Plans for investigating time-dependent biases in AIRS temperature profiles

Bill Irion
Jet Propulsion Laboratory, California Institute of Technology

With thanks to

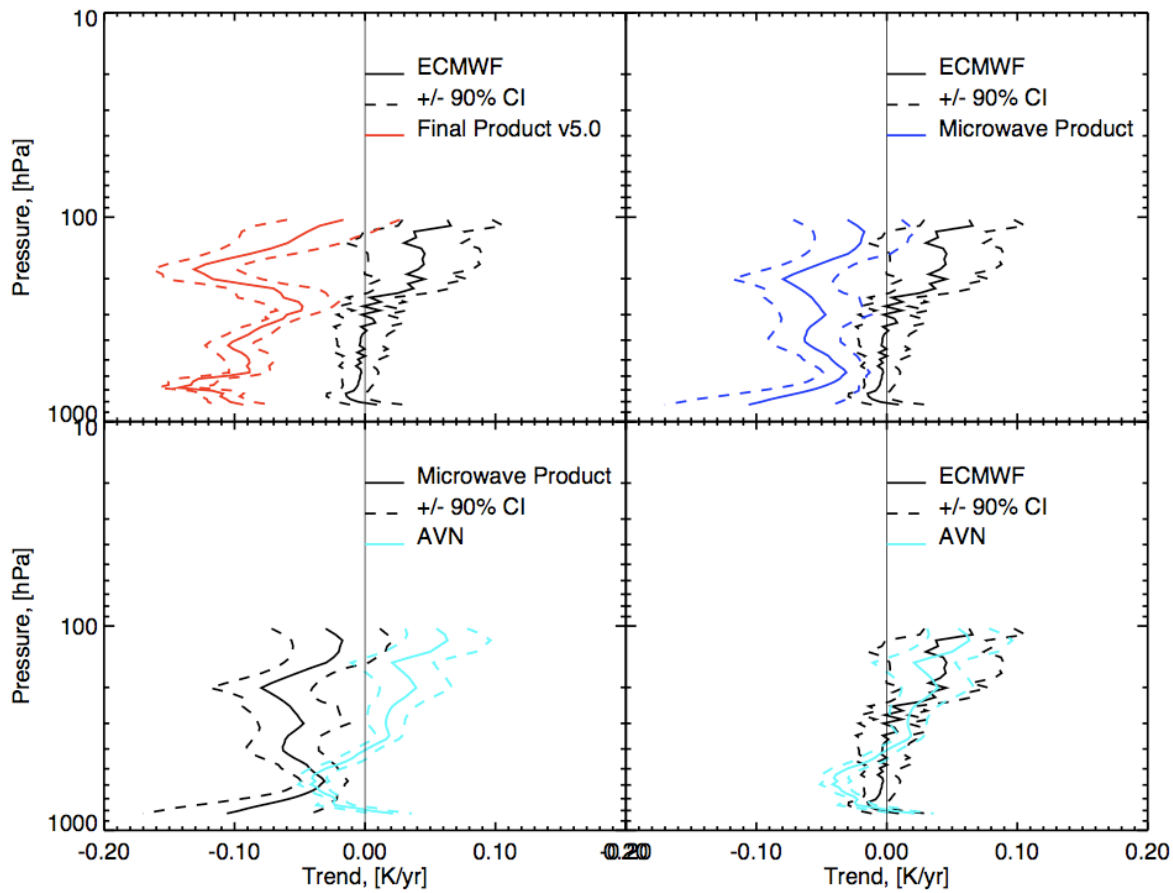
Chris Barnet, Murty Divakarla, Eric Maddy
NOAA

