



*Supplement of*

## **Valley floor inclination affecting valley winds and transport of passive tracers in idealised simulations**

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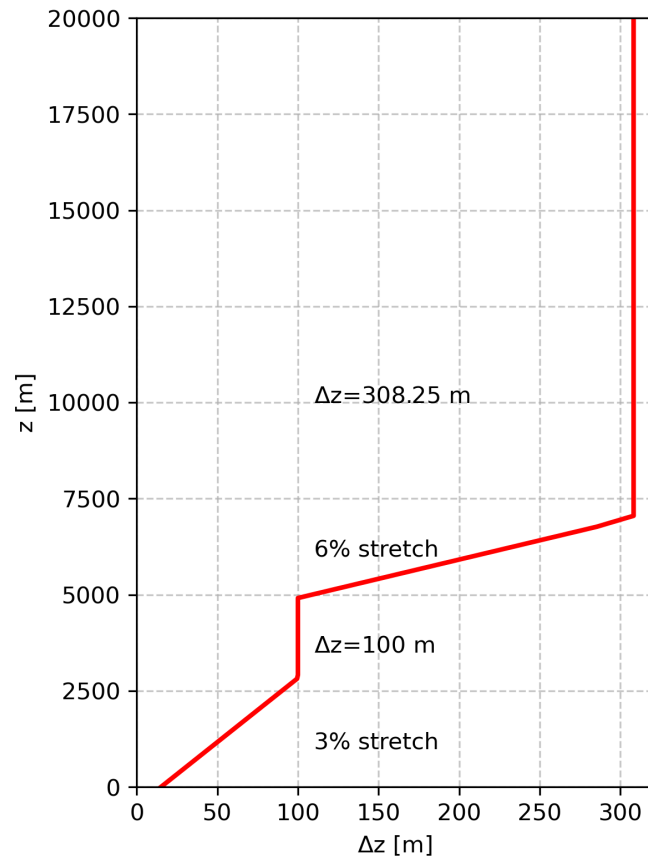
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**Table S1.** Tracer release locations and times in cases FLAT, I1, I2 and I3

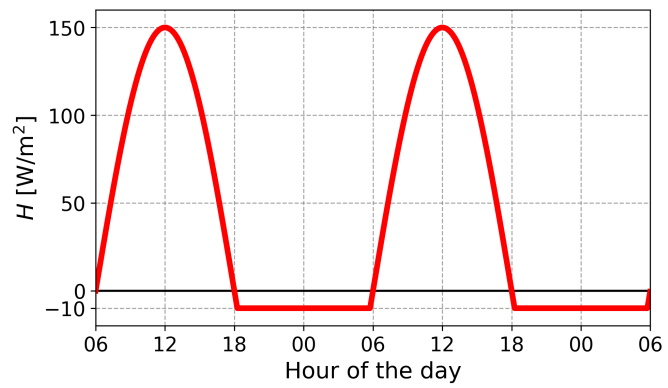
Tracer	<i>y</i> -release	<i>x</i> -release	Release start	Release duration
<b>1</b>	0 ... 10 km	-2 ... 2 km	Day 1 09:00am	60 min
<b>2</b>	20 ... 30 km	-2 ... 2 km	Day 1 09:00am	60 min
<b>3</b>	40 ... 50 km	-2 ... 2 km	Day 1 09:00am	60 min
<b>4</b>	20 ... 30 km	2 ... 6 km	Day 1 09:00am	60 min

