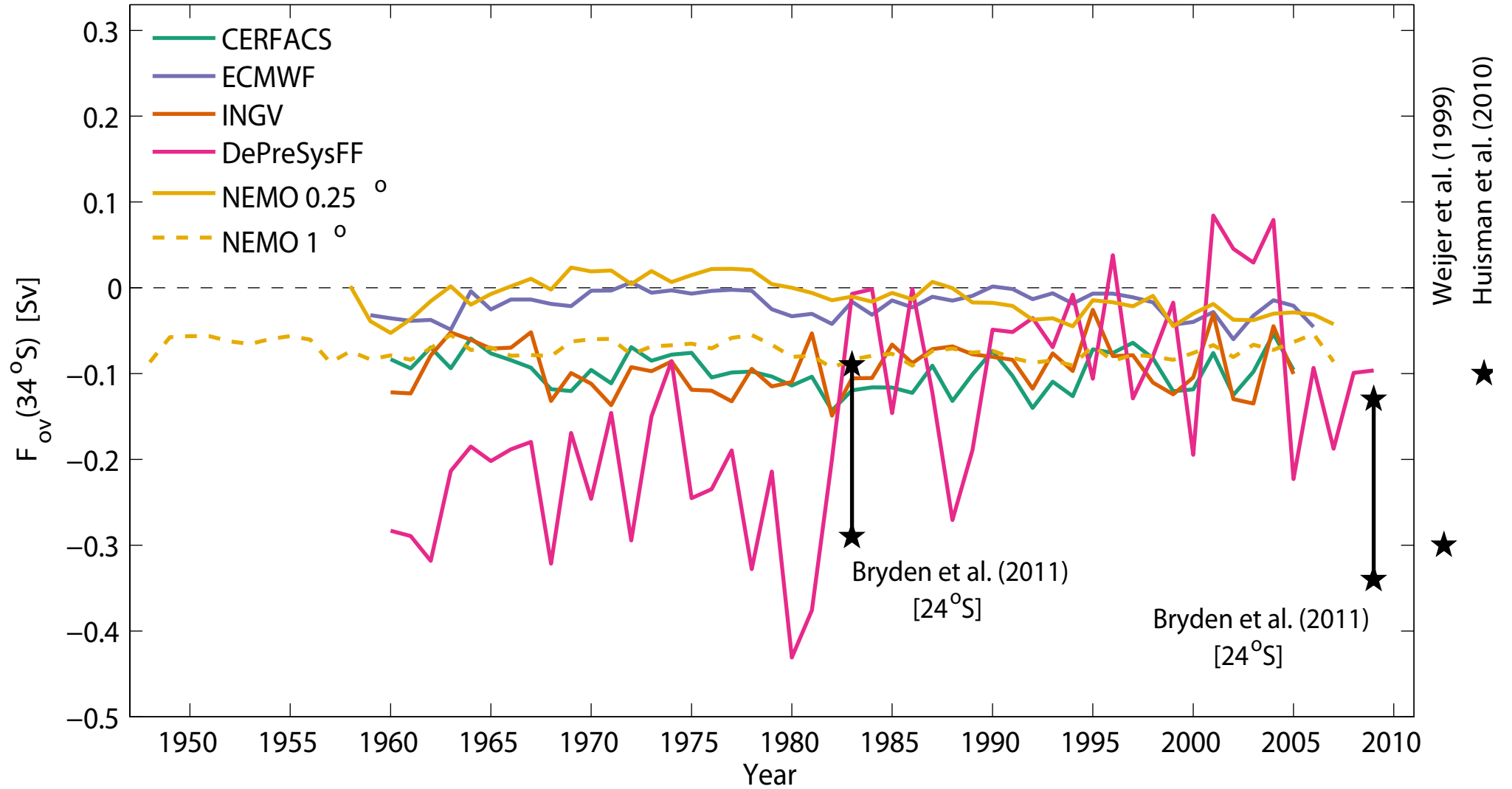
Transient experiments

- increasing hosing
- decreasing hosing