John Blaisdell, Thomas Hearty, Gyula Molnar
GSFC

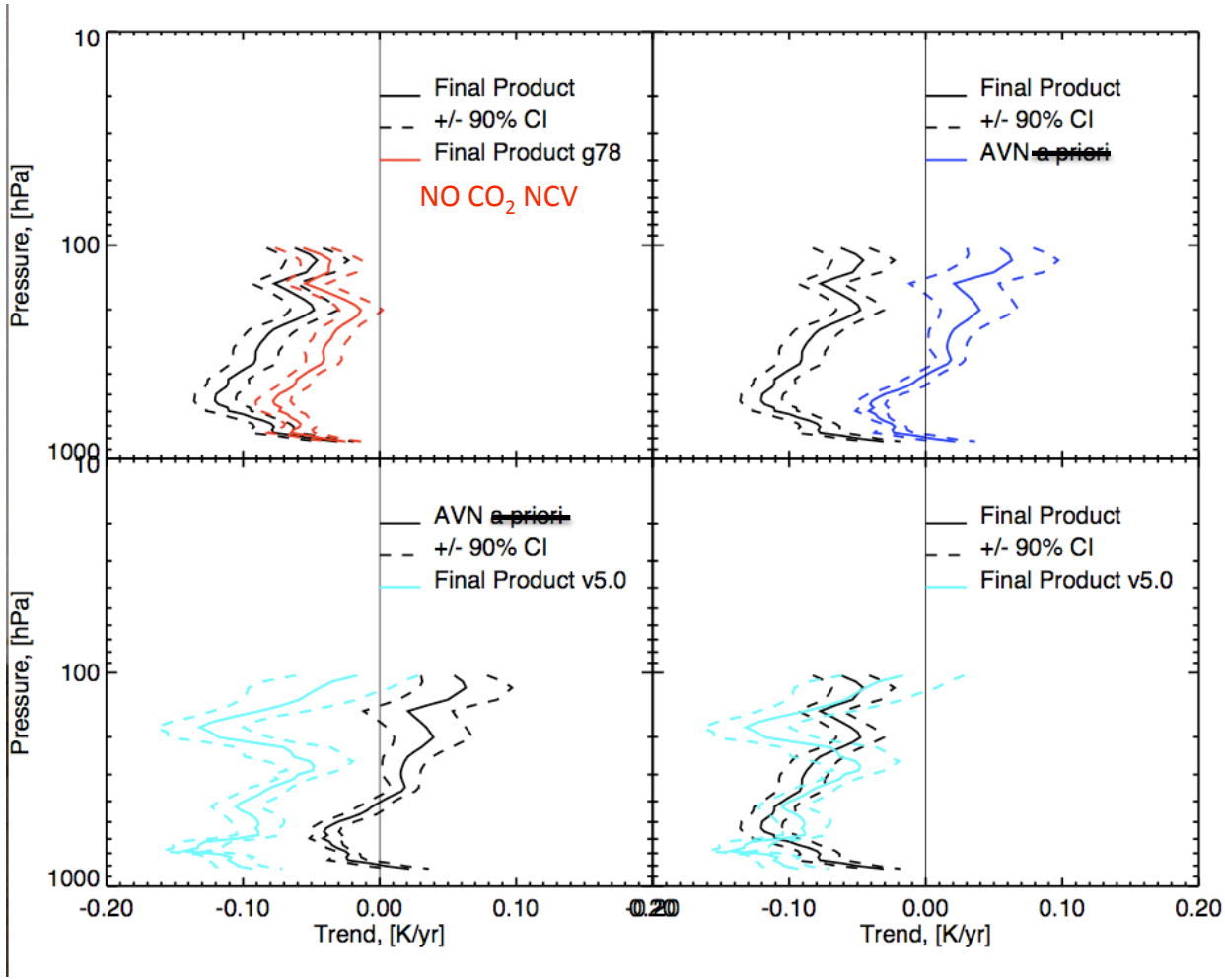
George Aumann, Eric Fetzer, Evan Fishbein, Steve Friedman,
Bjorn Lambrigtsen, Sung-Yung Lee, Evan Manning, Ed Olsen, Joao Teixeira
Jet Propulsion Laboratory, California Institute of Technology

Comparisons of trends in AIRS V5 (Final and MW products), AVN and ECMWF to sonde temperatures