**Table S2.** Tracer release locations and times in case SLOPE

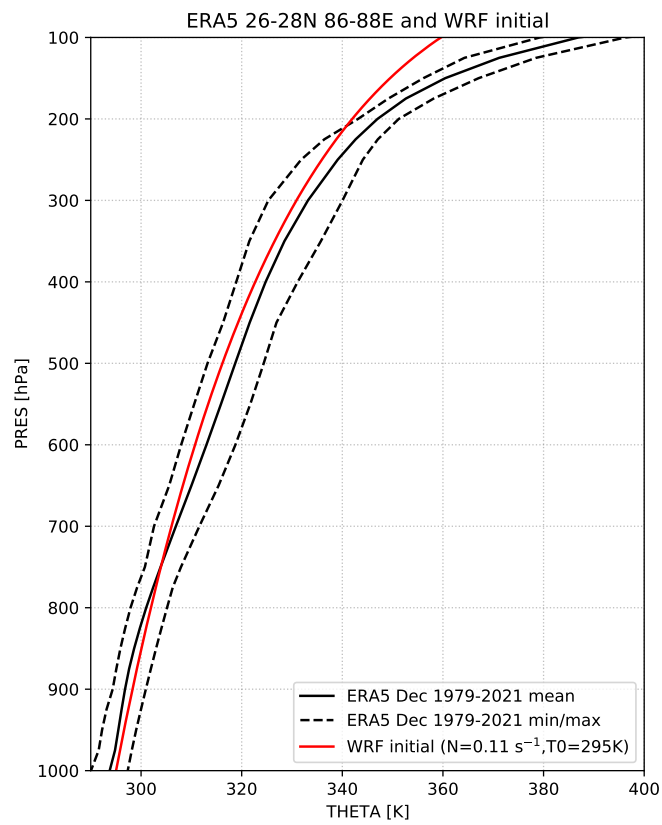
Tracer	<i>y</i> -release	<i>x</i> -release	Release start	Release duration
<b>1</b>	0 ... 10 km	-20 ... 20 km	Day 1 09:00am	60 min
<b>2</b>	20 ... 30 km	-20 ... 20 km	Day 1 09:00am	60 min
<b>3</b>	40 ... 50 km	-20 ... 20 km	Day 1 09:00am	60 min



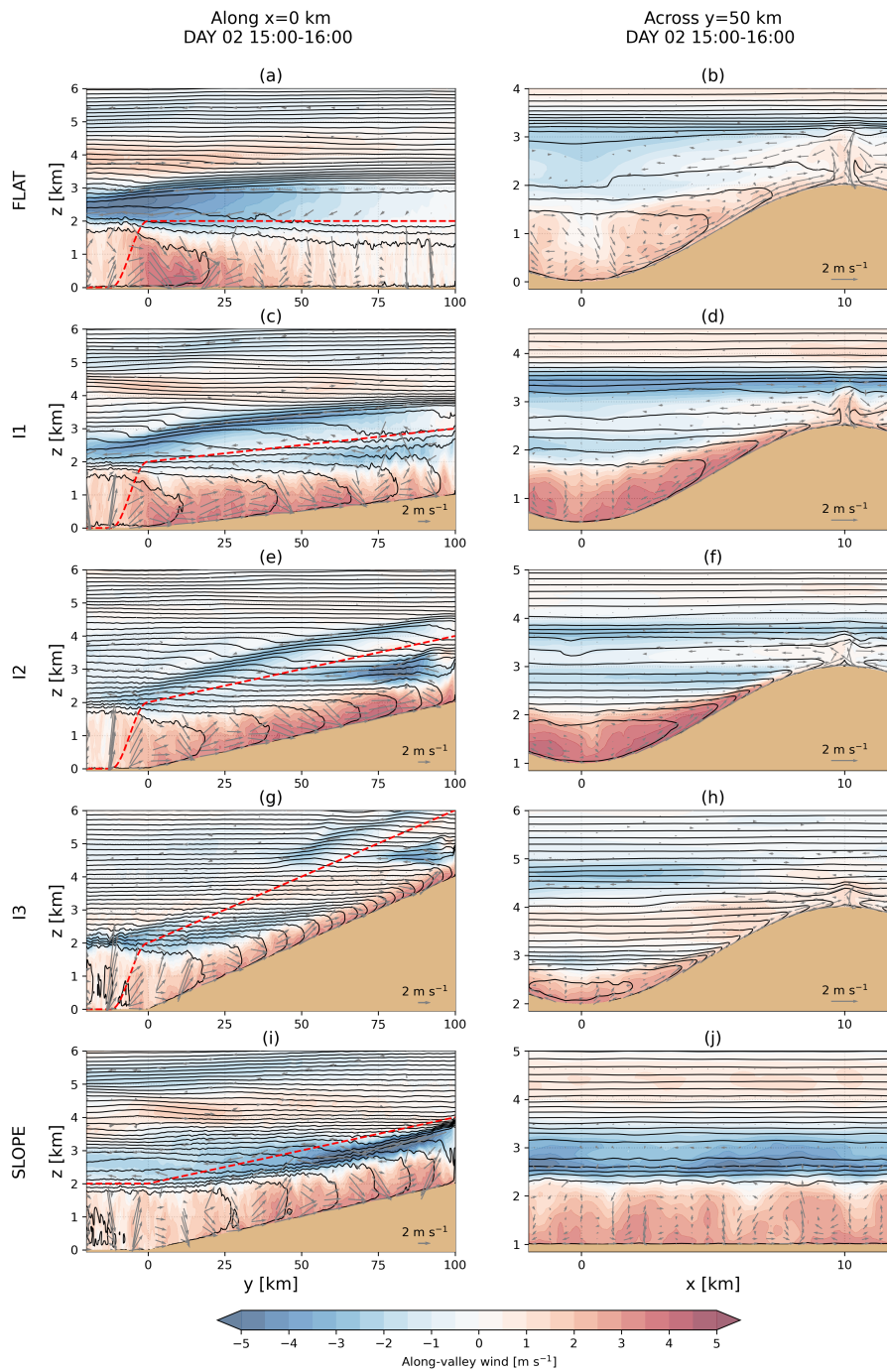
**Figure S1.** Vertical spacing of the model levels in the simulations (shown for grid points with surface height at 0 meters).