Constant hosing experiments

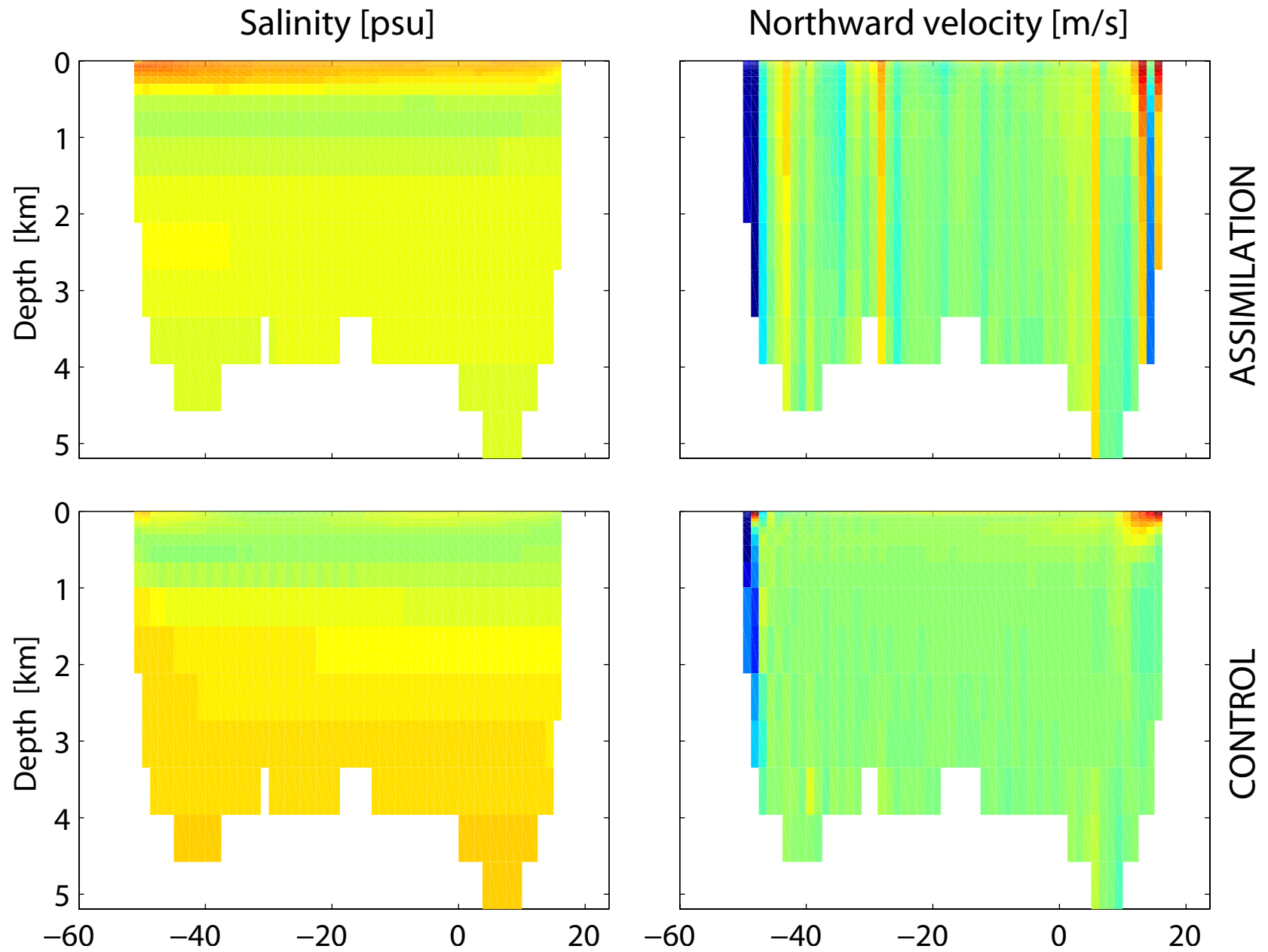
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