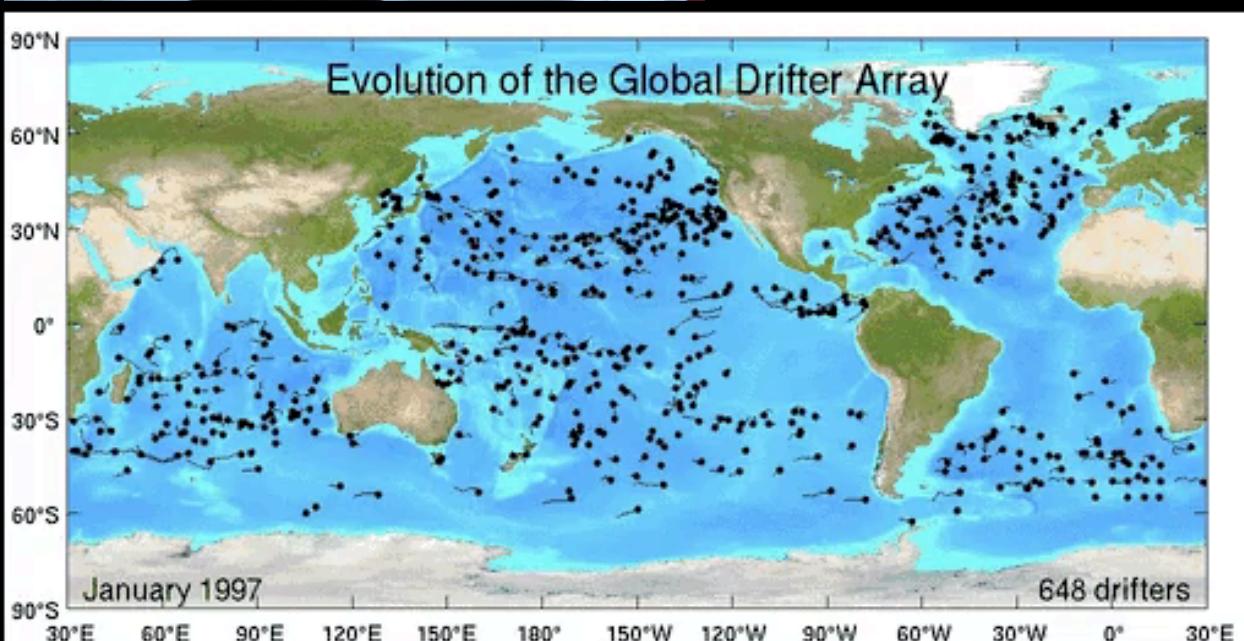


Bolin Centre
for
Climate Research



JOAKIM KJELLSSON
ATMOSPHERIC & OCEANIC
APPLICATIONS OF EULERIAN &
LAGRANGIAN TRANSPORT
MODELLING

LAGRANGIAN



- Study changes in properties as the element moves with the flow .
- Forecasts of pollution. Transport of water masses.
- Floating "drifters" with GPS give information about currents.

