MUMIP Meeting

February 2024

Cycle48 OIFS SCM

- New release with radiation fixes
- Installation on JASMIN. Inconveniences (envs issues → loads of mails/time)
- TESTING

Currently, it's not sufficiently reliable to work with!

(as of Monday)

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FIXED

SCMtiles

- Initial conditions script from DKRZ files 2D (z,t) → 4D (x,y,z,t)
  - Missing variables: TKE, albedo (emissivity, z0q/h)
  - Interpolation & padding
  - Current estimate of file size: 6-8 GB per day just for inits

- Installation locally in Oxford

→ JASMIN installation planned, as SCM doesn't run properly ~~not~~ yet useful

FIXED

Budgets IFS

- Note: budgets show that spin-up in e.g. BL for test case (ARMCU) is slightly affected by dt
- Test in 3 settings:

- forcing by SST
- forcing by fluxes
- forcing by both flags True

$$T = D + P$$

$$\int T\,dt = \int (D + P)dt$$

$$\phi(t) = \varphi_0 + \int T\,dt = \varphi_0 + \int (D + P)dt\,(+Res.)$$

Task: reconstruct initials back from state and acc. tendencies

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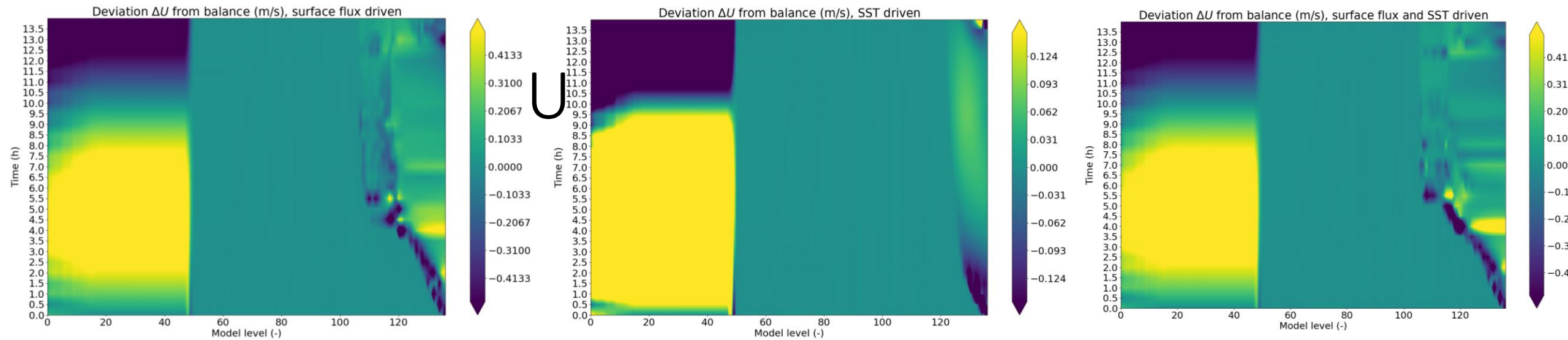
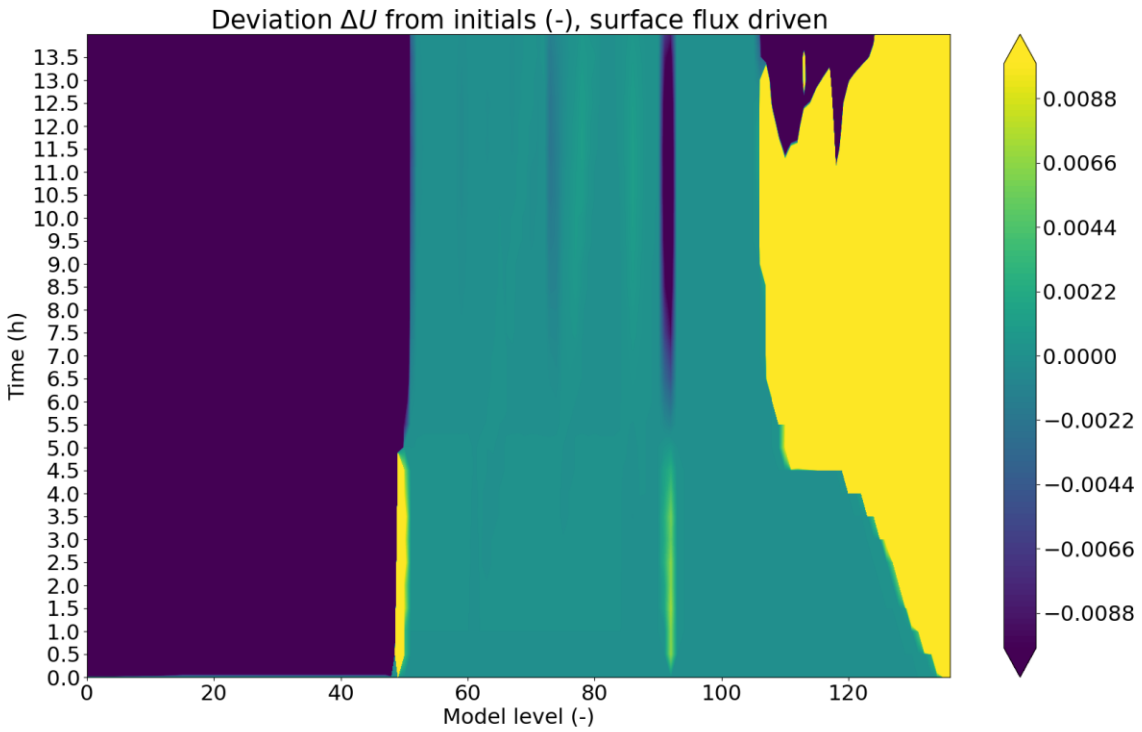
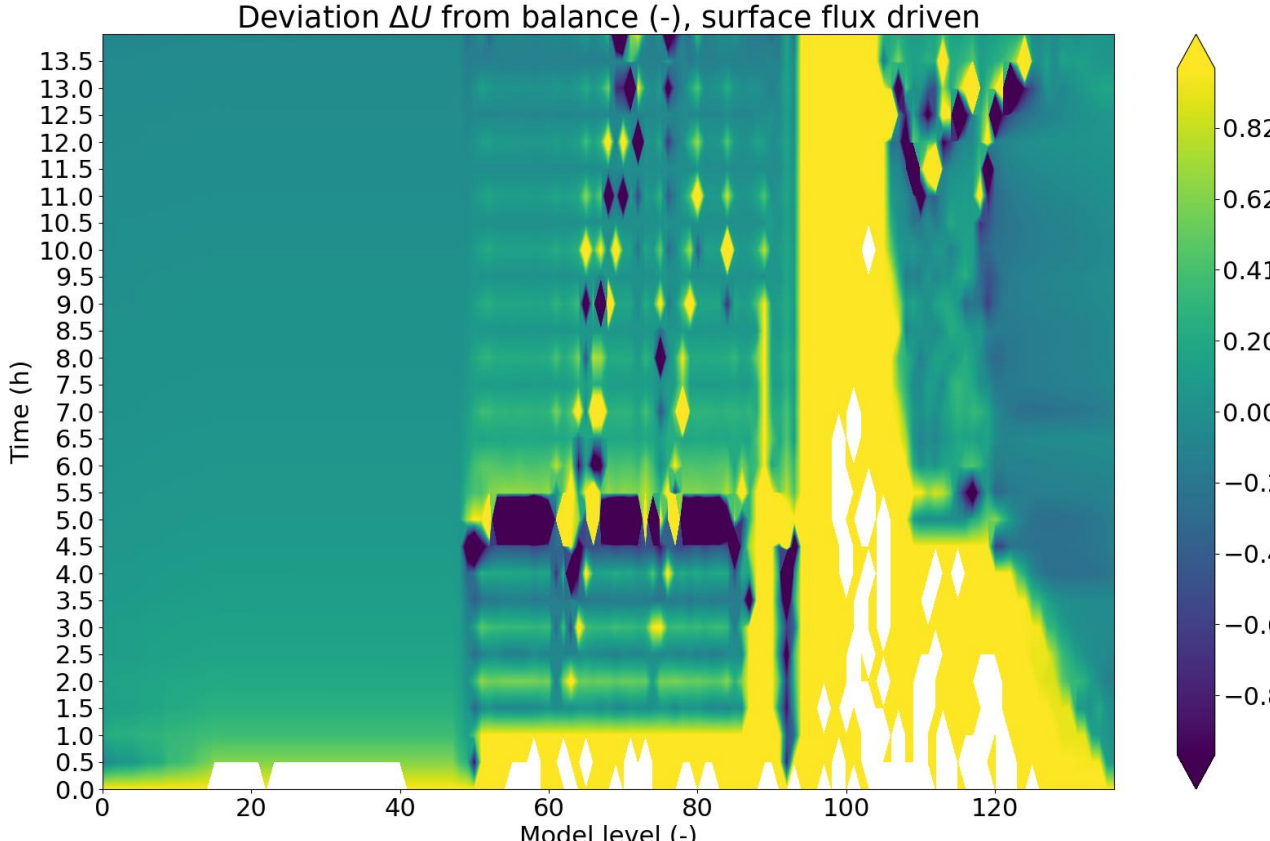
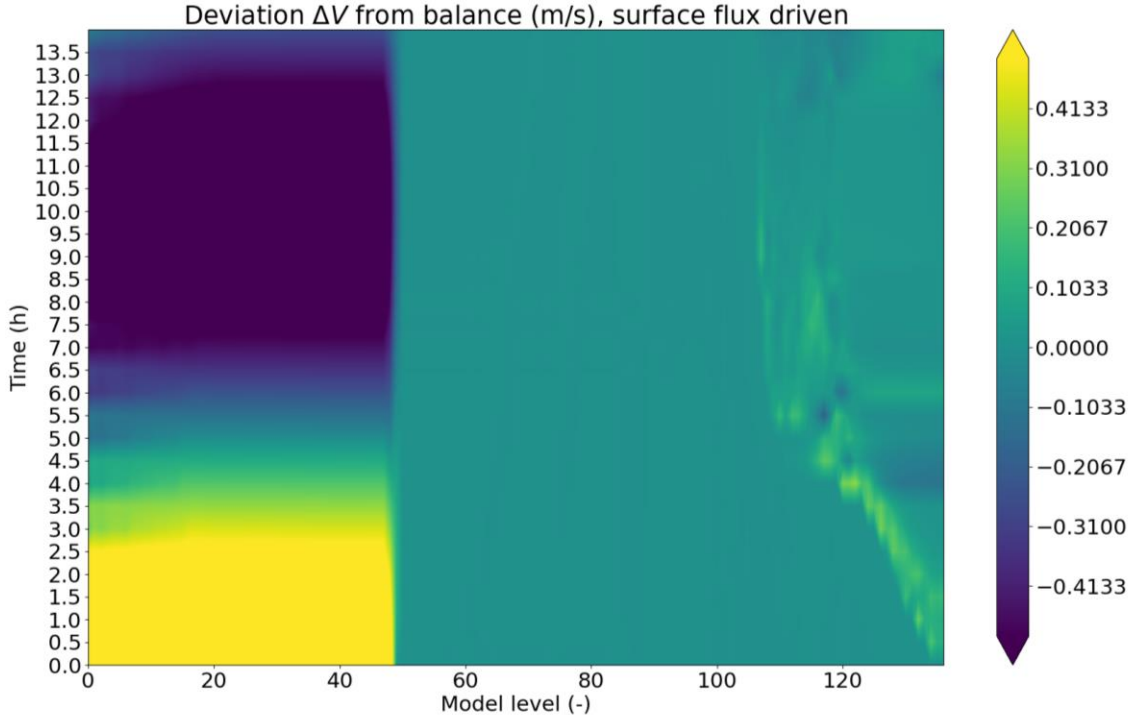
Task: reconstruct initials back from state and acc. tendencies