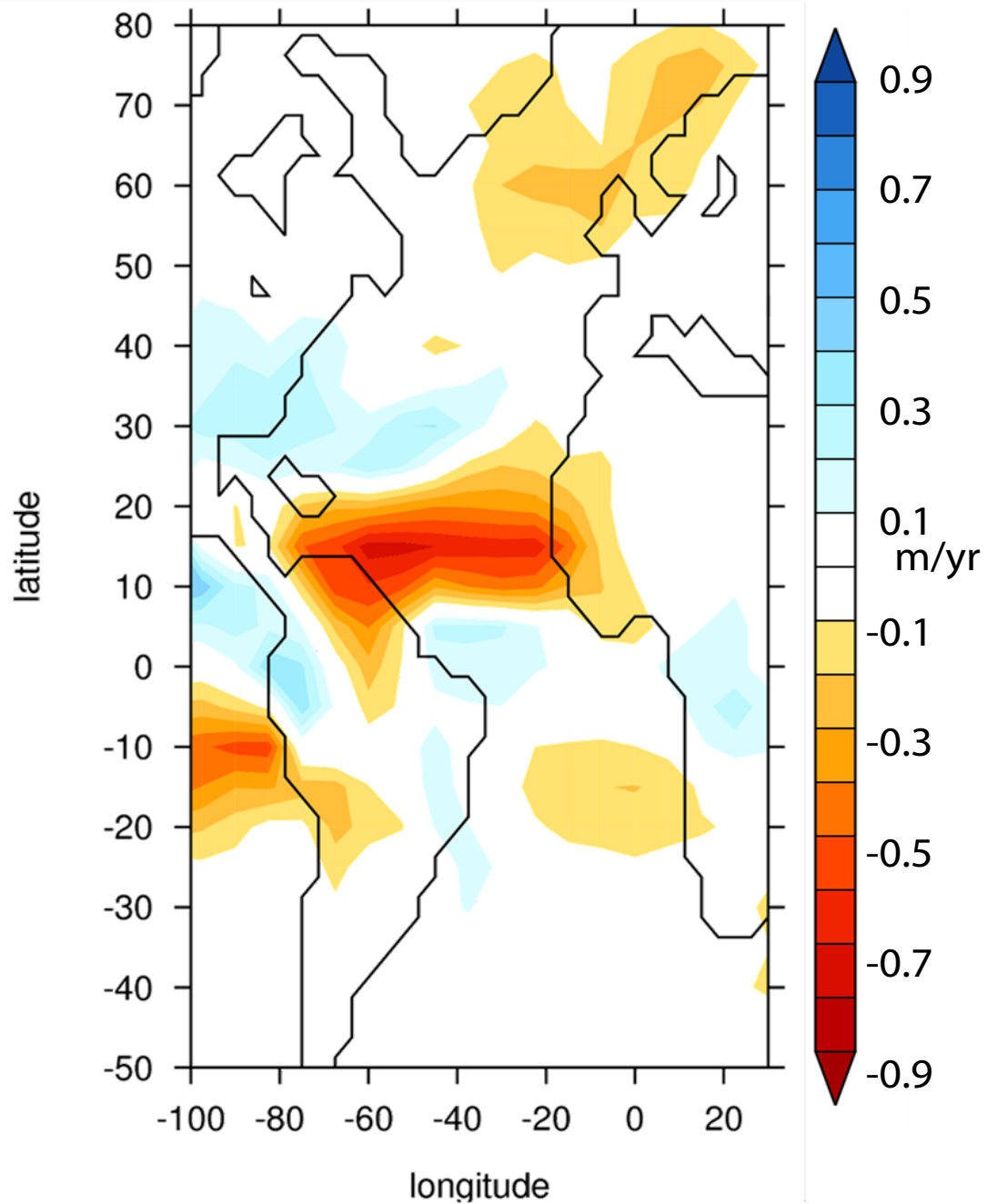
South Atlantic freshwater import in reality (?)