PART 1: LAGRANGIAN LAGRANGIAN OBSERVATIONS AND MODELLING IN THE BALTIC SEA

FIG. 1

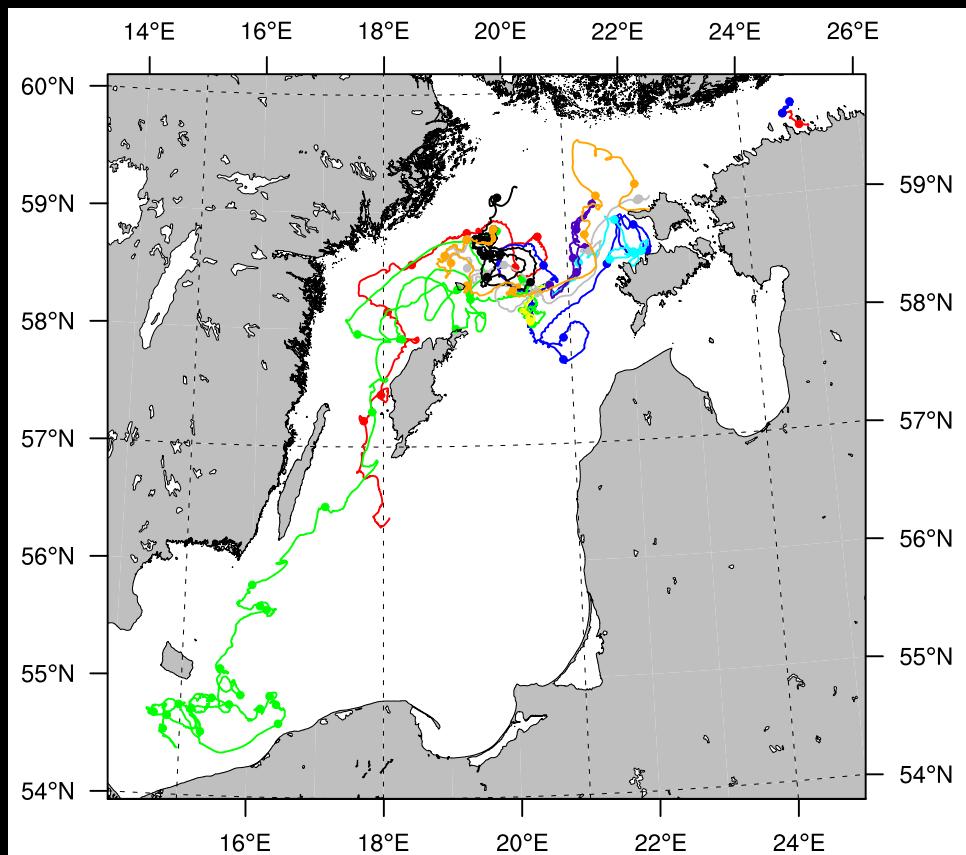


FIG. 4

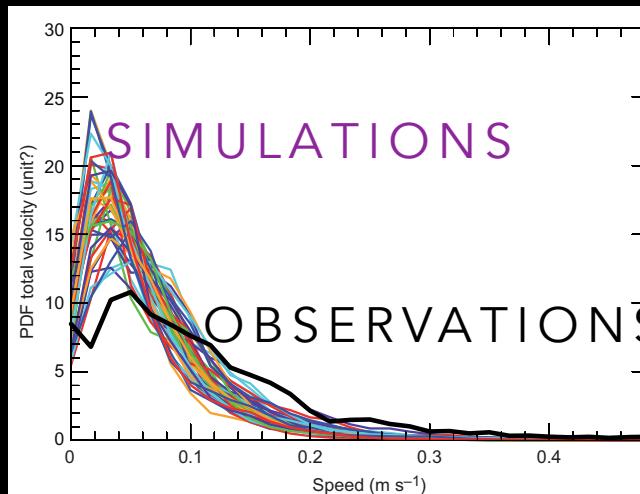
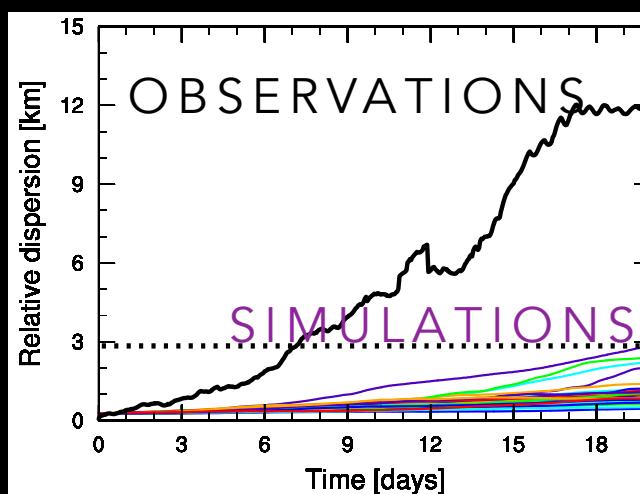
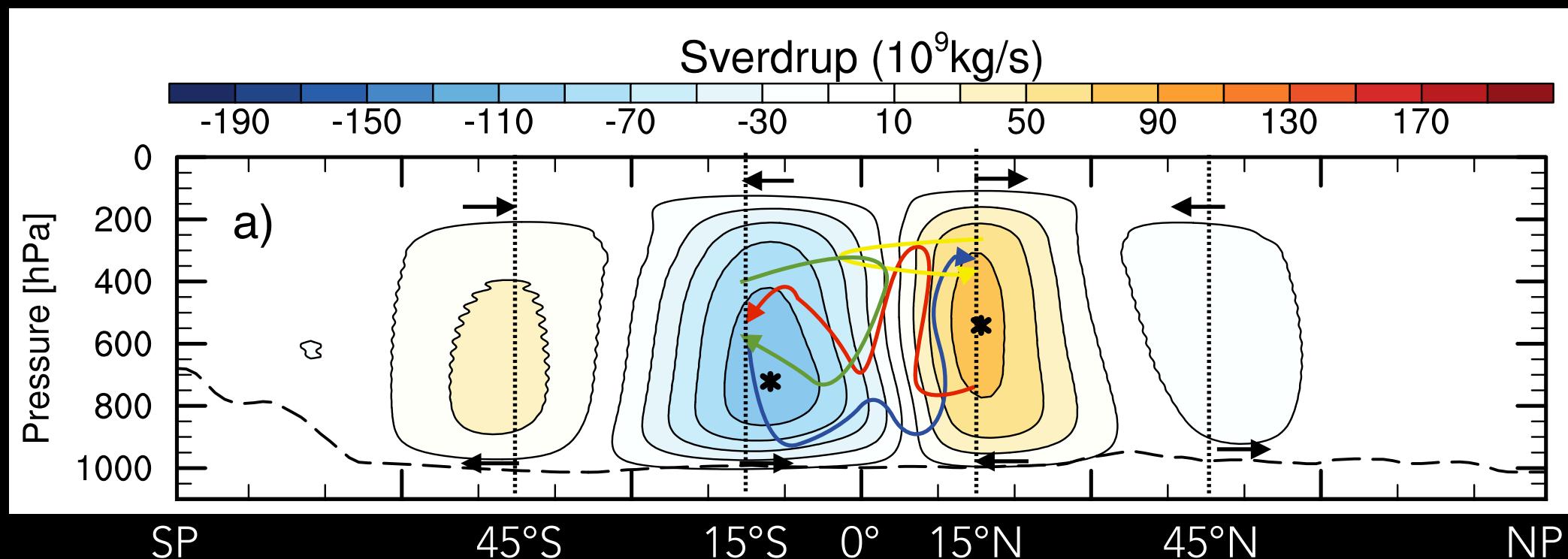


FIG. 6



PART 1: LAGRANGIAN
HOW ARE AIR MASSES TRANSPORTED FROM
THE TROPICS TO THE MIDLATITUDES?

Eulerian meridional overturning stream
function from ERA-Interim 1979-2009.



PART 1: LAGRANGIAN HOW ARE AIR MASSES TRANSPORTED FROM THE TROPICS TO THE MIDLATITUDES?

