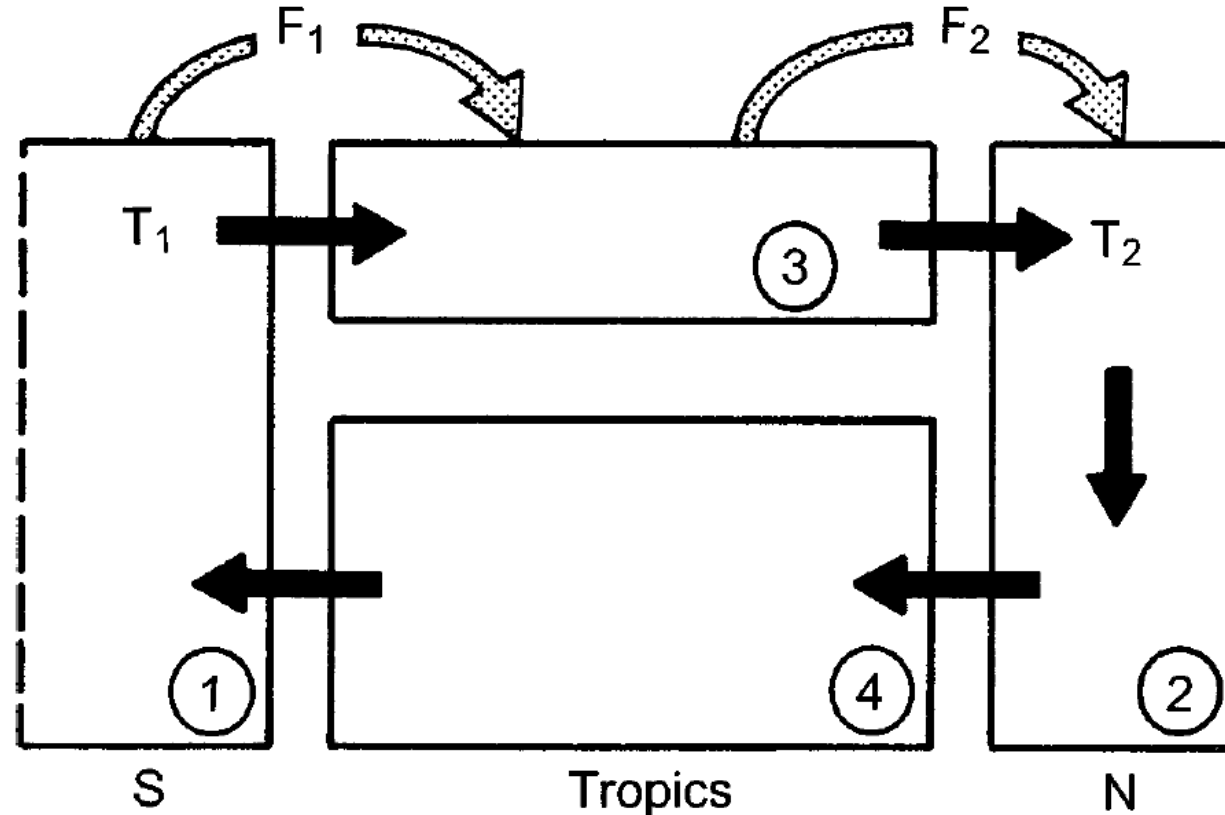


Special Session: AMOC Stability Metrics

Multiple Equilibria in Box Models