modified from Hawkins et al. 2010

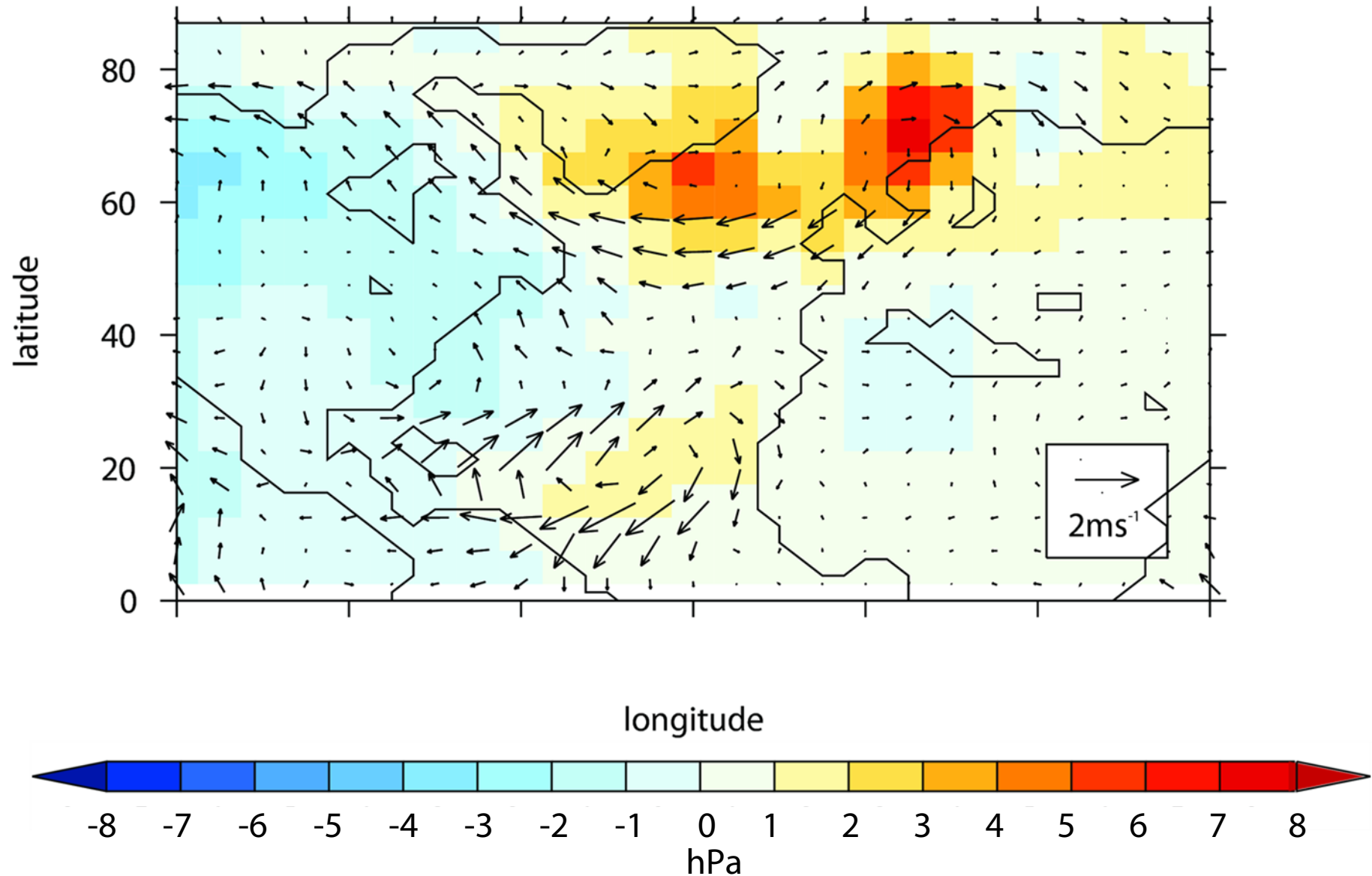
HadCM3: the impact of assimilation on salt transports @ 34S