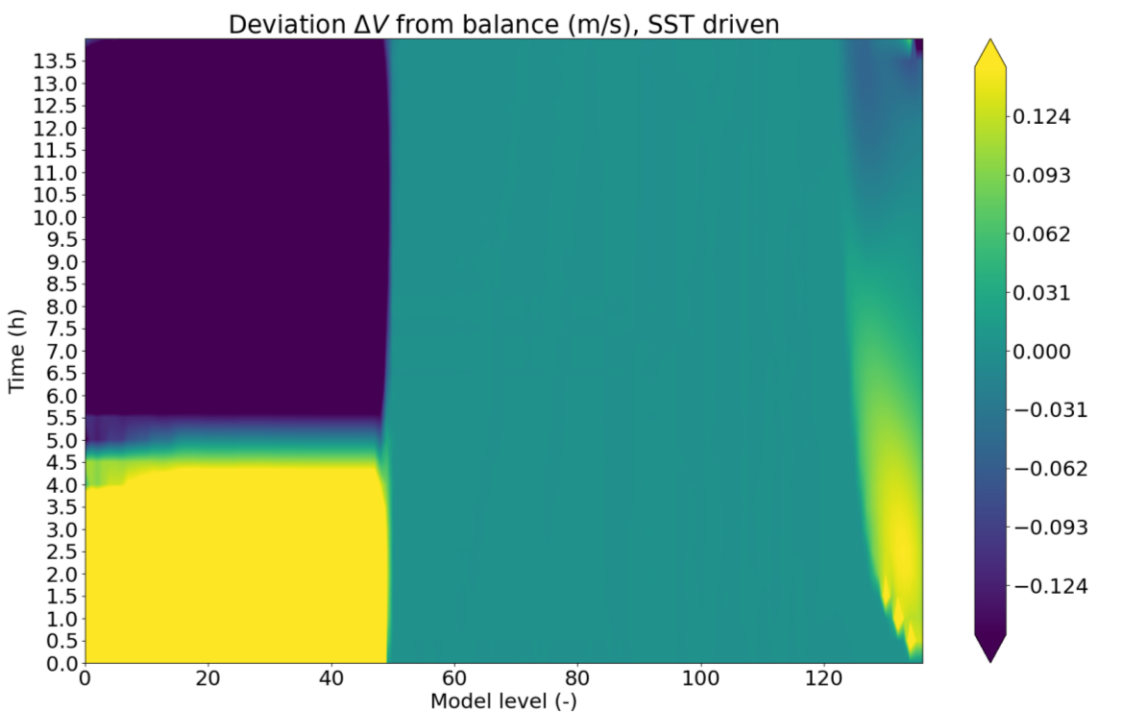

Deviation ΔU from balance (m/s), surface flux driven
Deviation ΔU from balance (m/s), SST driven
Deviation ΔU from balance (m/s), surface flux and SST driven
Time (h)
Model level (-)

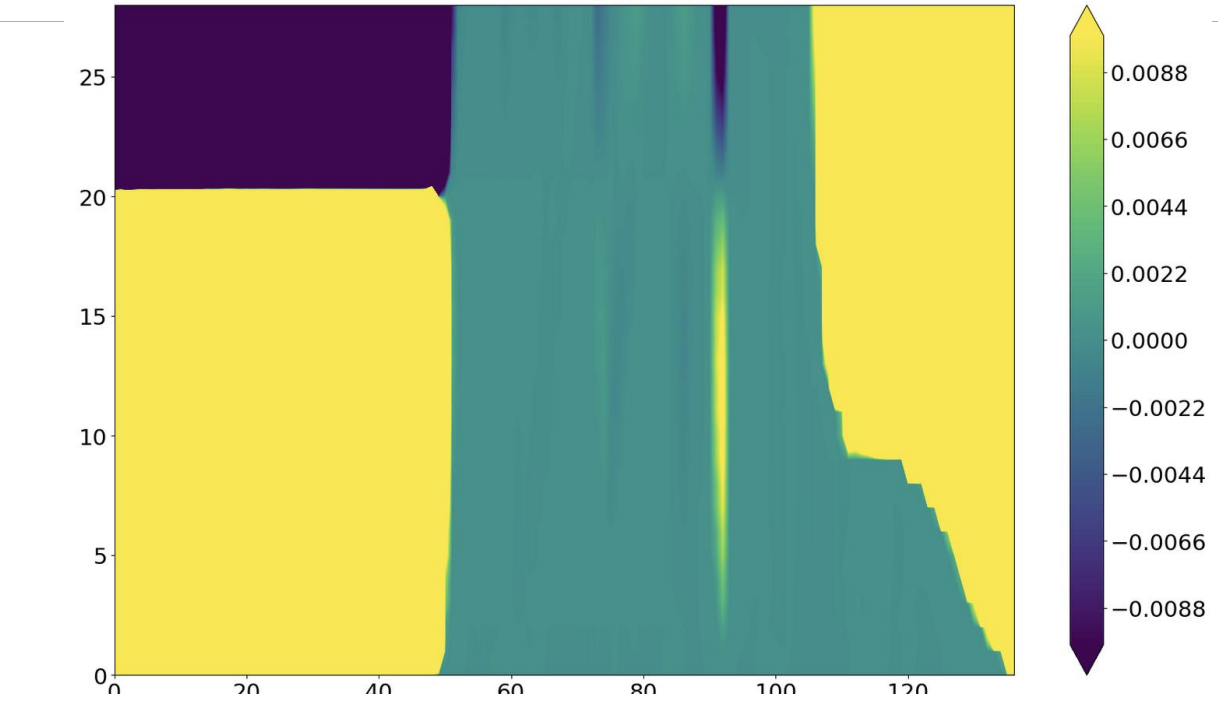

Deviation ΔU from initials (-), surface flux driven
Time (h)
Model level (-)