Courtesy of Eric Maddy

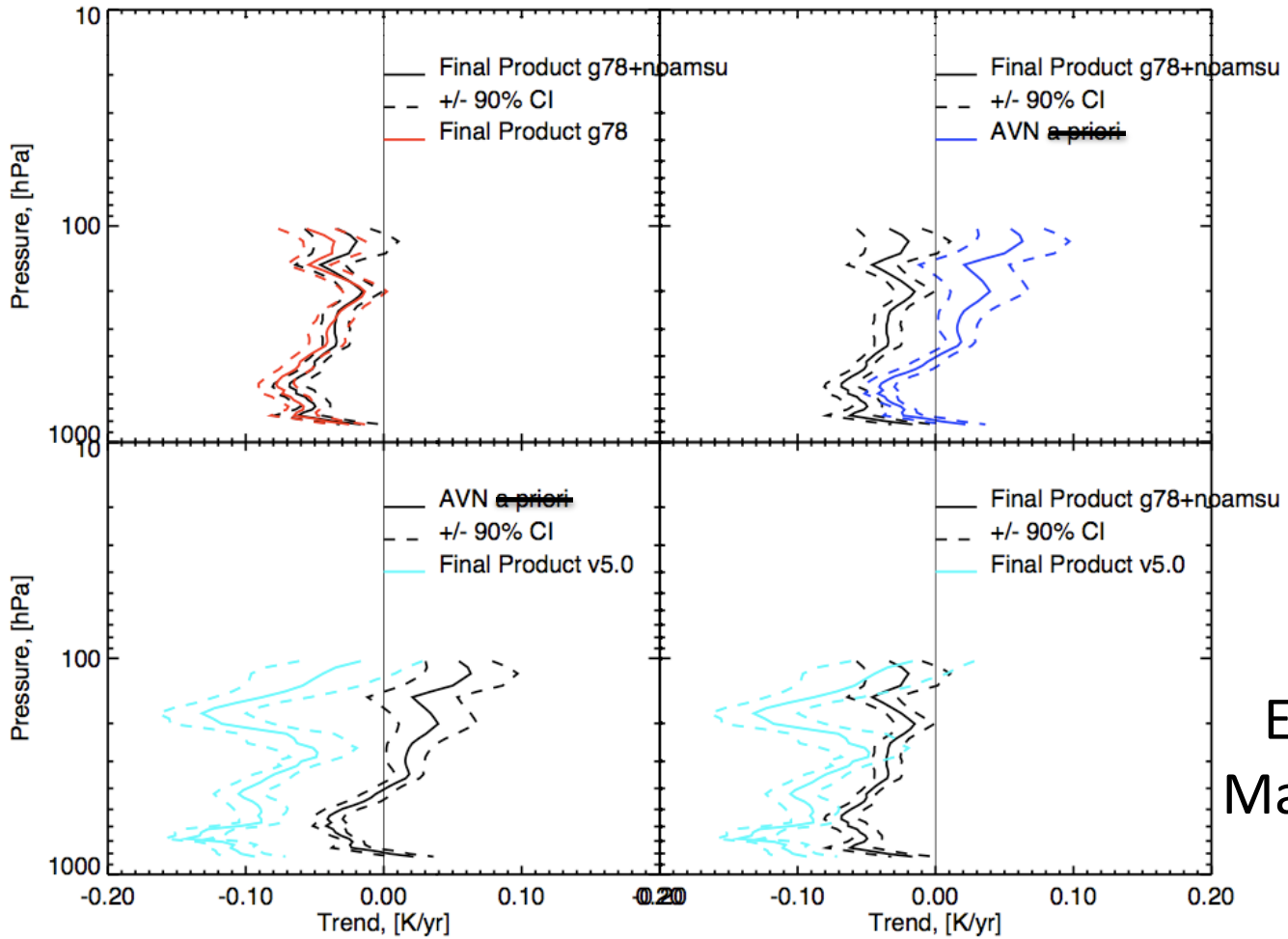


V5.0.14 + AVN Tq a priori + CarbonTracker CO_2 + no AMSU + CO_2 noise covariance matrix ON



Eric Maddy

V5.0.14 + AVN Tq a priori + CarbonTracker CO_2 + no AMSU + CO_2 noise covariance matrix OFF