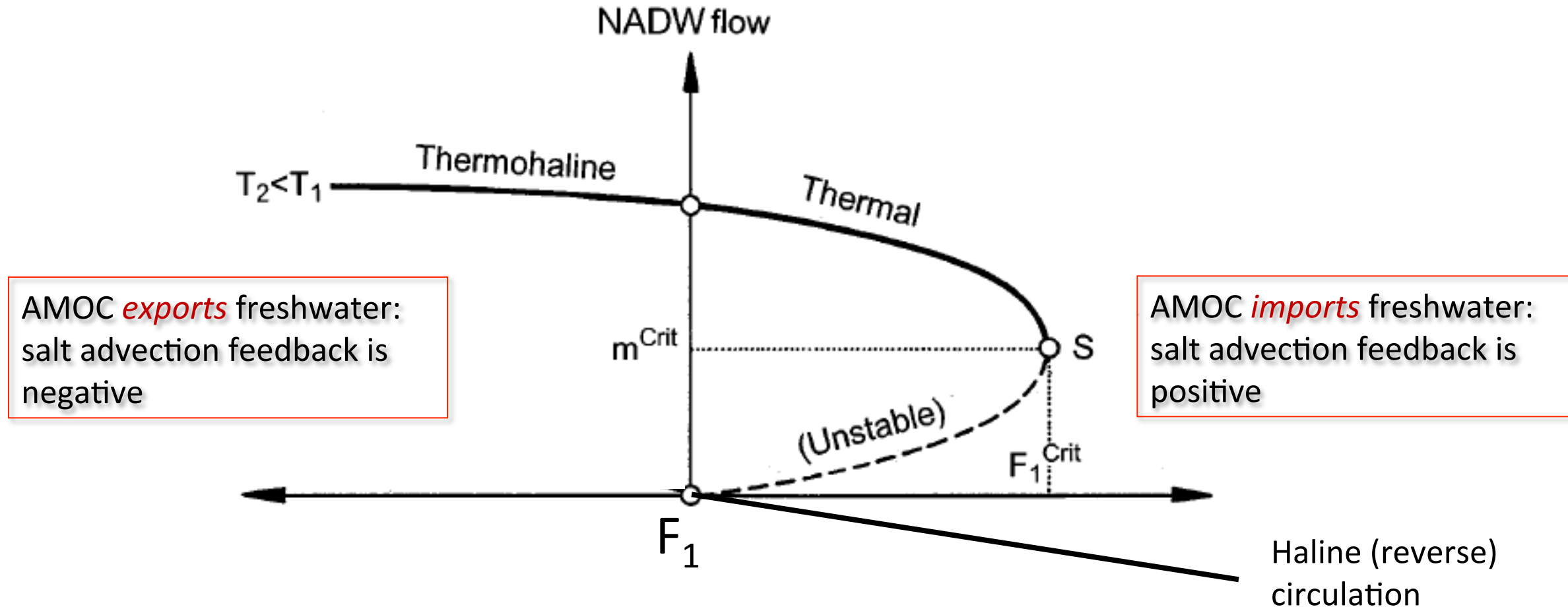


$$m = k(\rho_2 - \rho_1) = k[\beta(S_2 - S_1) - \alpha(T_2 - T_1)]$$

$$m(S_2 - S_1) = -S_0 F_1$$