FIG. 1 FROM PAPER 2

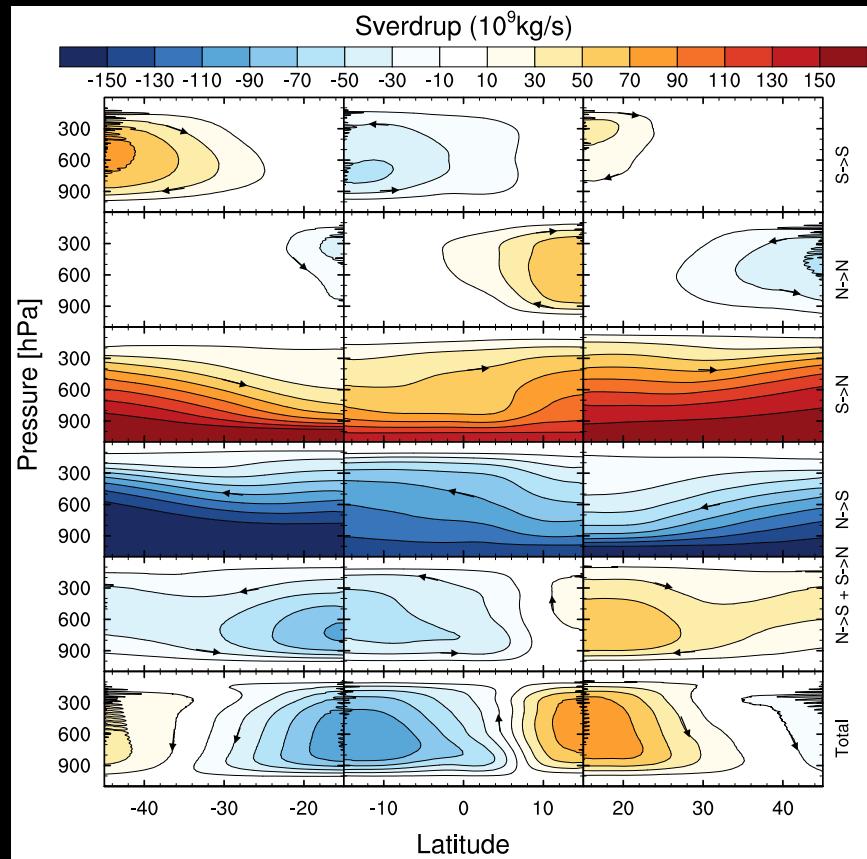