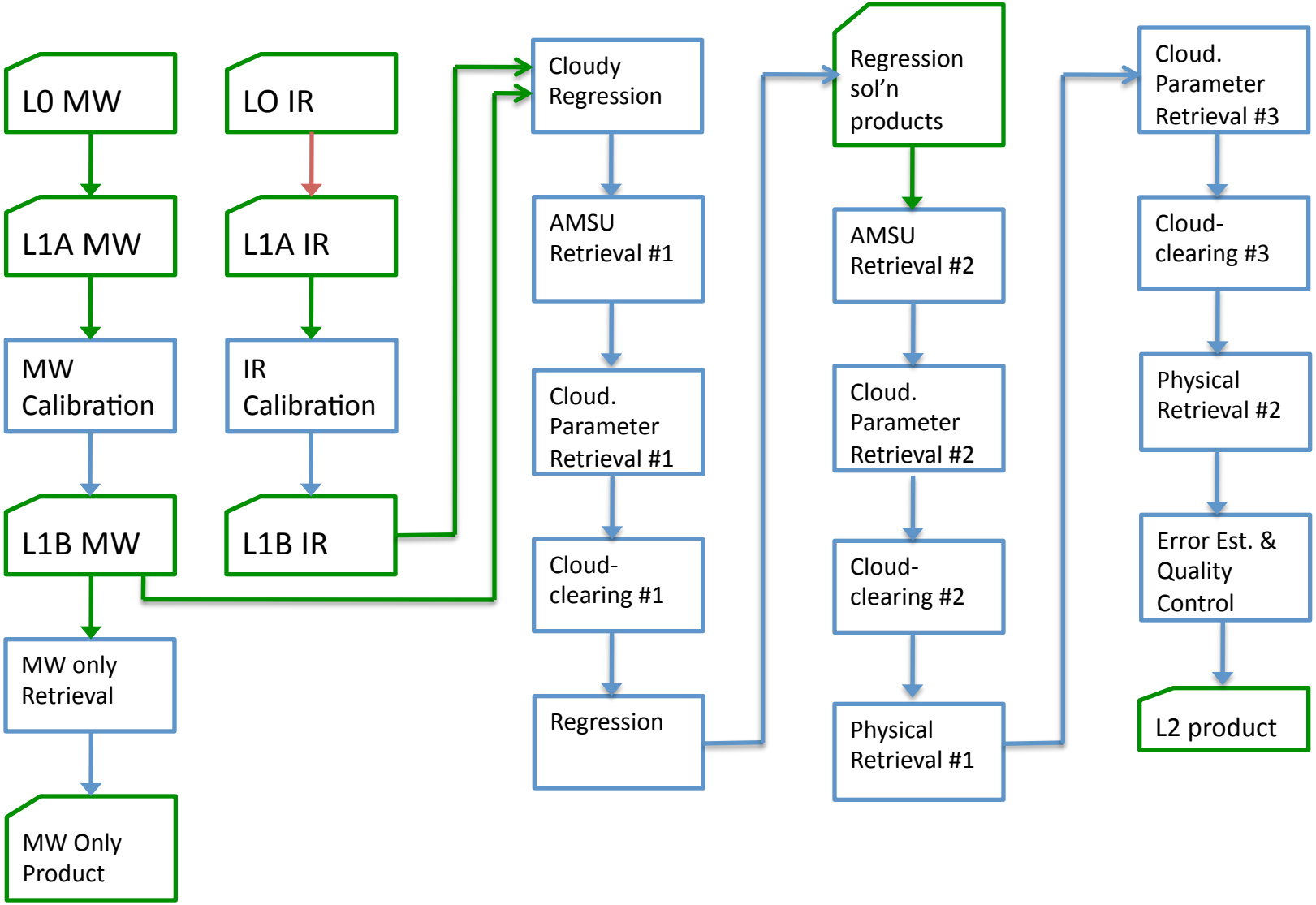


Eric Maddy

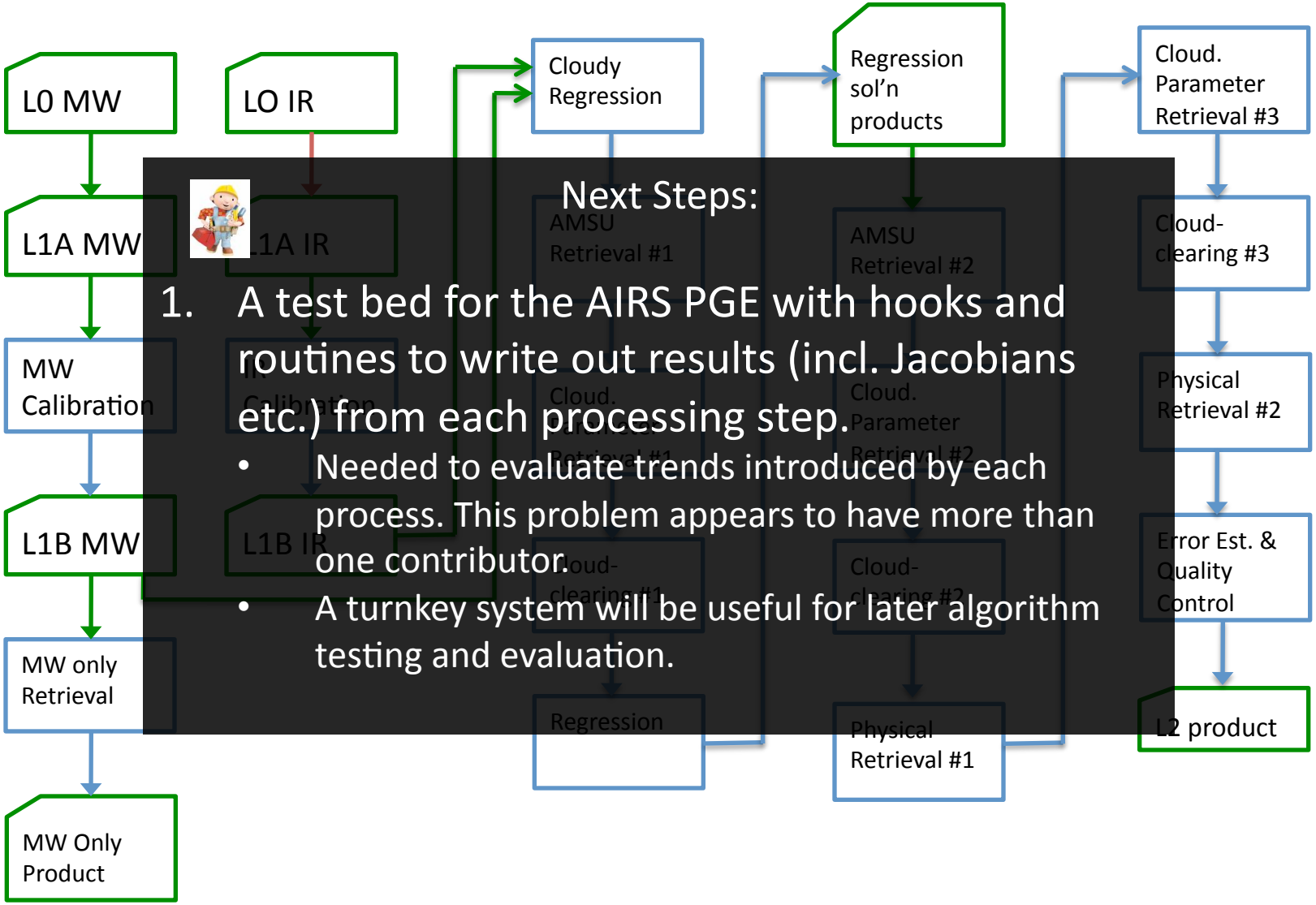
What do we know?

- V5.0.14 shows a time dependent bias w.r.t. sondes ~ -100mK yr^{-1}; similar results against ECMWF
- Microwave only retrievals show a lesser, but still significant bias ~ -50mK yr^{-1}
- Switching to Carbon Tracker CO_2 plus AVN Tq a priori with CO_2 NCV helps at 200 mb and boundary layer, but little difference in between
  - Turning CO_2 NCV off brings bias rate down to ~ -50mK yr^{-1}