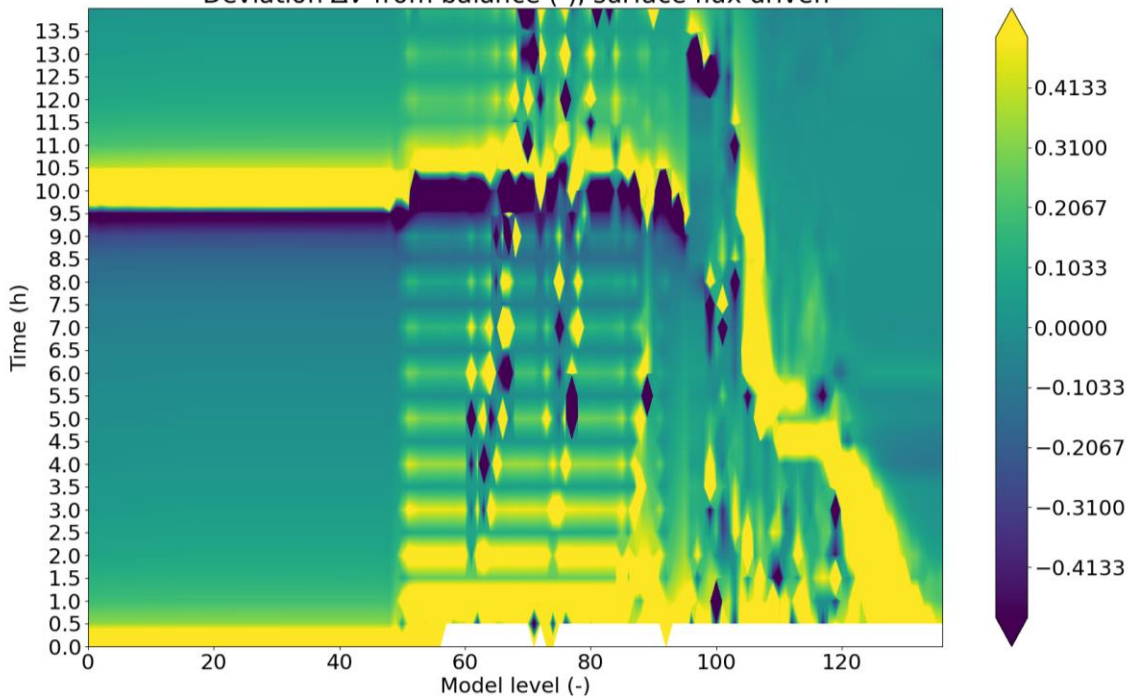

Deviation ΔU from balance (-), surface flux driven
Time (h)
Model level (-)

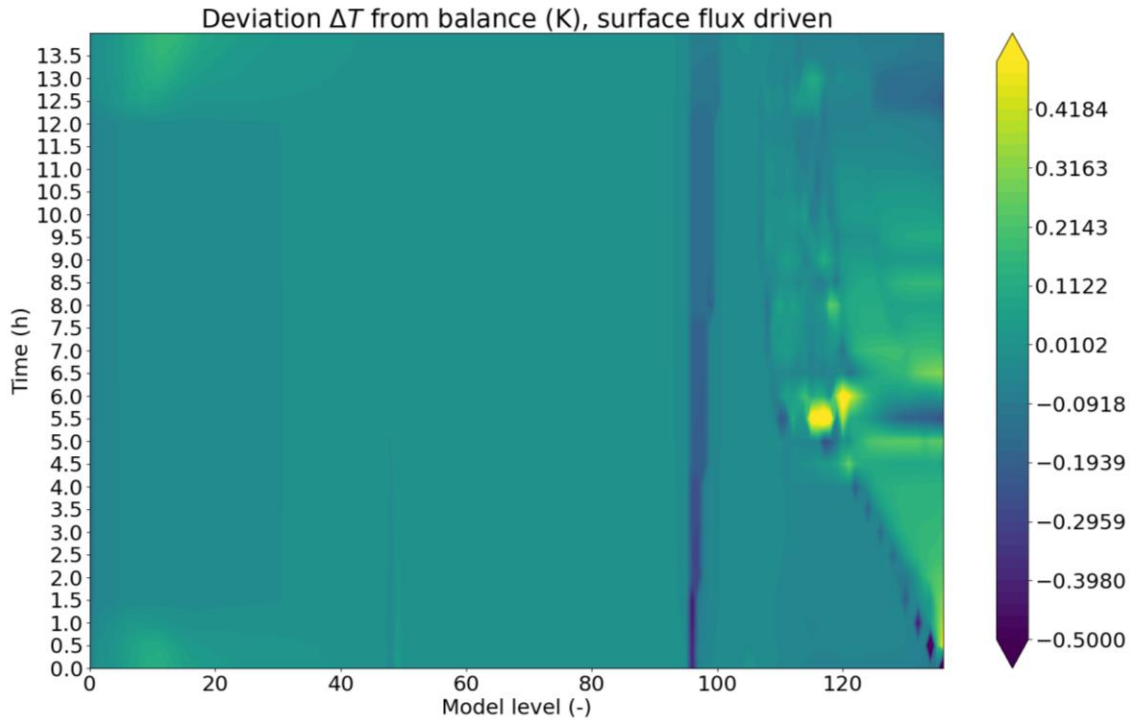

Deviation ΔV from balance (m/s), surface flux driven
Time (h)
Model level (-)
0.4133
0.3100
0.2067
0.1033
0.0000
−0.1033
−0.2067
−0.3100
−0.4133