Rahmstorf (1996)

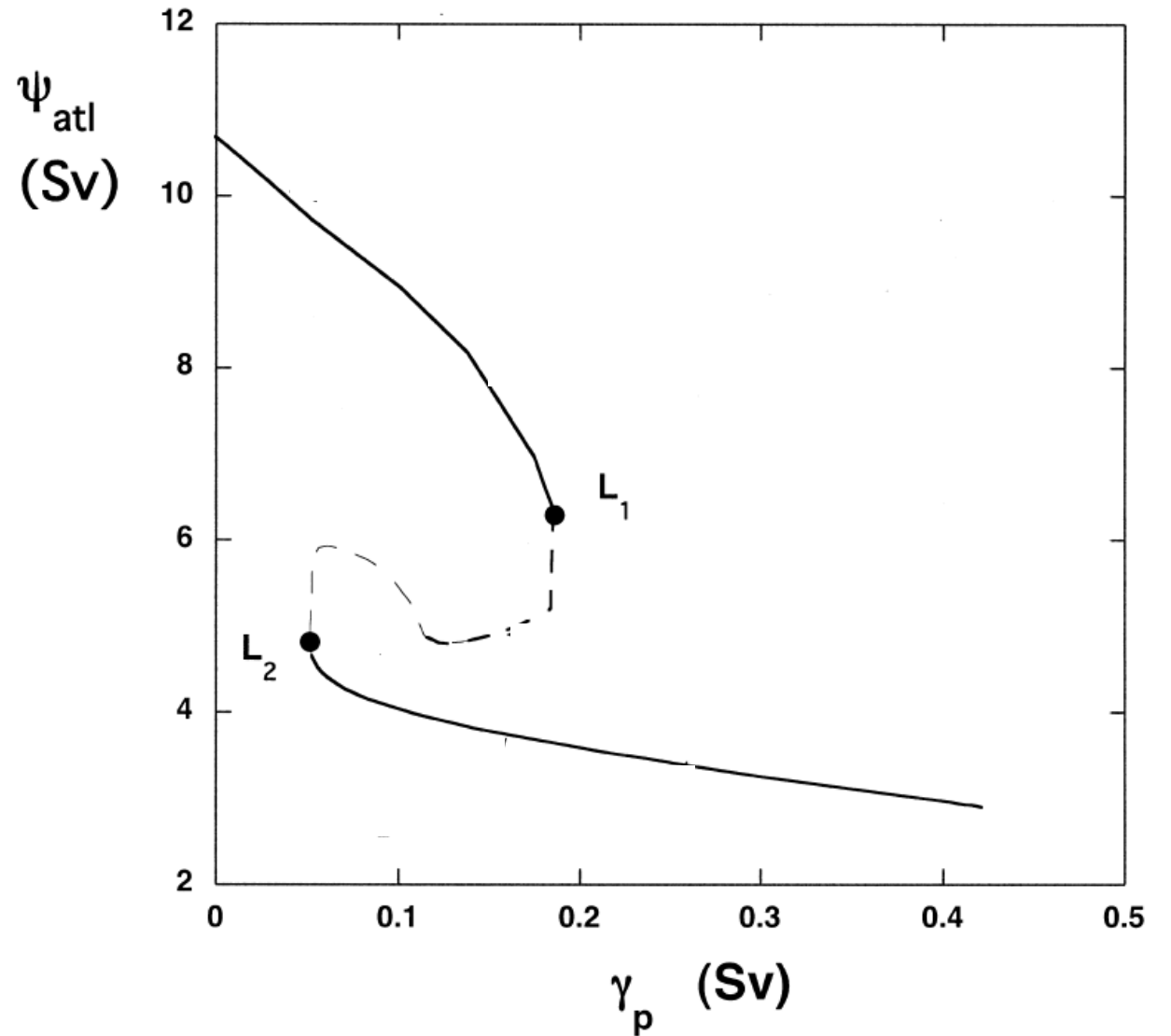
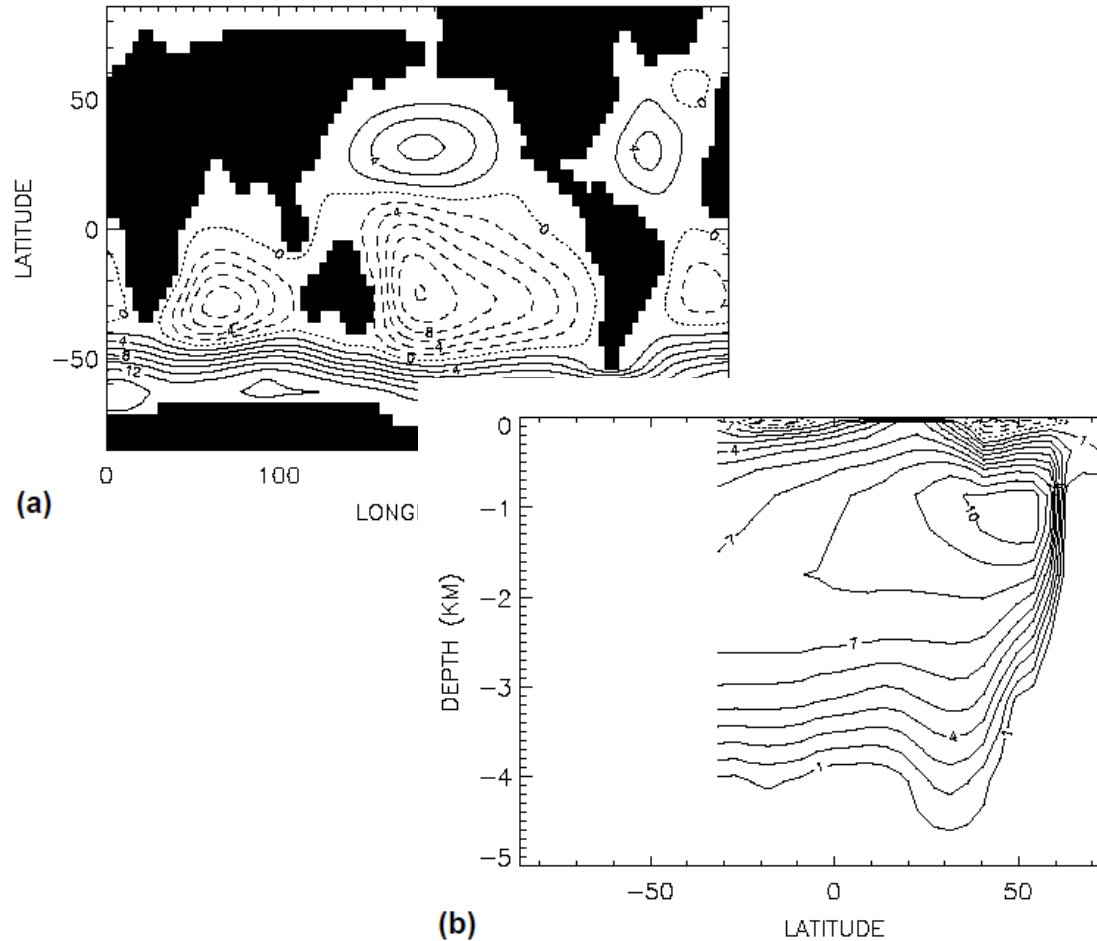
Multiple Equilibria in Box Models