AIRS Retrieval System



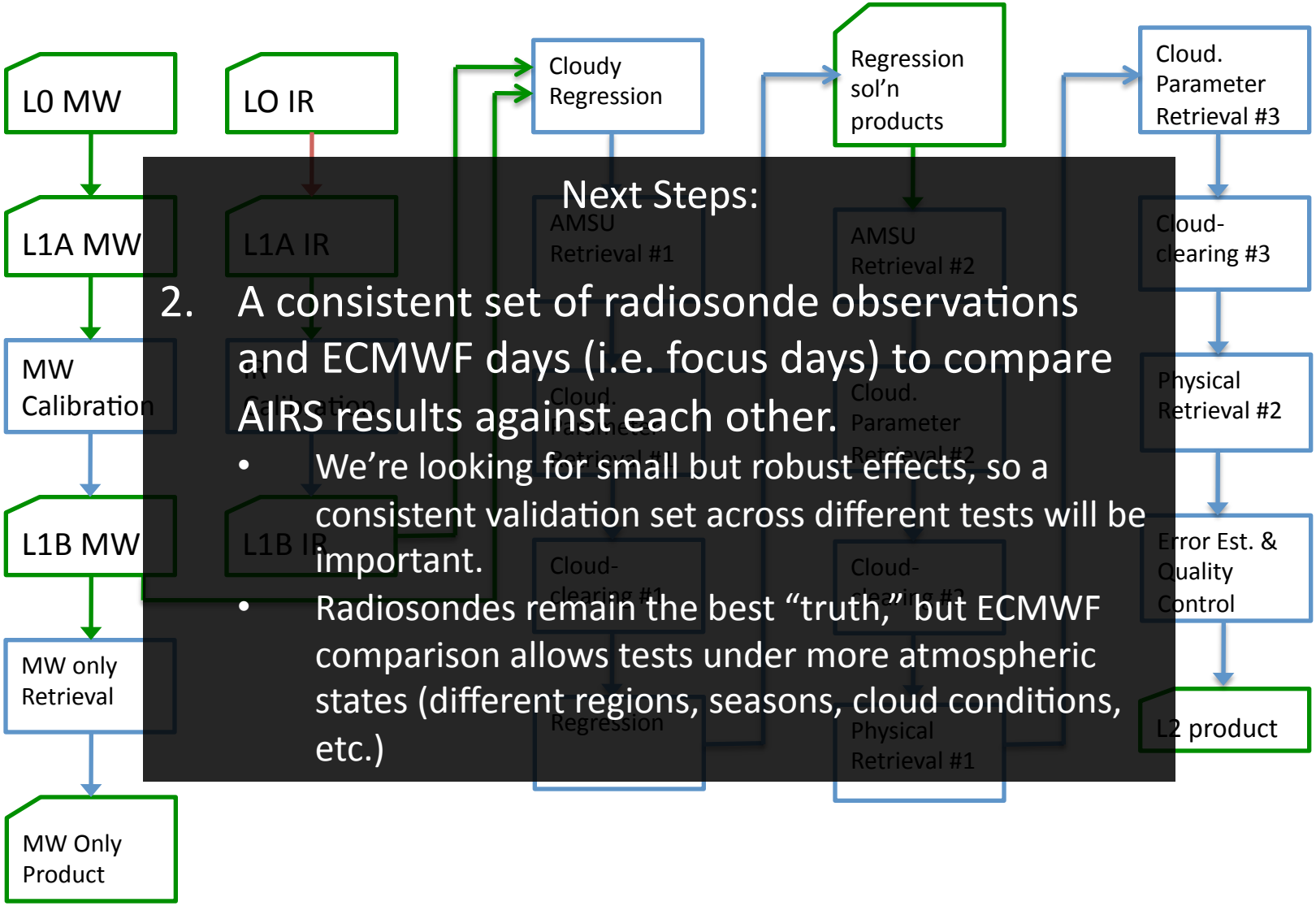
AIRS Retrieval System



Next Steps:

1. A test bed for the AIRS PGE with hooks and routines to write out results (incl. Jacobians etc.) from each processing step.
   - Needed to evaluate trends introduced by each process. This problem appears to have more than one contributor.
   - A turnkey system will be useful for later algorithm testing and evaluation.