V

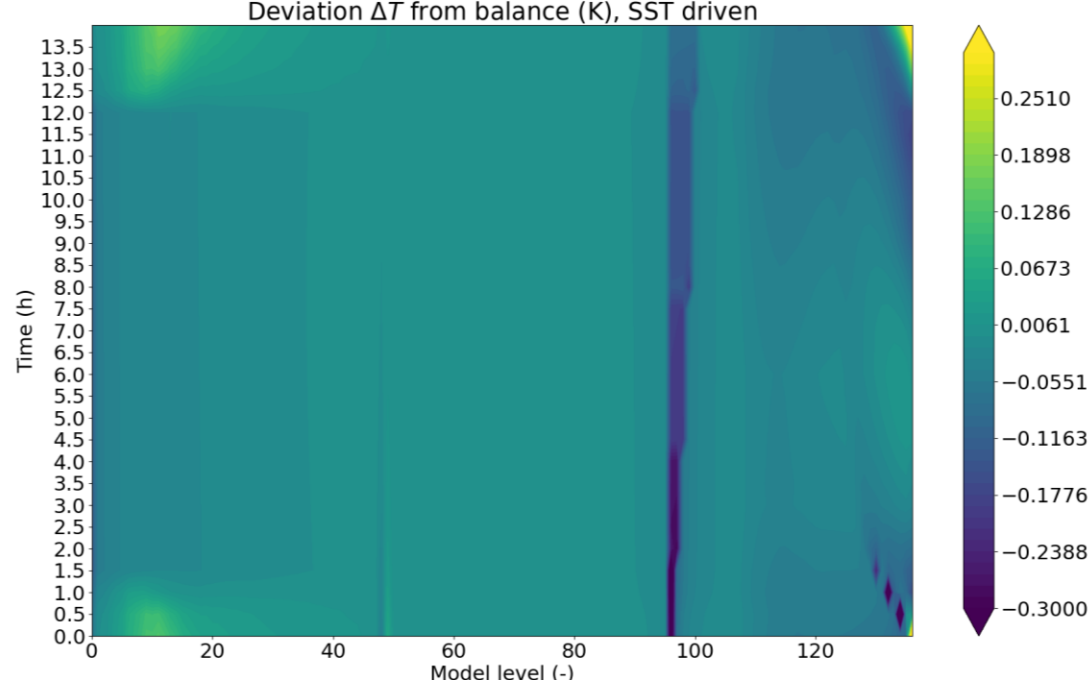

Deviation ΔV from balance (m/s), SST driven
Time (h)
Model level (-)
0.124
0.093
0.062
0.031
0.000
−0.031
−0.062
−0.093
−0.124

