

Response to second review from Anonymous referee #2:

We thank the reviewer for their further constructive feedback.

Please find below our response to the reviewer's comments. Text shown in bold indicates the new text that has been added to the manuscript.

1) I think the authors can embed the new outlook paragraph a bit better in the existing text. For example line 444. This sentence indicates future possibilities investigating the fate of evapotranspiration. This could act as a nice bridge to the next paragraph on recent developments on the land-surface model.

The new outlook paragraph has been slightly re-arranged and the connection to the next paragraph has been improved as suggested.

2) Repeating or stating the definition of ocean sourced precipitation (precipitation having its evaporative origin (source) over the ocean) would benefit the interpretation of the work. The added sentence on the interpretation of Figures 5-7 is very useful.

We have expanded the following sentence in section 2.3, to define ocean-sourced precipitation:

The scaled-flux tracers, as proposed by Fiorella et al. (2021) and illustrated in appendix A, are implemented following the approach of G24 which focusses only on precipitation that has its evaporative source over the open ocean ('ocean-sourced precipitation').

3) I appreciate the additional Appendix A to clarify the conceptual approach of the scaled-flux tracers. However, it also raises a few questions on how to align the notation in the Appendix with the notation in the methodology:

a. As mentioned in the response to the review the variables should have multiple indices $q(i,j,k,t)$, but that this is not applied in Figure A1 to make it more legible. That is fine but then I would put a remark noting this in the caption of figure A1. Further, I would also add a comma between $X(i,j)$ in Figure A1 to avoid confusion.

The index (ij) has been changed to (i,j) and the following has been added to the caption:

All fields have multiple indices, but to reduce complexity, the only indices shown are (i,j) which indicate the surface grid box at the time of evaporation.

b. In Figure A1 E_{wt} is determined by $X(ij)E(ij)$ while in equation (4) in the main text E_{wt} is a product of the scaling factor with evaporation ($E_{wt} = SF(i,j,t,i_{wt})E(i,j,t)$), which is not the same? It seems more logic to multiply evaporation with a scaling factor then a source property?

We have changed figure A1 so that $X(i,j)$ is replaced $SF(i,j)$ to be more consistent and added the following to the caption:

$SF(i,j)$ is the scaling factor which here equals the source property that is being tracked (e.g. latitude, longitude, SST), which is scaled to be between 0 and 1 as shown in Eq. (5).

We have also added a delta sign to the surface water vapour term to indicate this is a change in water vapour caused by the evaporation.

Updated figure A1:

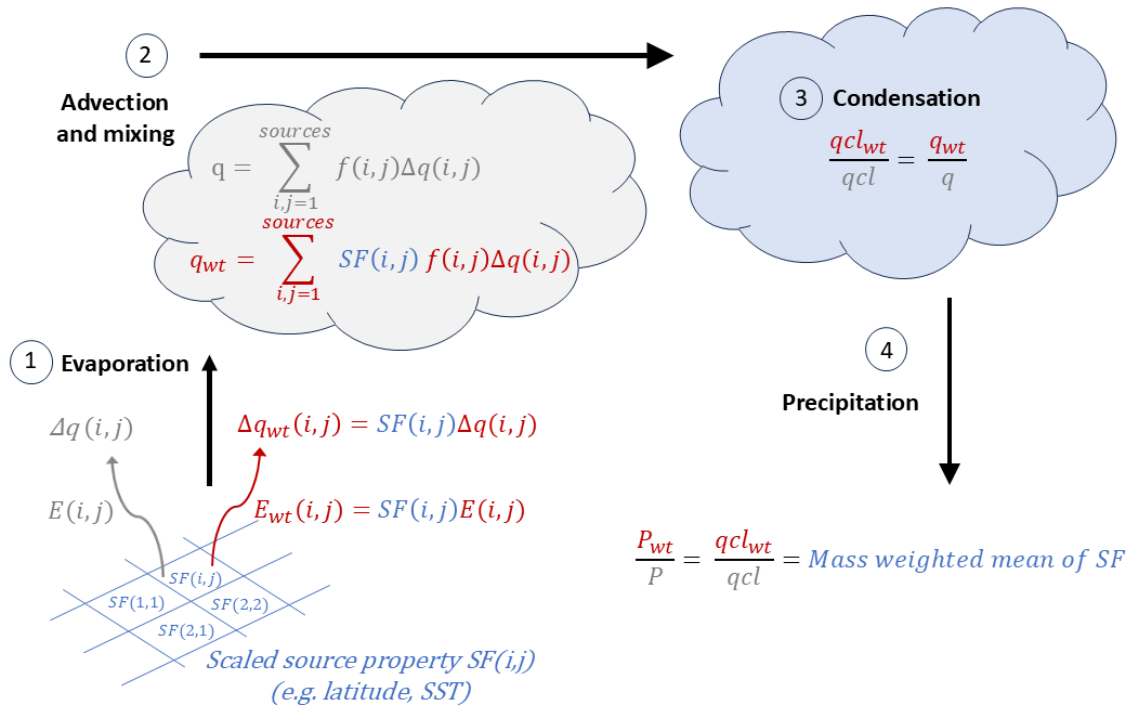


Figure A1: Schematic diagram to illustrate the scaled-flux water tracer method. q , qcl , E , P are specific humidity, liquid or ice condensate, surface evaporative flux and precipitation respectively. The water tracer equivalents are q_{wt} , qcl_{wt} , E_{wt} and P_{wt} . $SF(i,j)$ is the scaling factor which here equals the source property that is being tracked (e.g. latitude, longitude, SST), which is scaled to be between 0 and 1 as shown in Eq. (5). All fields have multiple indices, but to reduce complexity, the only indices shown are (i,j) which indicate the surface grid box at the time of evaporation. So $\Delta q(i,j)$ is the vapour amount originating from the evaporative flux at the surface grid box (i,j) . f is the fraction of each source that contributes to the total specific humidity in a model grid box. The numbers in circles indicate various steps in the cycle which are described in the main text.

Detailed comments

1) Scaled-flux and scaled flux is used throughout in the manuscript, be consistent

‘Scaled-flux’ and also ‘Prescribed-region’ are now used consistently, when referring to the different types of water tracers. This is also consistent with Gao et al. (2024).

2) *Same with ocean(-)sourced precipitation, be consistent*

‘Ocean-sourced precipitation’ is now used consistently.

Further changes to manuscript:

We have changed the reference for the UM GA8.0 scientific configuration from a Met Office technical report (Xavier et al, 2024) to a preprint which has recently become available (Willett et al, 2025a).