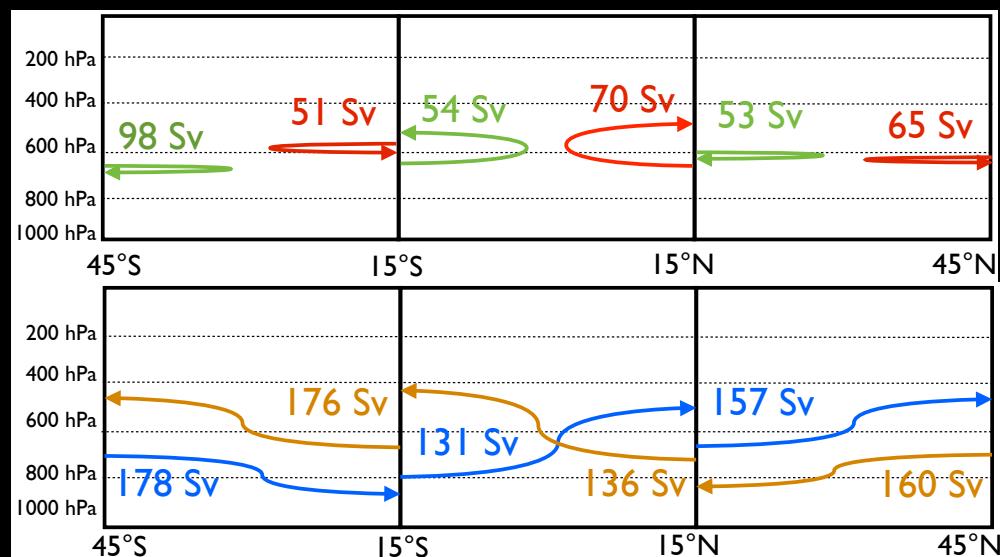
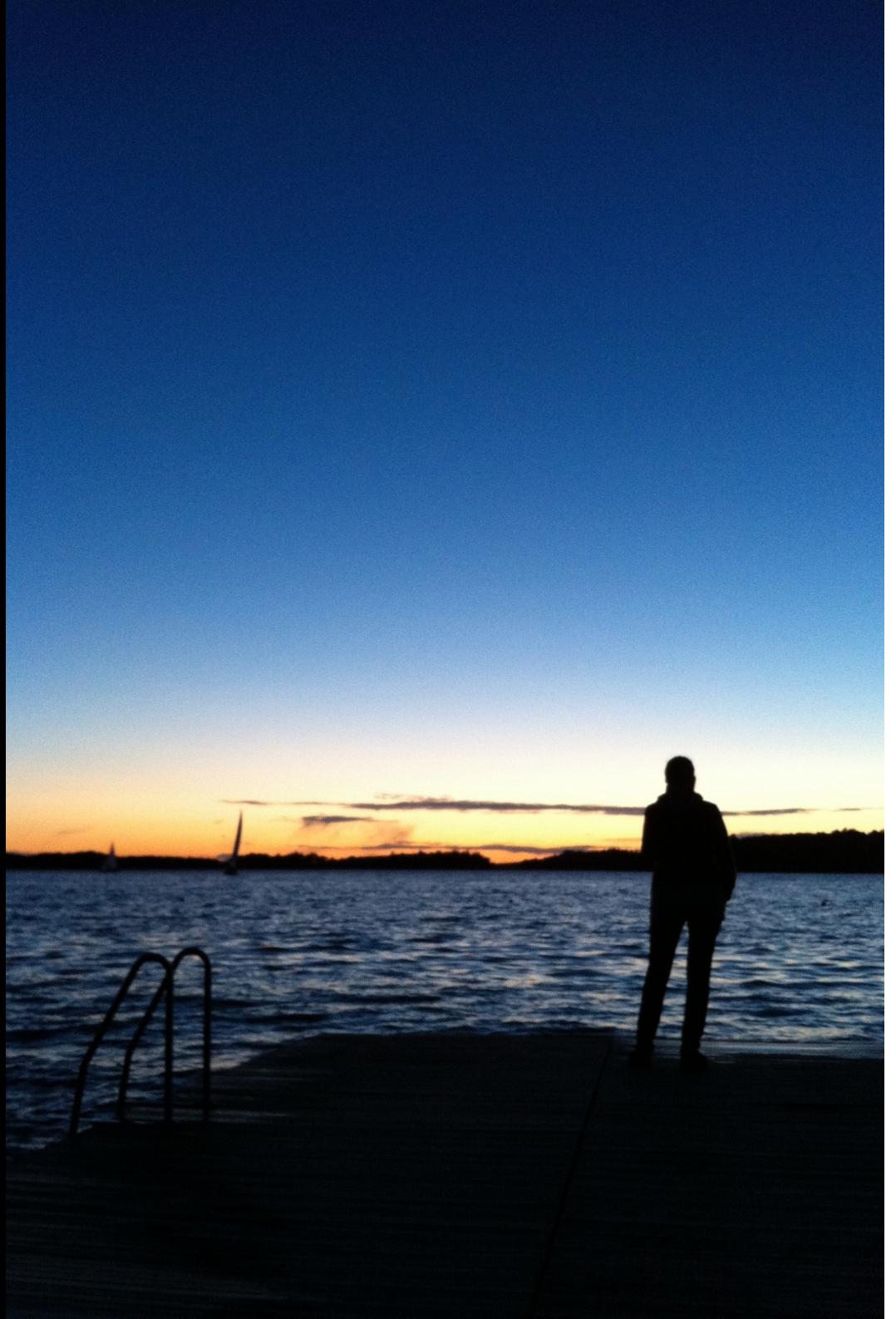