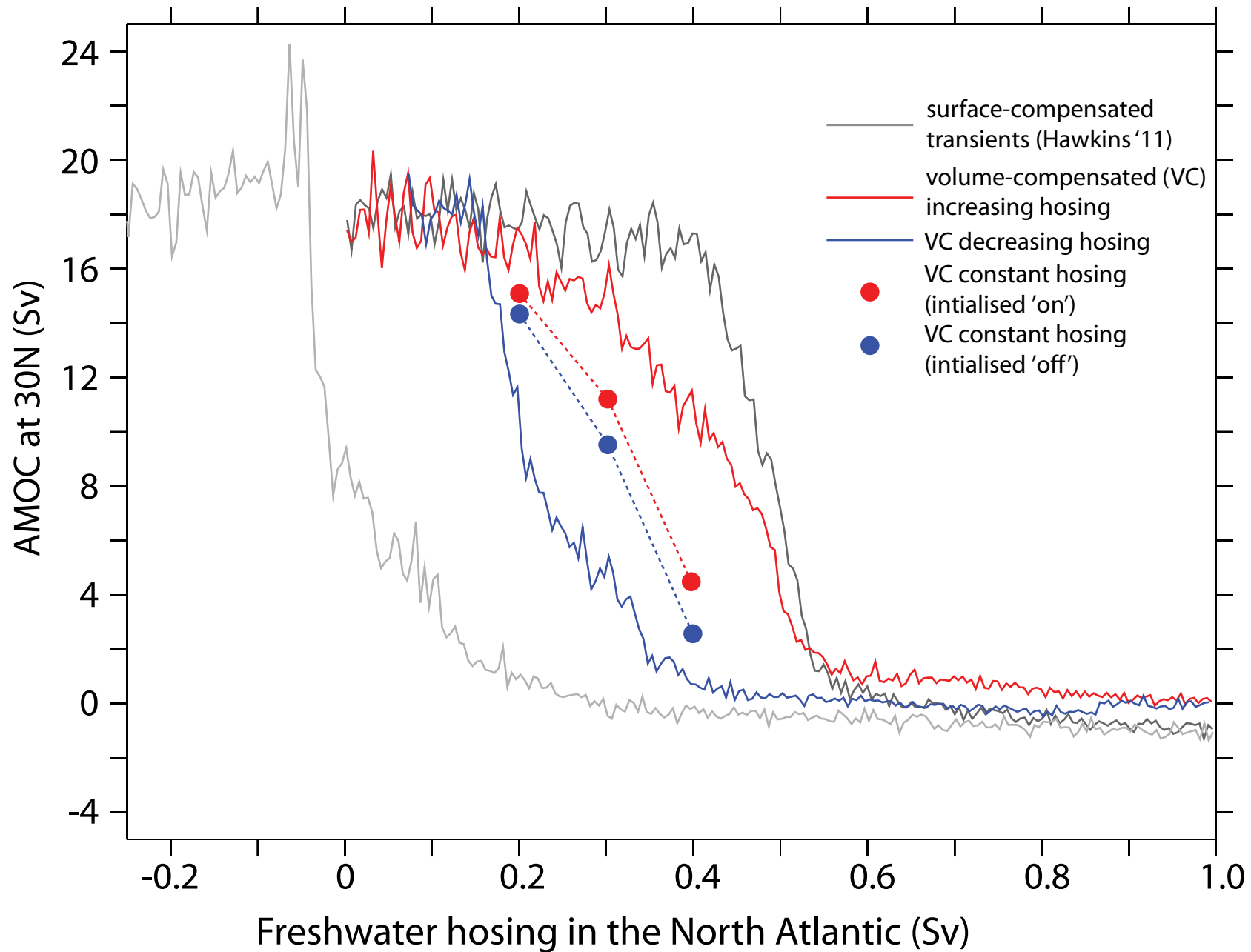


Change in precipitation
(FAMOUS [AMOC off] -
[AMOC on])

Changes in 10m winds and mean sea-level pressure (FAMOUS [AMOC off] - [AMOC on])