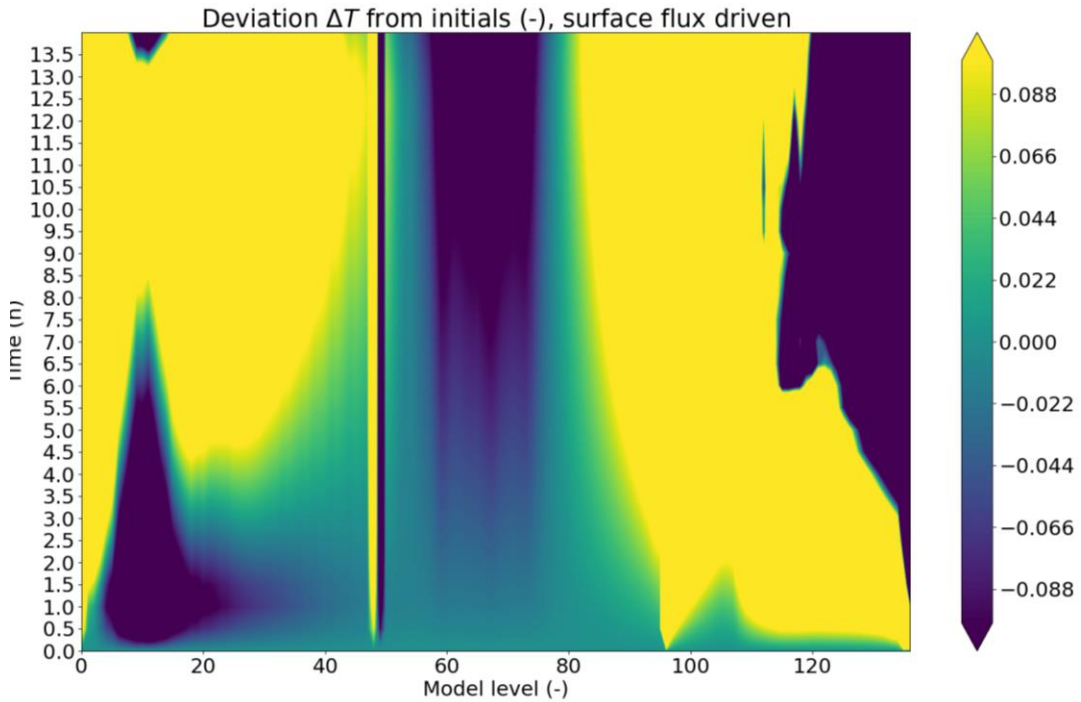

0.0088
0.0066
0.0044
0.0022
0.0000
−0.0022
−0.0044
−0.0066
−0.0088

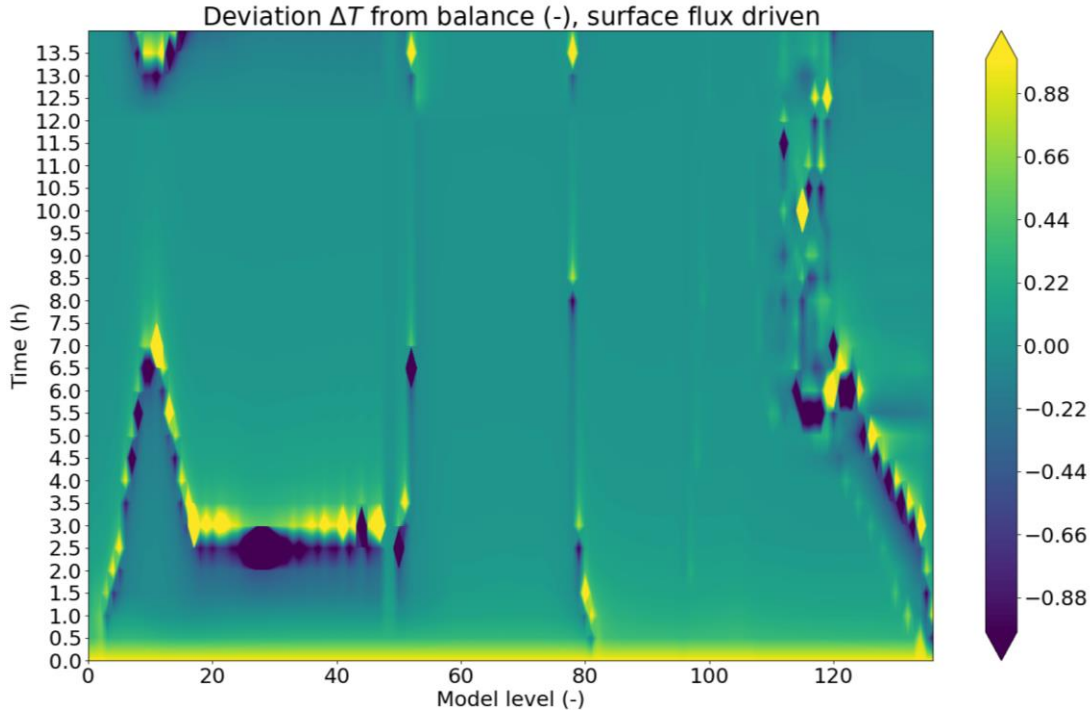

Deviation ΔV from balance (-), surface flux driven
Time (h)
Model level (-)
0.4133
0.3100
0.2067
0.1033
0.0000
−0.1033
−0.2067
−0.3100
−0.4133

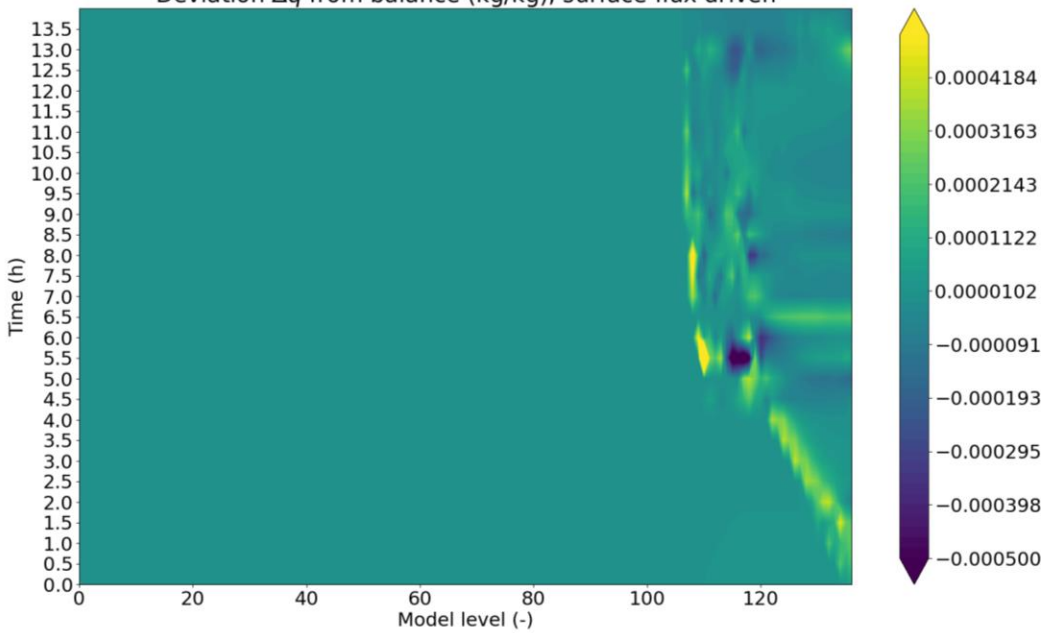

Deviation ΔT from balance (K), surface flux driven
Time (h)
Model level (-)
0.4184
0.3163
0.2143
0.1122
0.0102
−0.0918
−0.1939
−0.2959
−0.3980
−0.5000