FIG. 2



EULERIAN

- Standing on the shoreline watching the river flow by
- Common for weather forecasts, computer models, observations, etc.



PART 2: EULERIAN EULERIAN STREAM FUNCTION

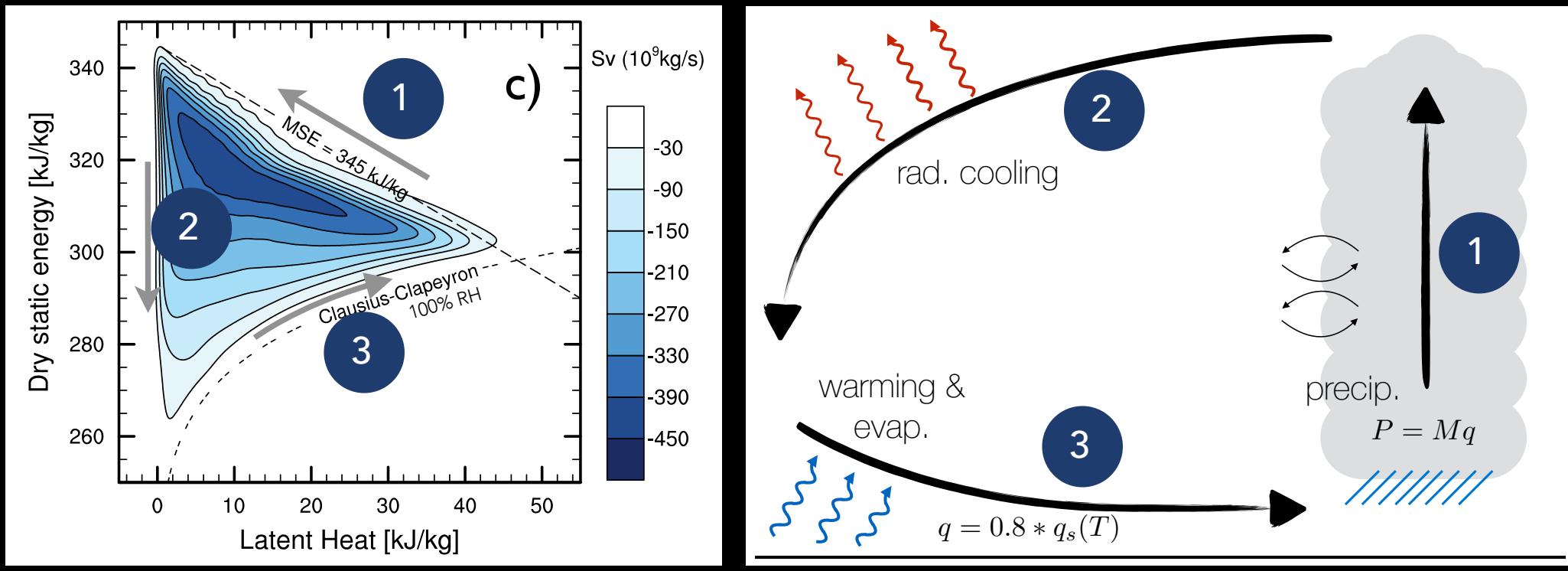
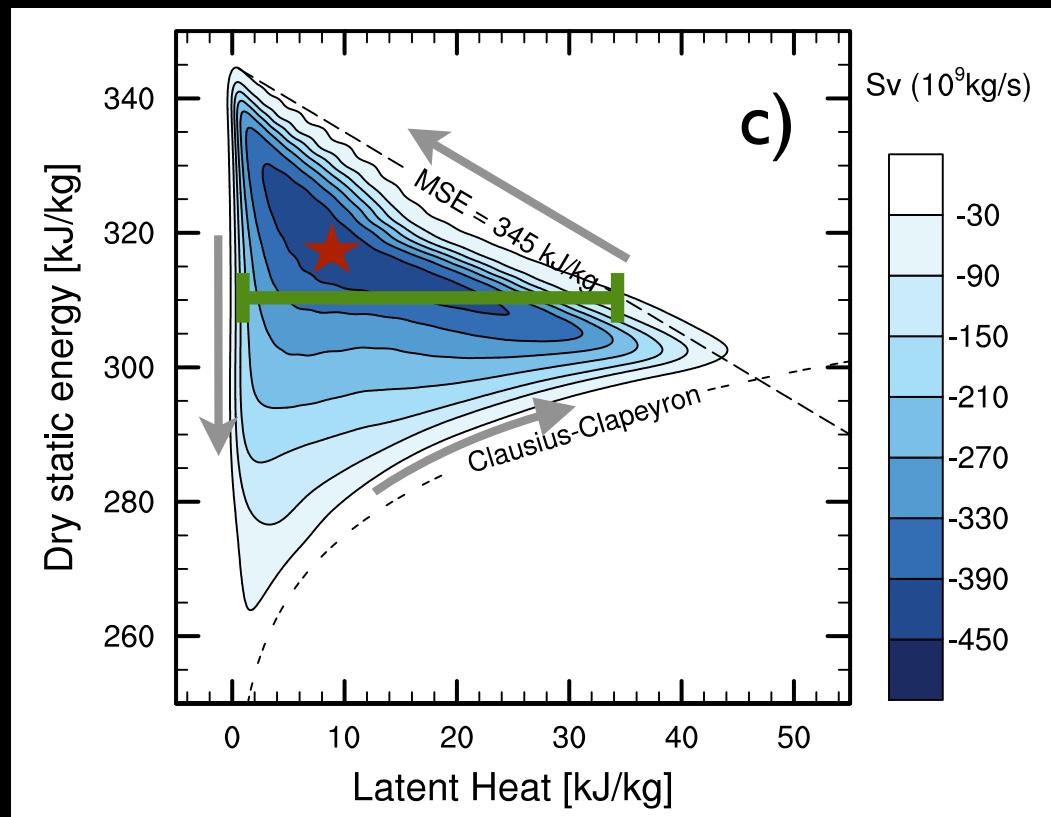