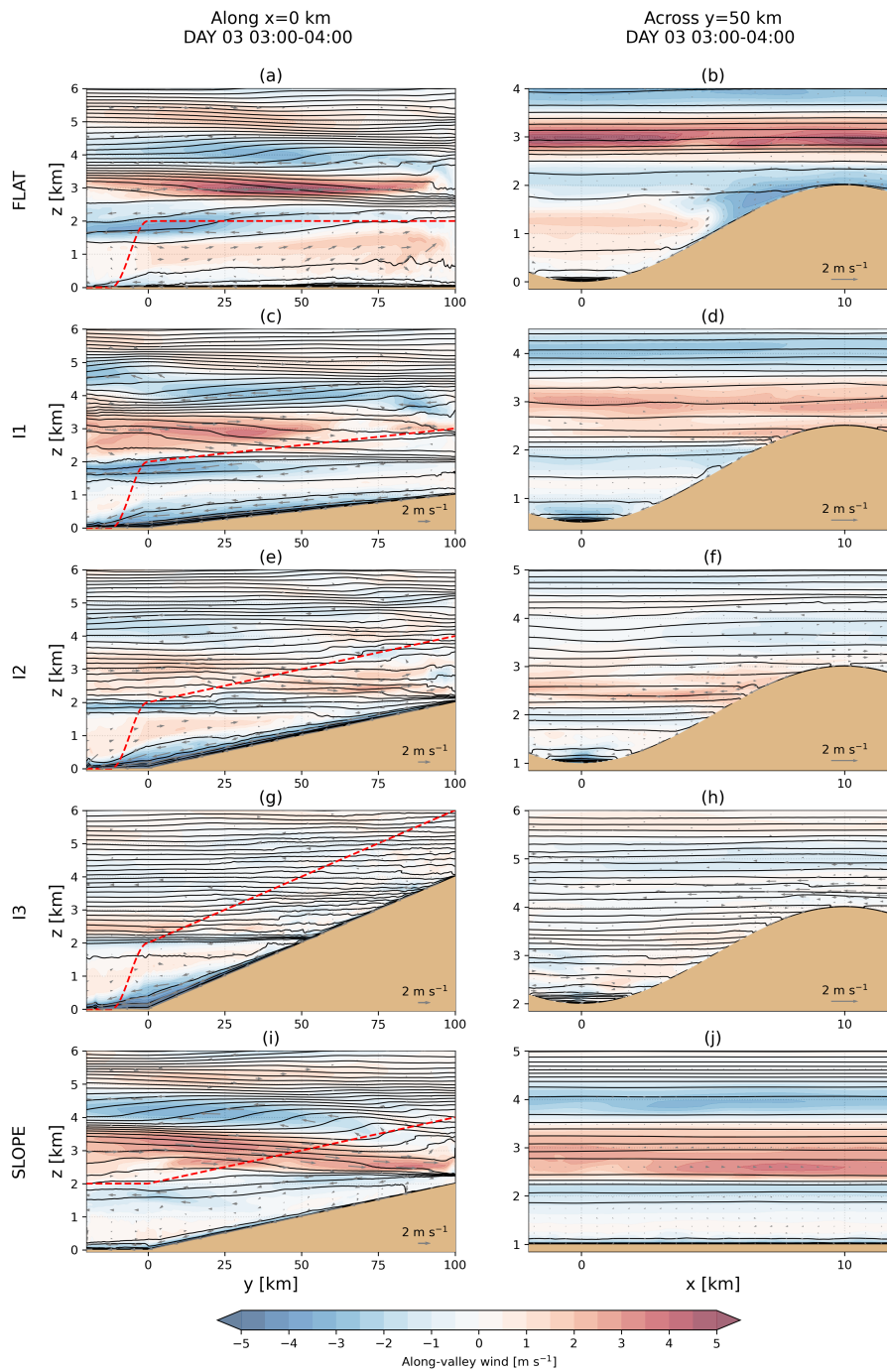
**Figure S2.** Prescribed surface sensible heat flux in the simulations (Eq. 1 in Section 2).