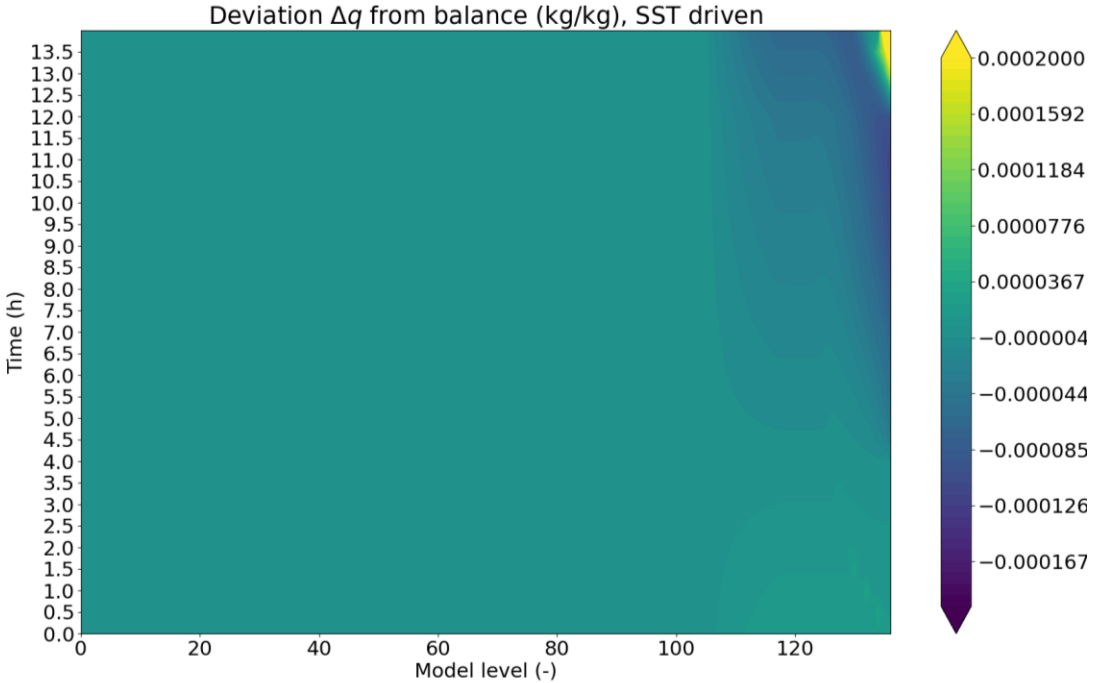
T

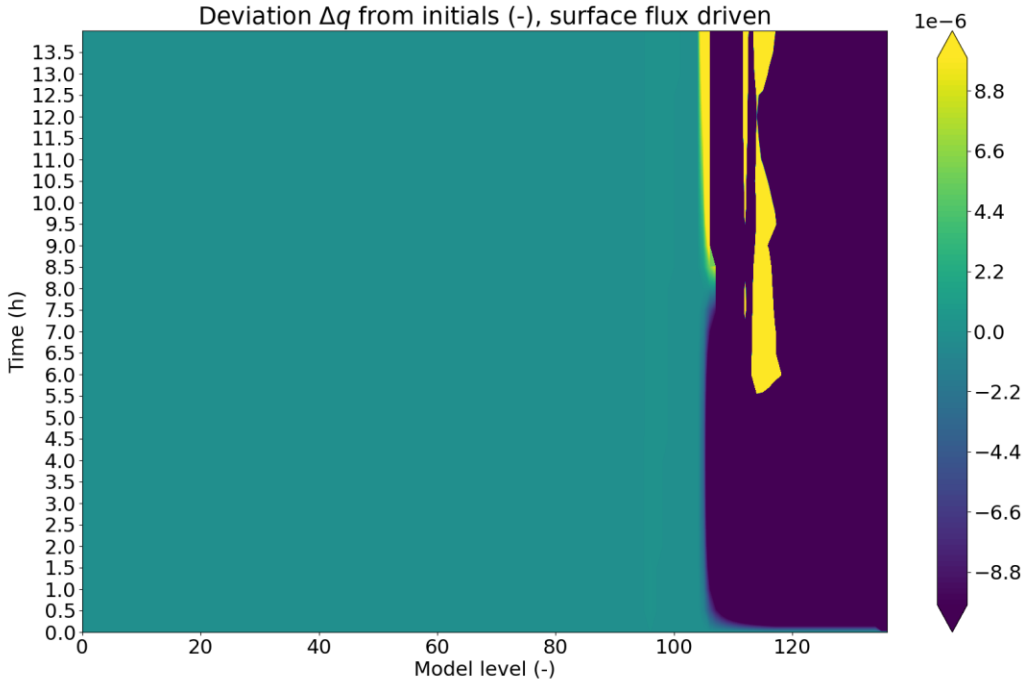

Deviation ΔT from balance (K), SST driven
Time (h)
Model level (-)
0.2510
0.1898
0.1286
0.0673
0.0061
−0.0551
−0.1163
−0.1776
−0.2388
−0.3000

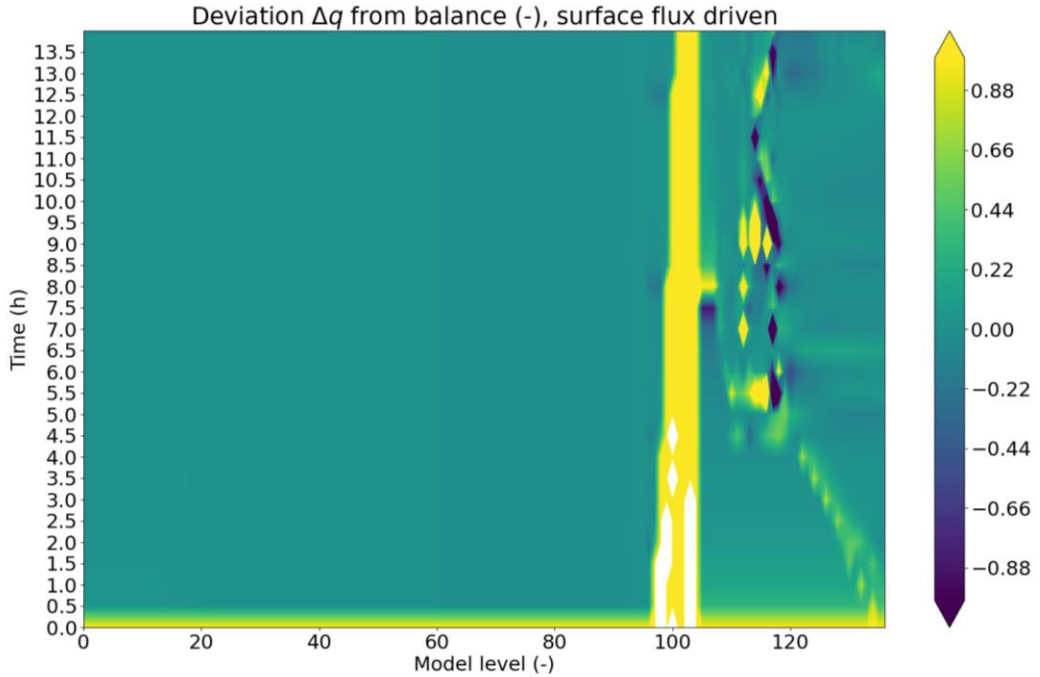

Deviation ΔT from initials (-), surface flux driven
Time (h)
Model level (-)
0.088
0.066
0.044
0.022
0.000
−0.022
−0.044
−0.066
−0.088


Deviation ΔT from balance (-), surface flux driven
Time (h)
Model level (-)
0.88
0.66
0.44
0.22
0.00
−0.22
−0.44
−0.66
−0.88


Deviation Δq from balance (kg/kg), surface flux driven
Time (h)
Model level (-)
0.0004184
0.0003163
0.0002143
0.0001122
0.0000102
−0.000091
−0.000193
−0.000295
−0.000398
−0.000500