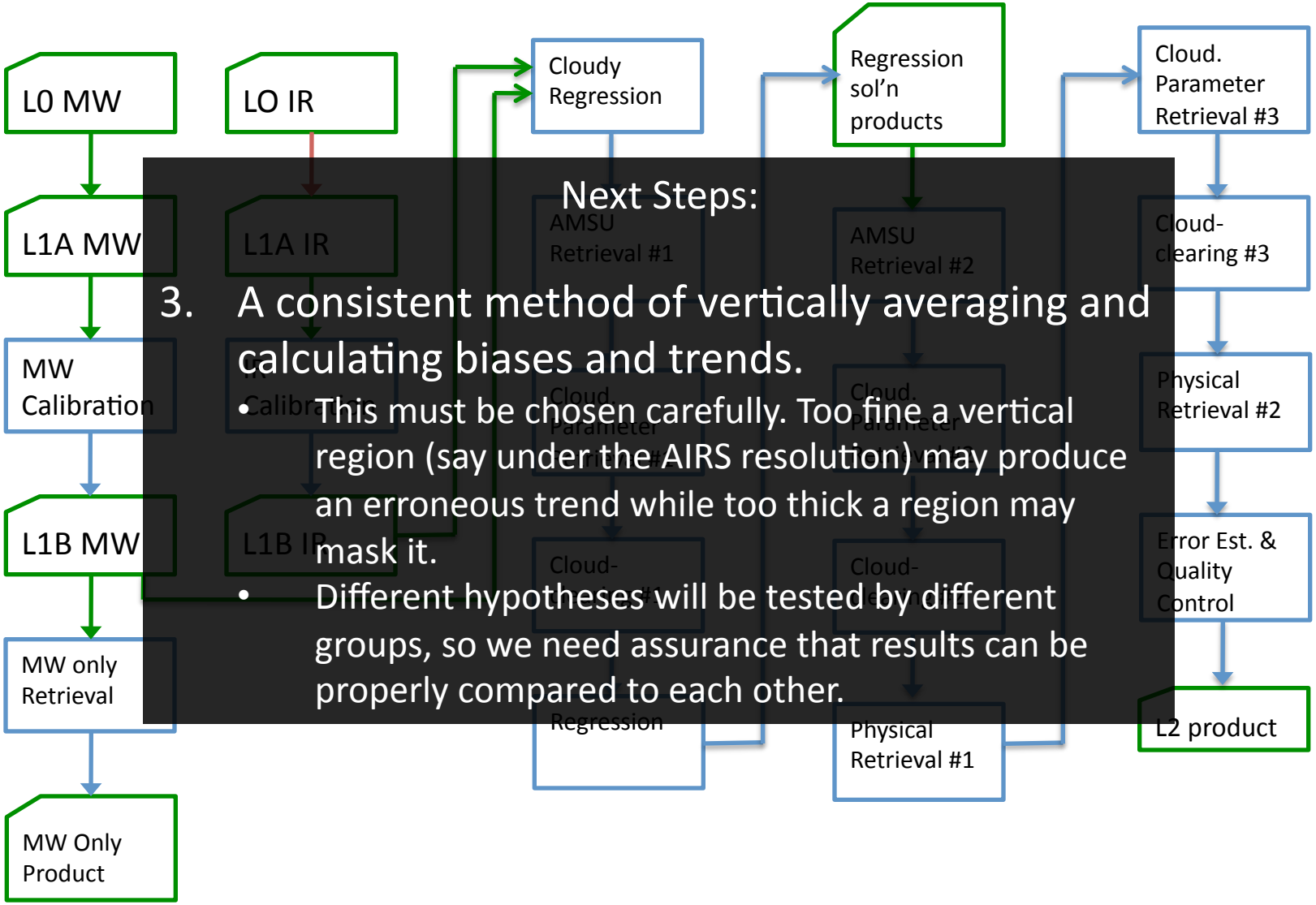
AIRS Retrieval System



Next Steps:

2. A consistent set of radiosonde observations and ECMWF days (i.e. focus days) to compare AIRS results against each other.
   - We're looking for small but robust effects, so a consistent validation set across different tests will be important.
   - Radiosondes remain the best "truth," but ECMWF comparison allows tests under more atmospheric states (different regions, seasons, cloud conditions, etc.)

AIRS Retrieval System



Next Steps:

3. A consistent method of vertically averaging and calculating biases and trends.
   - This must be chosen carefully. Too fine a vertical region (say under the AIRS resolution) may produce an erroneous trend while too thick a region may mask it.
   - Different hypotheses will be tested by different groups, so we need assurance that results can be properly compared to each other.

Discussion