FIG 2 FROM PAPER 3

PART 2: EULERIAN VARIABILITY OF THE ATMOSPHERIC CIRCULATION WITH ENSO

ERA-Interim reanalysis



NOAA ERSST.v3b

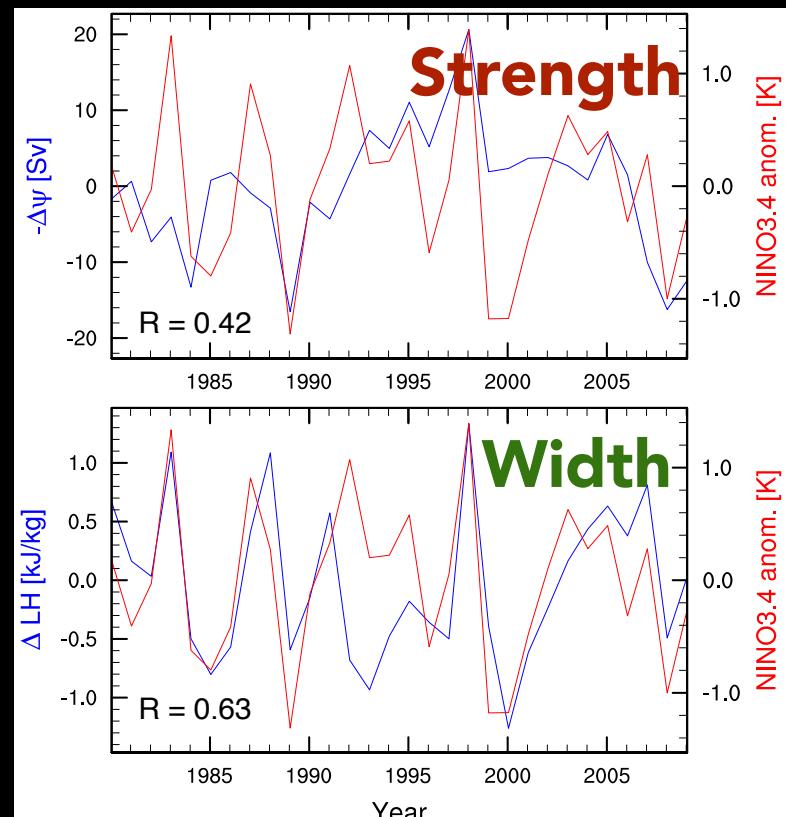
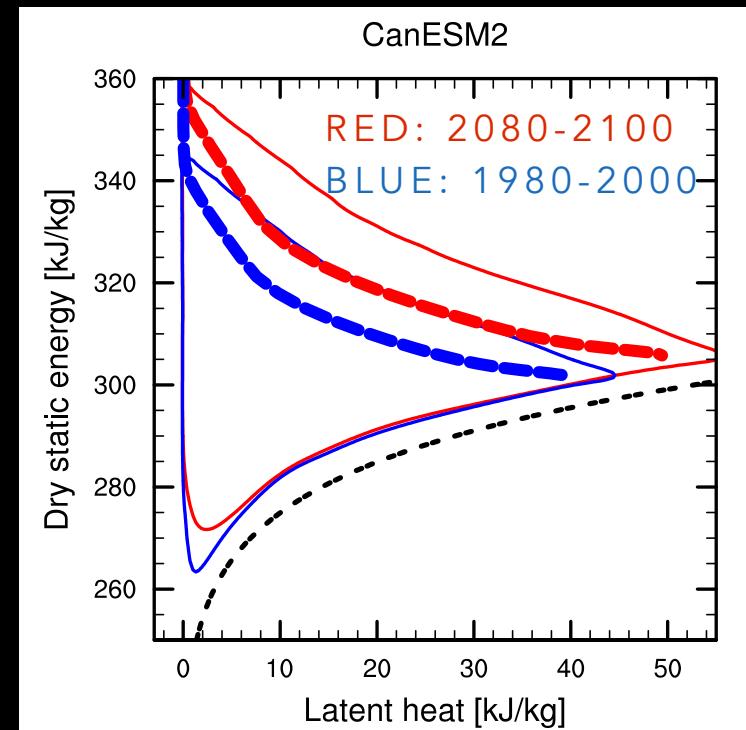
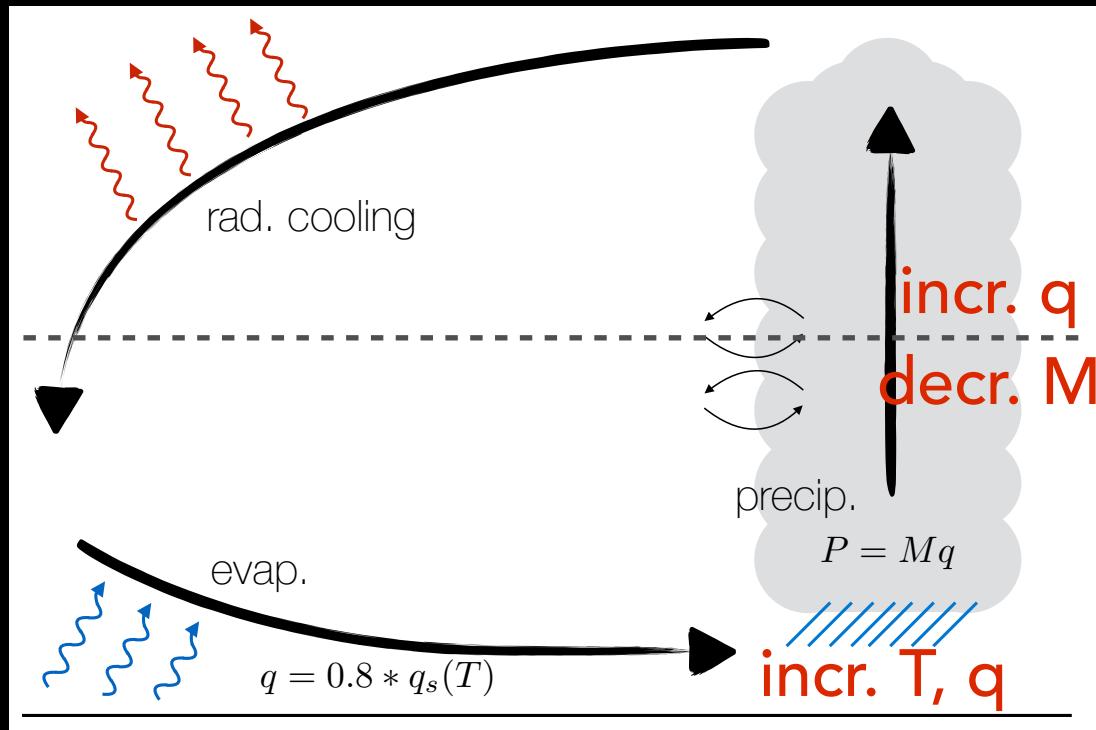


FIG 2 FROM PAPER 3

FIG 6 FROM PAPER 3

PART 2: EULERIAN SLOWDOWN OF ATMOSPHERIC CIRCULATION WITH GLOBAL WARMING



Near-surface specific humidity, q , increases more than precipitation, P . Mass flux, M , decreases.

FIG 3 FROM PAPER 4

SUMMARY & OUTLOOK

- Used and introduced methods for studying oceanic and atmospheric flows and to compare observations and computer models.
- Observations grow in numbers and models grow in complexity.
- Continuous Baltic drifter deployments and new model, Nordic?
- "On-line" hydrothermal diagnostic of atmosphere models?



A photograph of a forest scene. In the foreground, several tall evergreen trees stand prominently, their dark green needles contrasting with the bright, overexposed sky above. The trees have thick, textured trunks and some show signs of age or damage. The background is a soft-focus view of more trees and possibly a clearing or path.

THANK YOU FOR
LISTENING!