$$m = -\frac{1}{2} k\alpha(T_2 - T_1) \pm \sqrt{\frac{1}{4} [k\alpha(T_2 - T_1)]^2 - k\beta S_0 F_1}$$

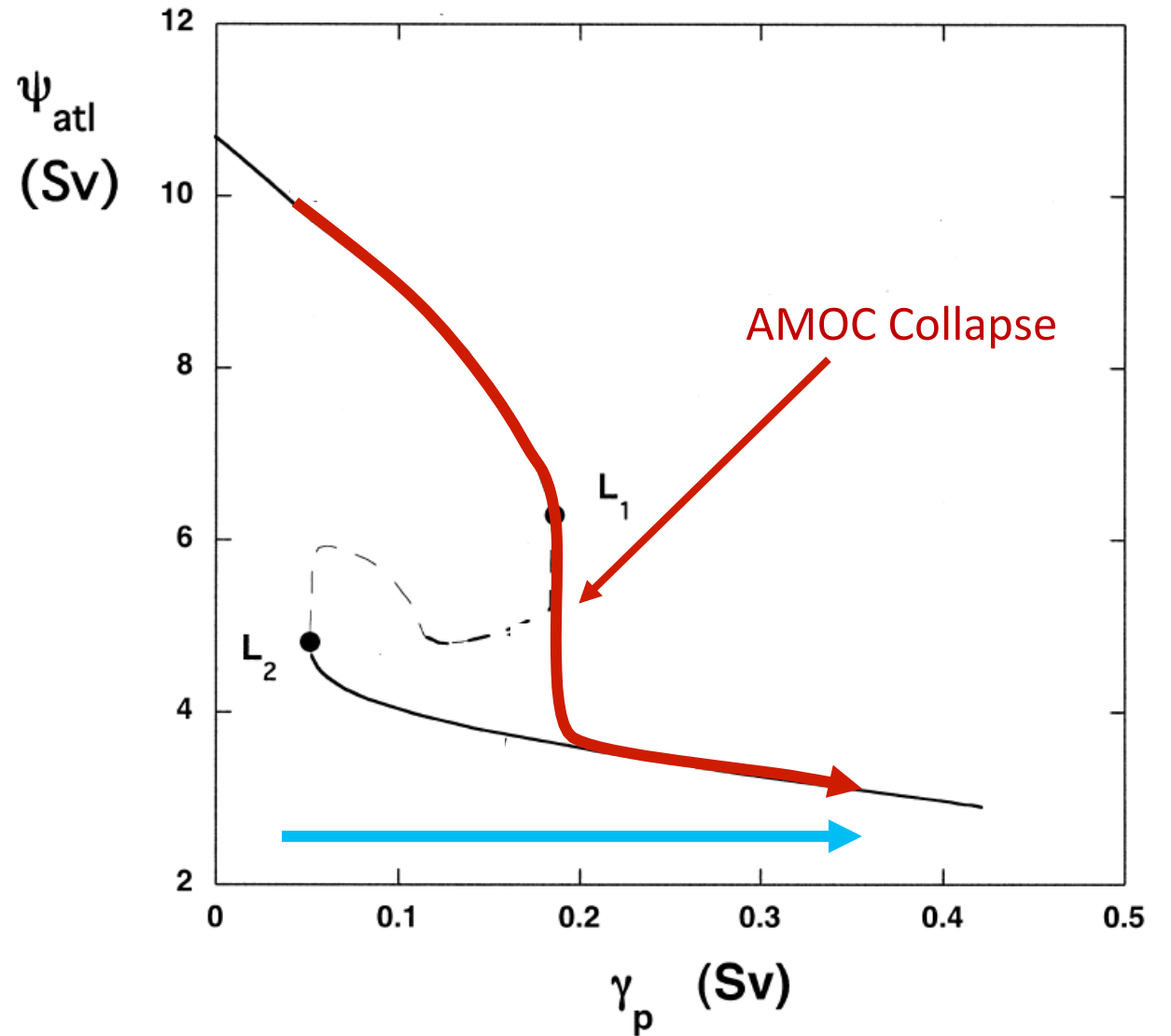
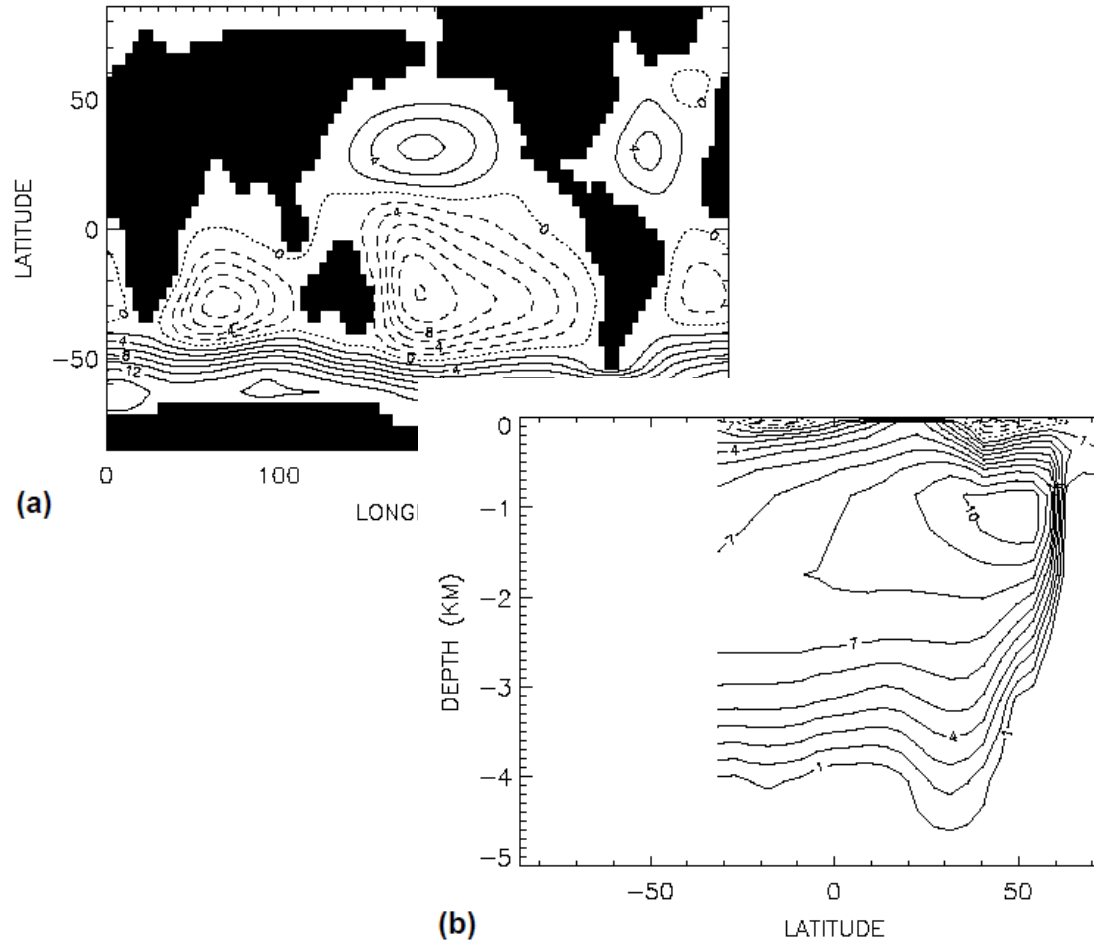
Rahmstorf (1996)