Deviation Δq from balance (kg/kg), SST driven
Time (h)
Model level (-)
0.0002000
0.0001592
0.0001184
0.0000776
0.0000367
−0.000004
−0.000044
−0.000085
−0.000126
−0.000167


Deviation Δq from initials (-), surface flux driven
1e−6
Time (h)
Model level (-)
8.8
6.6
4.4
2.2
0.0
−2.2
−4.4
−6.6
−8.8


Deviation Δq from balance (-), surface flux driven
Time (h)
Model level (-)
0.88
0.66
0.44
0.22
0.00
−0.22
−0.44
−0.66
−0.88

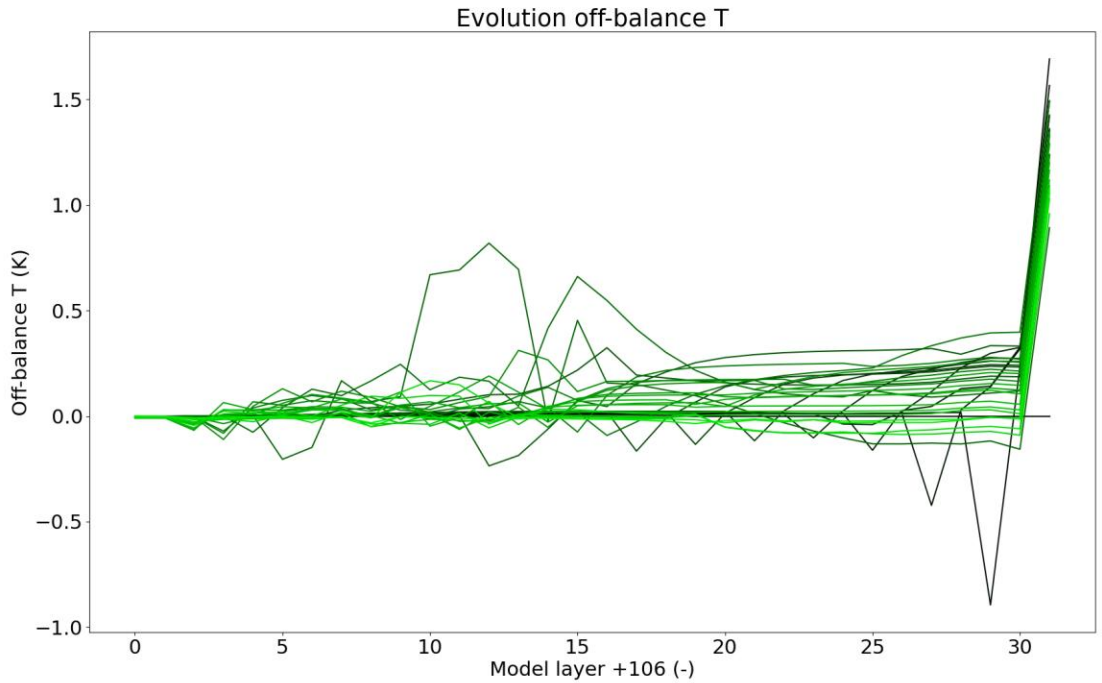
Q

Budget deviations

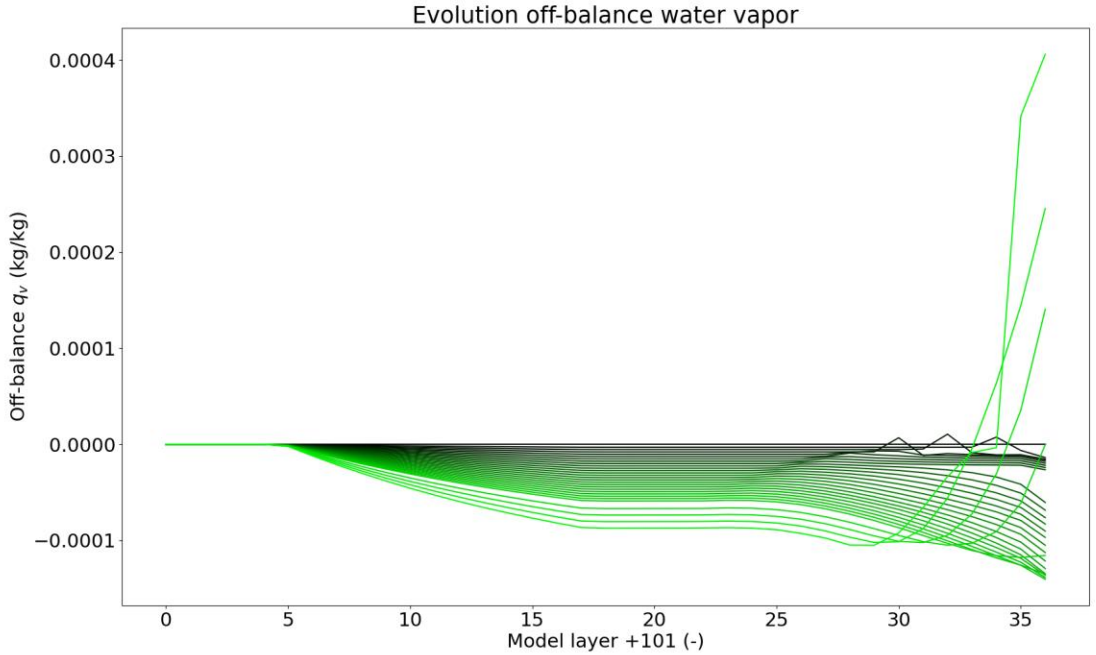
Flags such as semi-lagrangian averaging affect tendencies

- For a number of flags, the model breaks if I try to investigate their role in budget closure

Flux driven



SST driven



Summary

- Budget closes relatively well

But: energy constraints + numerical diffusion?

- Ekman spiralling?
- Aliasing onto different layers (in particular BL-top; free troposphere, affected by e.g. S-L-Avg)
- Padding regions have residuals
- Closure of near-zero regions can’t be tracked very well