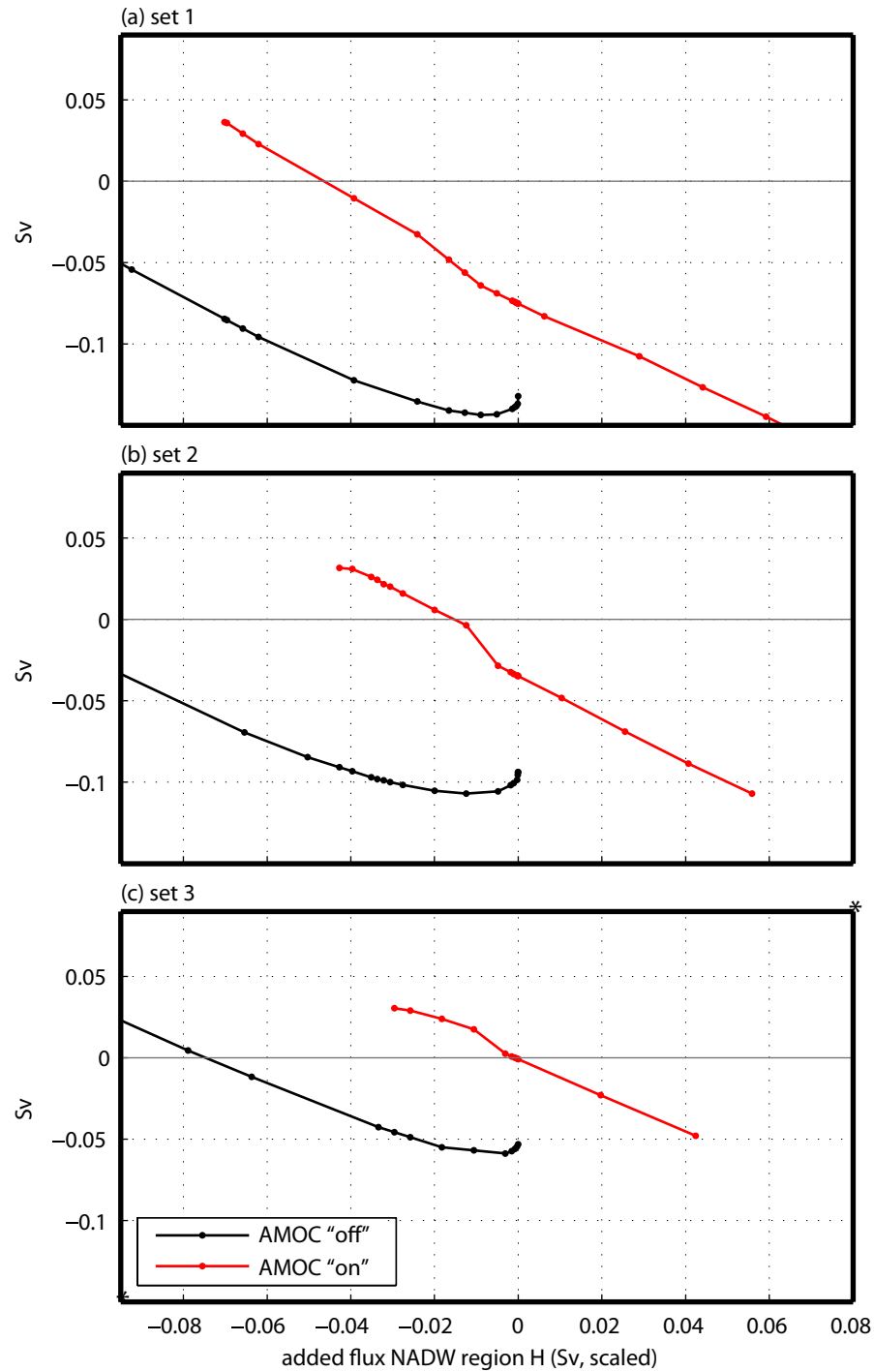


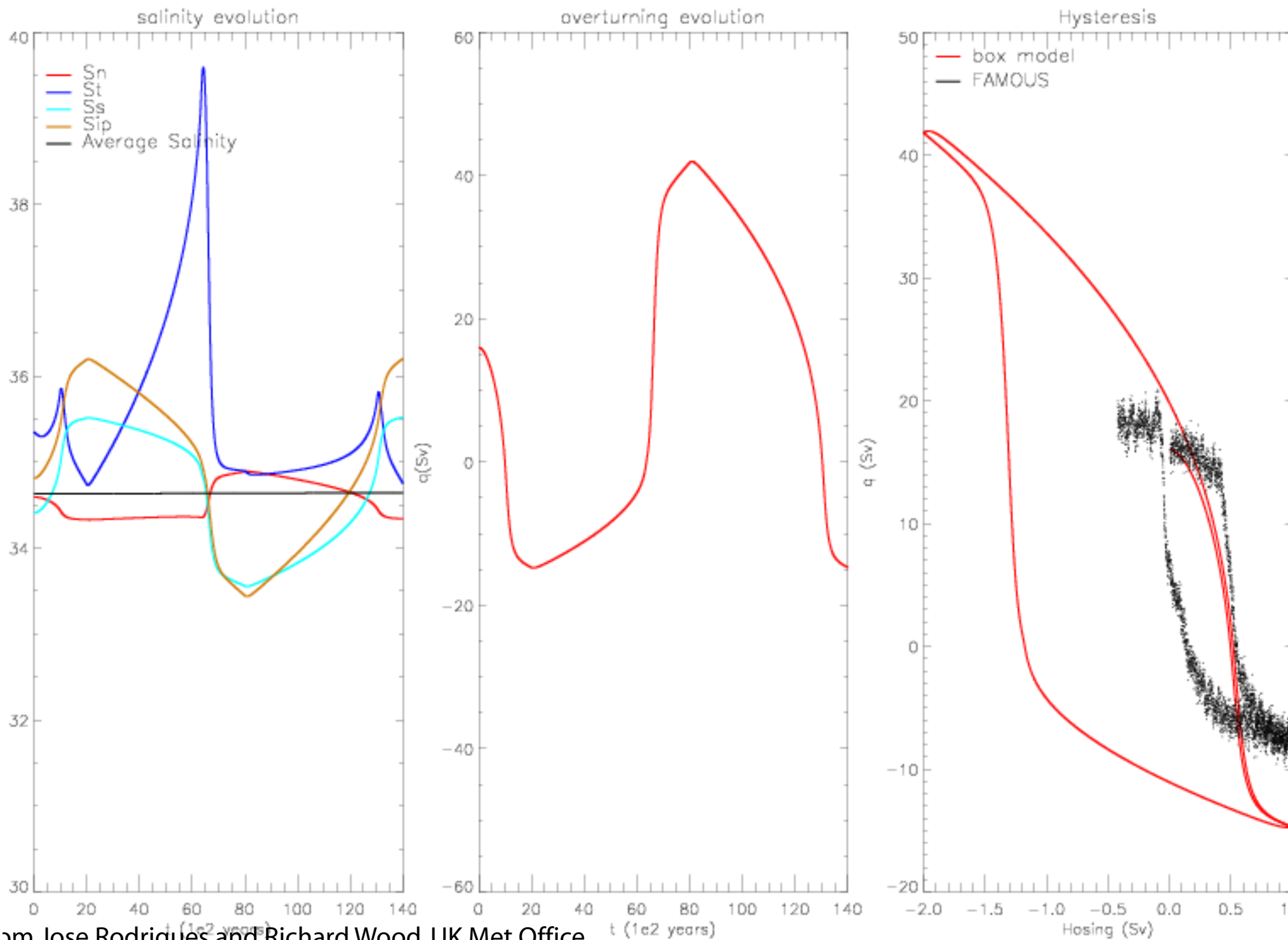
not AMOC Hysteresis in FAMOUS: compensating the hosing



South Atlantic salinity import in the UVic coupled model

(courtesy of Willem Sijp)





- ① AMOC bistability has been found in a “complex” coupled model
- ① It's rather sensitive to the experimental setup: unclear exactly why
- ① Simple diagnostics from freshwater transports seem to hold in more complex models - but possibly not the real ocean!
- ① If robust *and* measurable, these diagnostics may help predict a forced AMOC collapse

Transition between on and off states
for volume-compensated runs