Multiple Equilibria in Comprehensive Models



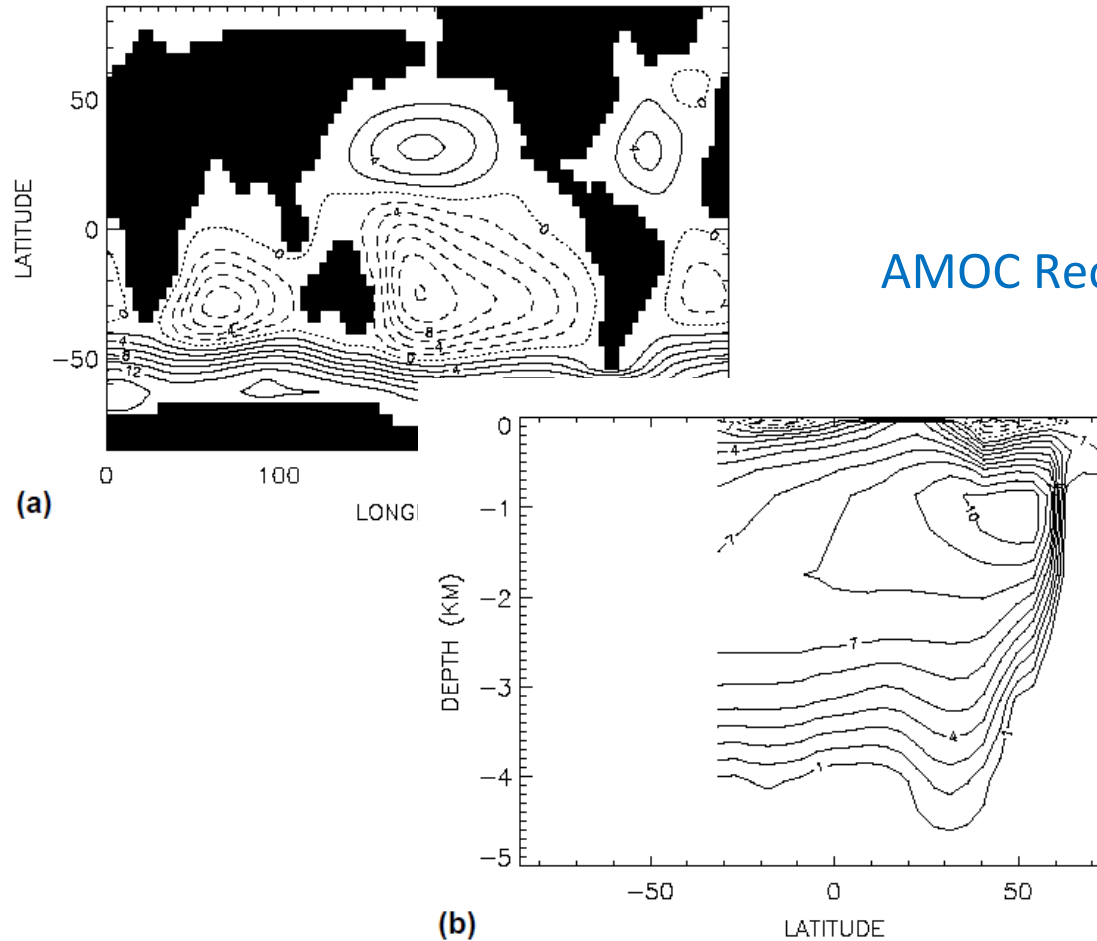
Dijkstra & Weijer (2003), Weijer & Dijkstra (2003)

