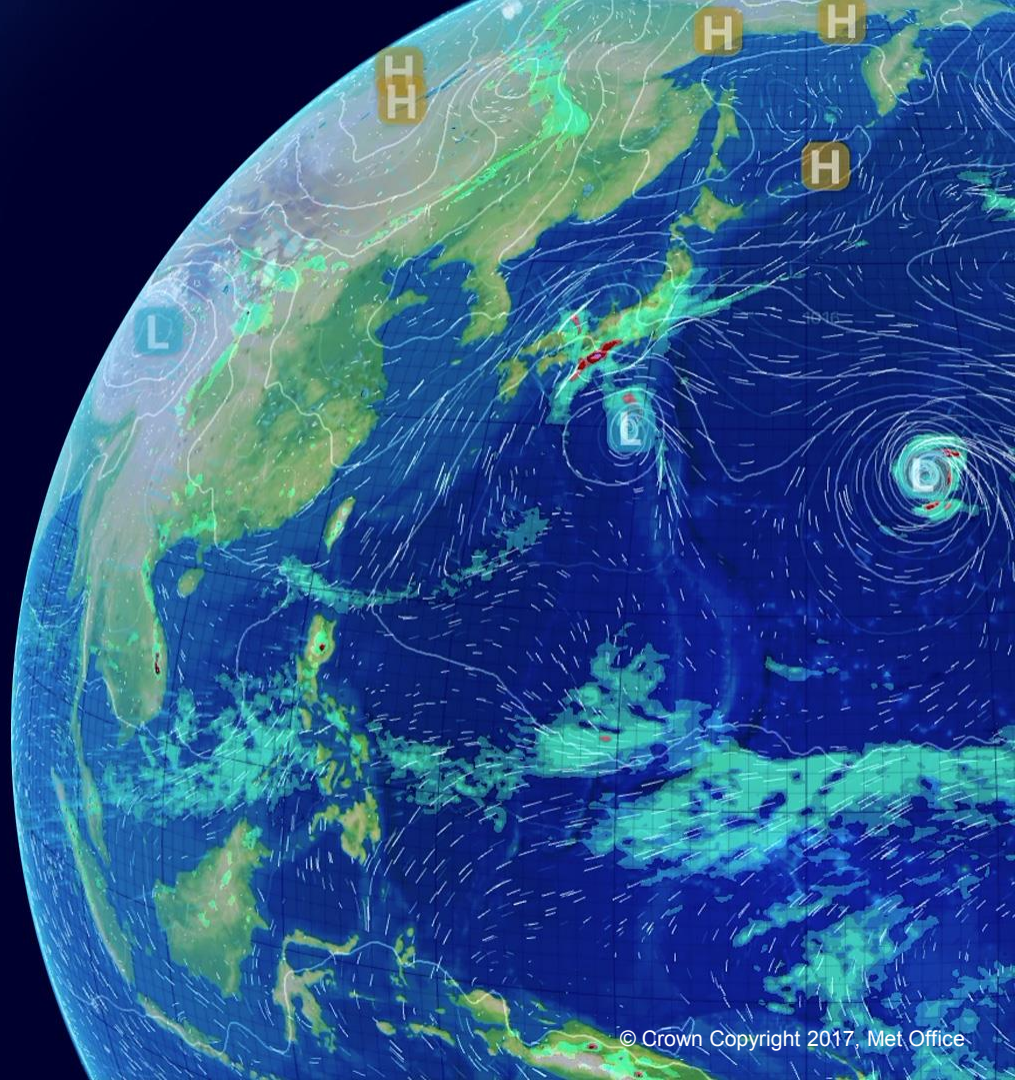


# WGNE-PDEF Initial tendency intercomparison project

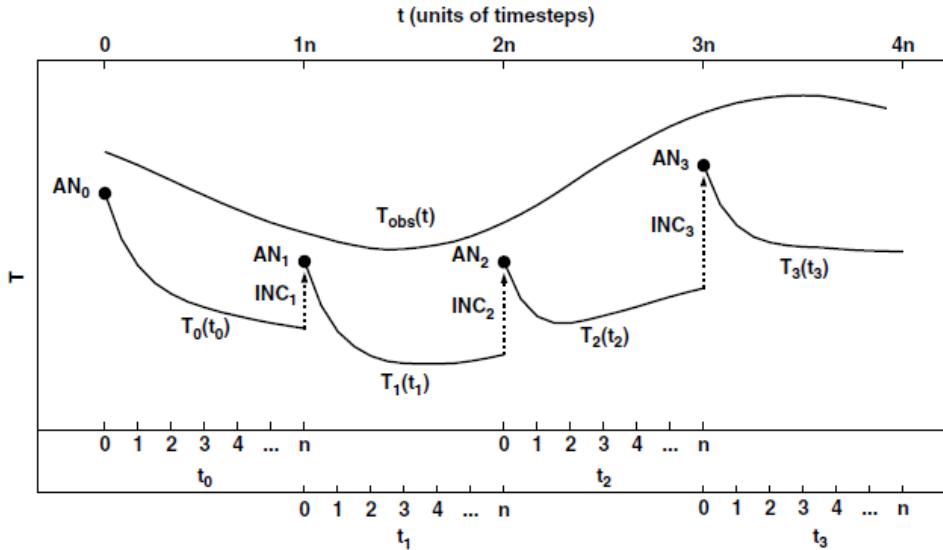
Keith Williams

24/09/19



**Met Office** Based on Klinker and Sardeshmukh (1992) and Rodwell and Palmer (2007)

Schematic diagram showing the data assimilation / forecast cycle

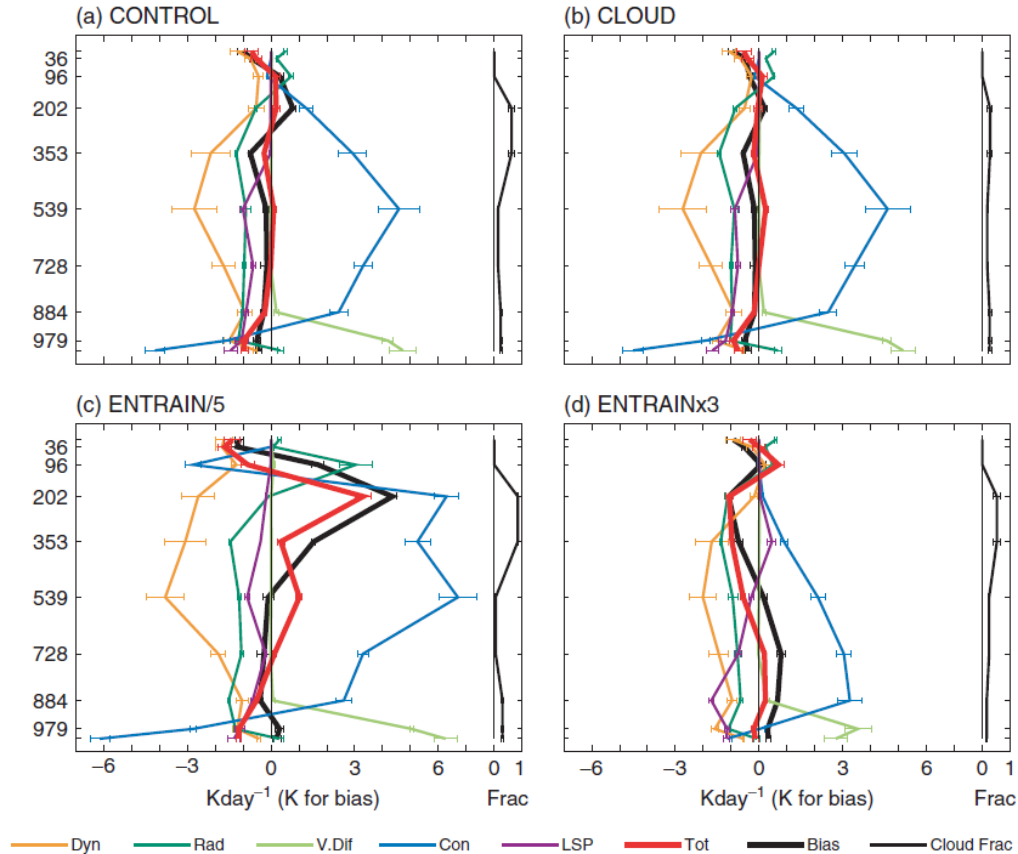


- If the model has a bias, then these ‘analysis increments’ should have a systematic component which will act against this bias.
- Over a large number of forecasts, the initial tendency in the forecast should be the negative of the analysis increment.
- By examining modelled process tendencies (“initial tendencies”), it may be possible to identify which process(es) represented (or possibly not represented) within the model cause(s) this bias.
- By having more models involved, it may be easier to identify which schemes display the more significant differences between models in terms of their tendencies.

Copied from Rodwell and Palmer (2007)



# Met Office Initial tendencies from different physics



Copied from Rodwell and Palmer (2007)

# Met Office Proposed experiment & diagnostics

- 6 hour forecast cycles for two seasons: DJF 2018/19 and JJA 2019.
- Diagnostics for forecast lead times up to 24 hours are requested (to compare total tendency with day-1 bias).
- 6-hour 3D tendencies of T, q, u & v. (6hr in order to ensure that the diurnal cycle is sampled and that errors are growing in a sufficiently linear manner. The proposal is to ignore the first timestep as many models do something different on that timestep and we want to investigate the routine physics/dynamics evolution.)