Multiple Equilibria in Comprehensive Models

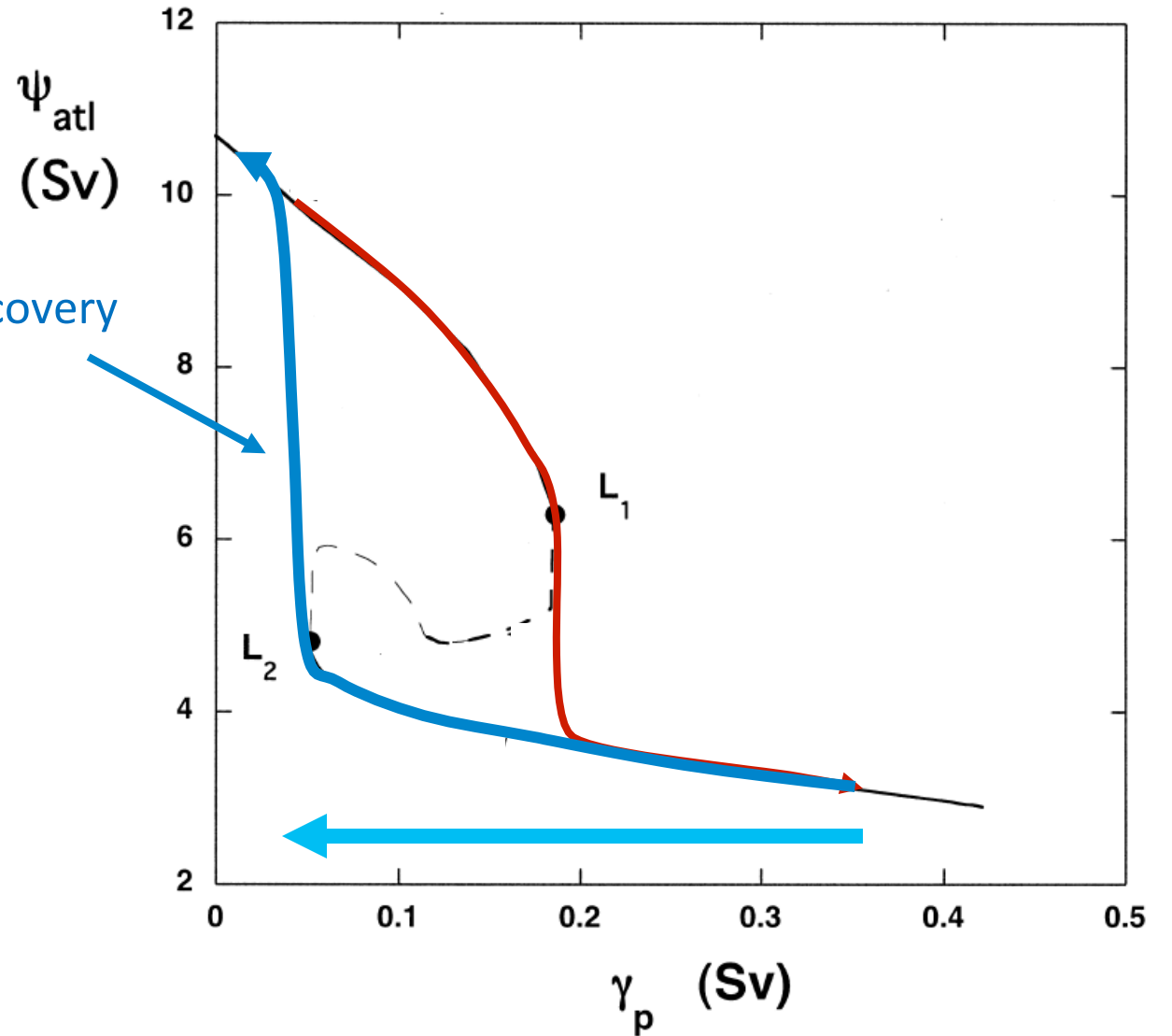


Dijkstra & Weijer (2003), Weijer & Dijkstra (2003)

Multiple Equilibria in Comprehensive Models

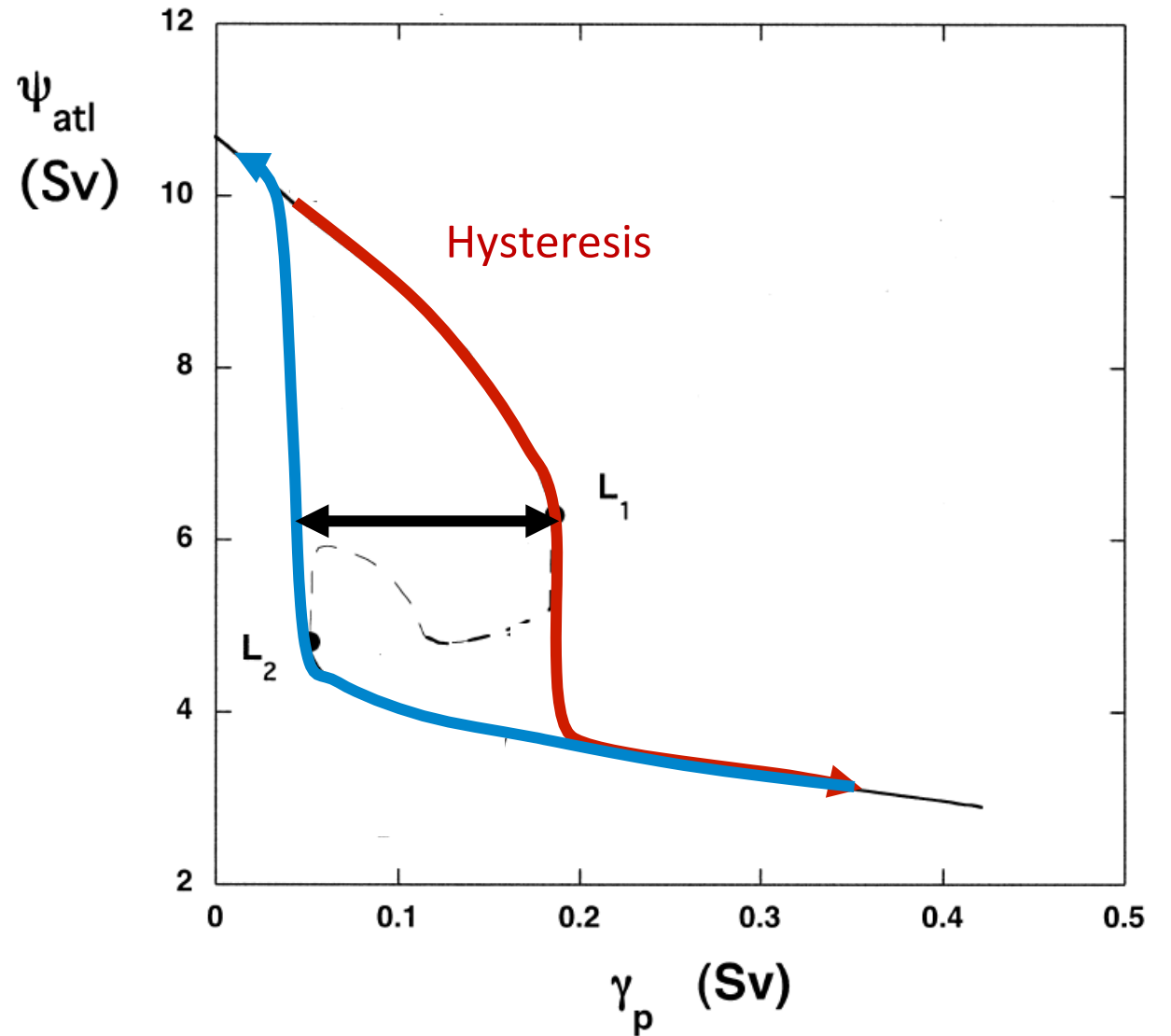
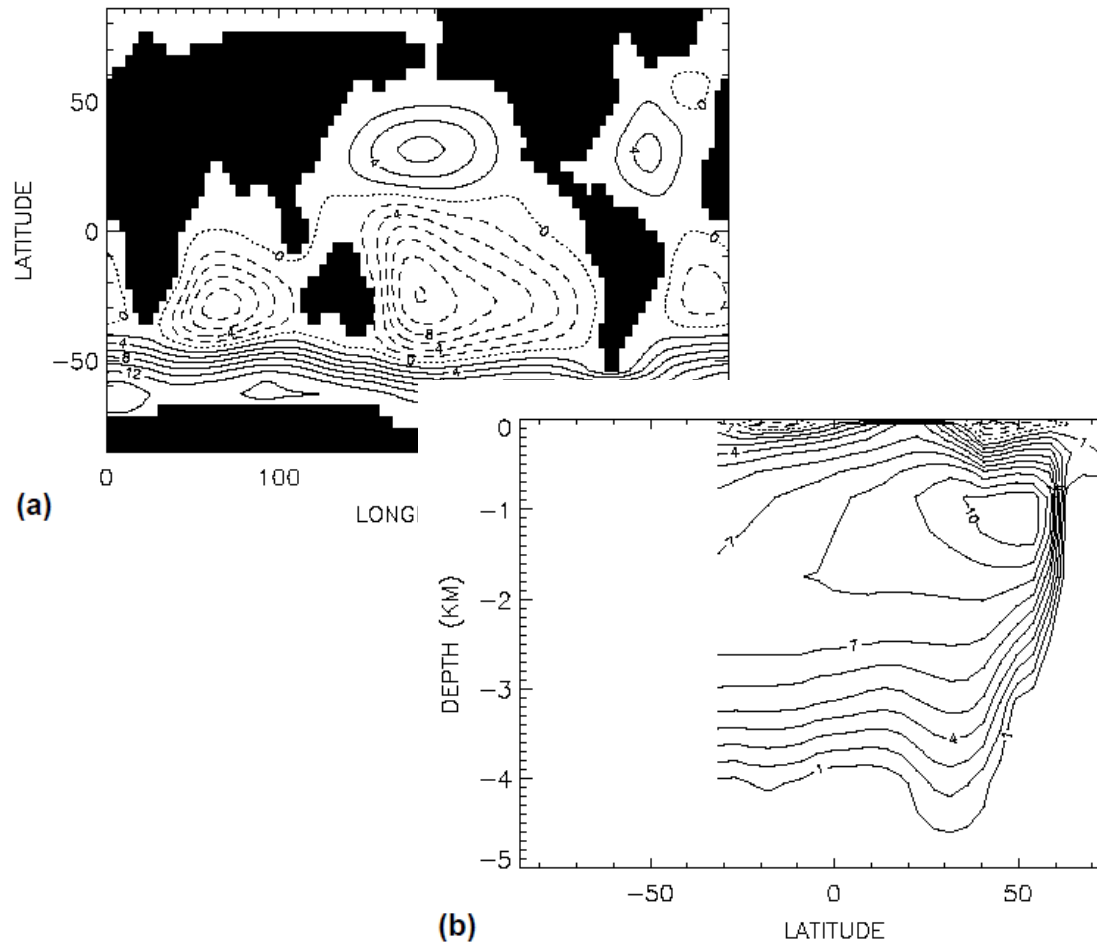