- Global data to be submitted in CF-compliant netCDF format.
- Initial focus for the subsequent analysis will be on regions where model performance is known to differ and many models struggle (Southern Ocean, Maritime Continent, subtropical stratocumulus regions, etc.).

# Met Office Proposed tendency diagnostics

- Dynamics (T, q, u, v)
- SW radiation (T, q)
- LW radiation (T, q)
- Convection (T, q, u, v)
- Microphysics/large-scale precipitation (T, q)
- Boundary layer (T, q, u, v)
- Gravity wave drag (u, v)
- Miscellaneous (if the above don't add to the total e.g. corrections, stochastic physics) (T, q, u, v)
- Total (T, q, u, v)

Also requesting a metadata text file providing further information on what exactly is within each component tendency

# Met Office Questions

- Which modelling centres are interested in participating in this activity?
- Most centres only output tendencies from schemes on models levels, but any kind of intercomparison needs to use pressure levels. Are centres able to submit the tendencies on pressure levels or should this be done as part of the analysis?
- Proposal is to ignore first timestep (so request diagnostics for T+1\_timestep & T+6\_hours+1\_timestep). Is this a problem for anyone?
- Is the proposed scheme breakdown sensible?
- For data volume reasons, only seasonal mean diagnostics requested so can't undertake flow-dependent analysis etc. Is this a problem? (If it is then could anyone offer data storage?).
- When should the deadline for submission be?
- Any other feedback on the protocol?