AMOC Recovery



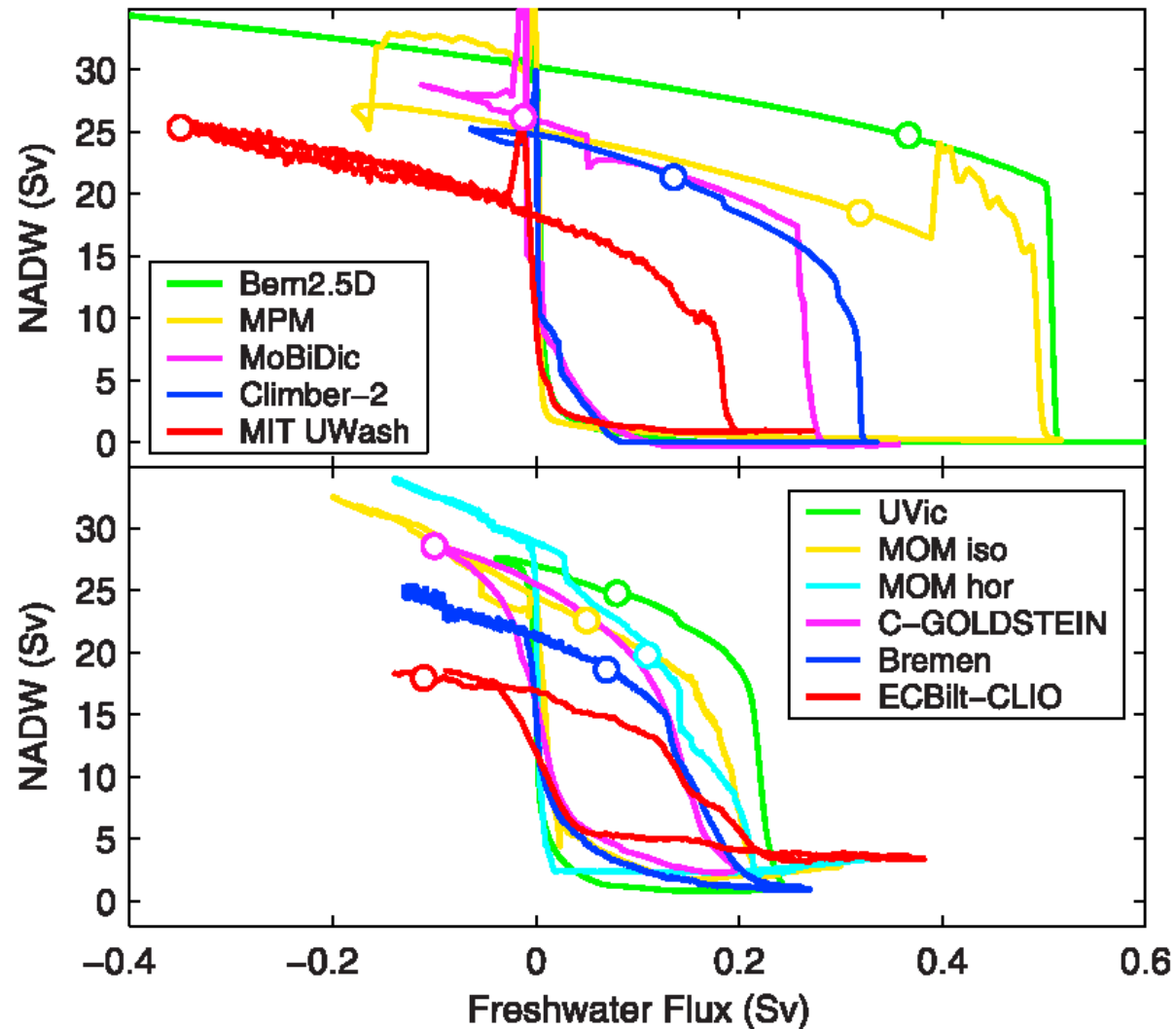
Dijkstra & Weijer (2003), Weijer & Dijkstra (2003)

Multiple Equilibria in Comprehensive Models



Dijkstra & Weijer (2003), Weijer & Dijkstra (2003)

Multiple Equilibria in Comprehensive Models



F_{ov} as AMOC Stability Metric

The Atlantic freshwater budget as a diagnostic for the existence of a stable shut down of the meridional overturning circulation

Pedro de Vries and Susanne L. Weber

Royal Netherlands Meteorological Institute (KNMI), De Bilt, Netherlands

“Pulse experiments strongly suggest that *its sign* determines the existence of a *monostable* or *bistable* regime in our model”

What is the sign of F_{ov} ?

- Observations suggest $F_{ov} < 0$ (bistable regime)
 - E.g., Weijer et al. (1999), Huisman et al. (2010)
- Most coupled climate models $F_{ov} > 0$
 - E.g., Weaver et al. (2012)
- Are coupled climate models overestimating AMOC stability?

Special Session Presentations

- **Wei Liu:** Overlooked possibility of a collapsed Atlantic meridional overturning circulation in warming climate
- **Laura Jackson:** AMOC hysteresis in a state-of-the-art GCM
- **Aixue Hu:** Influence of the freshwater forcing pathway on the AMOC during 8.2k event in a high resolution coupled model
- **Wei Cheng:** Quantifying salt-advection feedback in GFDL and CESM pre-industrial control simulations