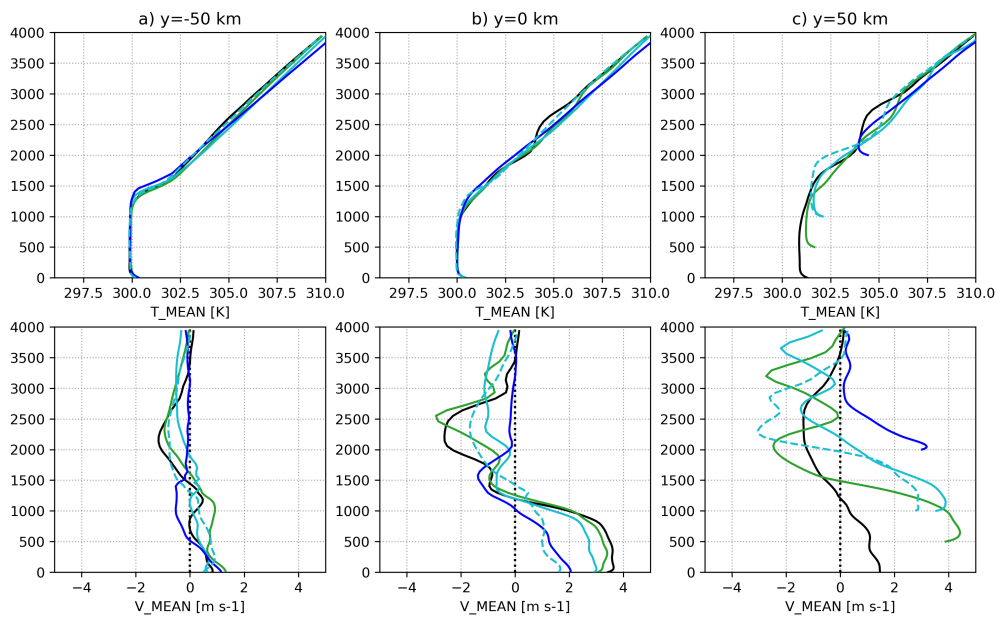
**Figure S3.** Initial temperature profile of the WRF-simulations and ERA5 1979-2021 December average profile for 26-28N 86-88E.



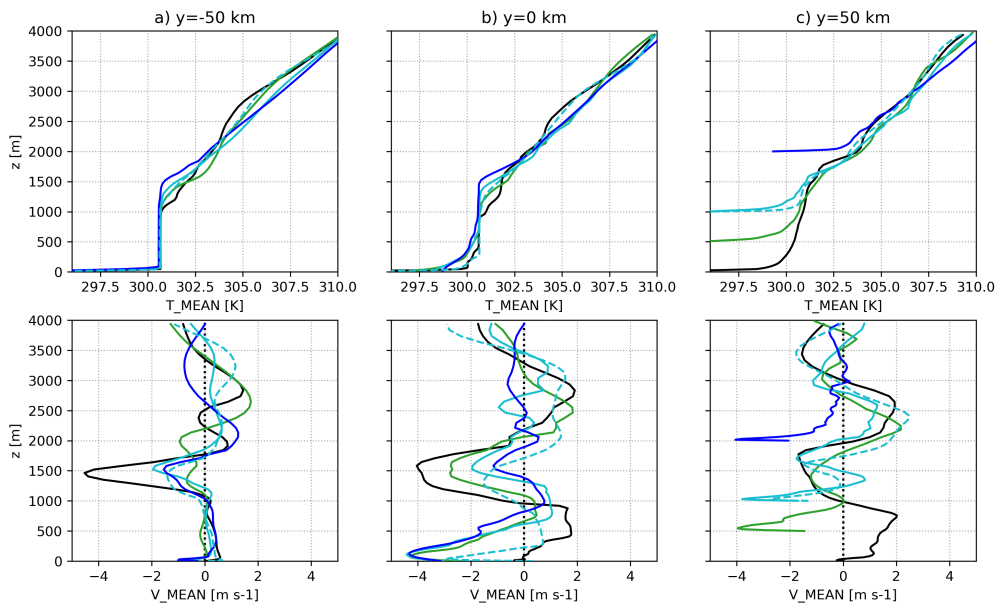
**Figure S4.** Same as Fig. 3 in the main text but for the second day of the simulation at 15:00-16:00.



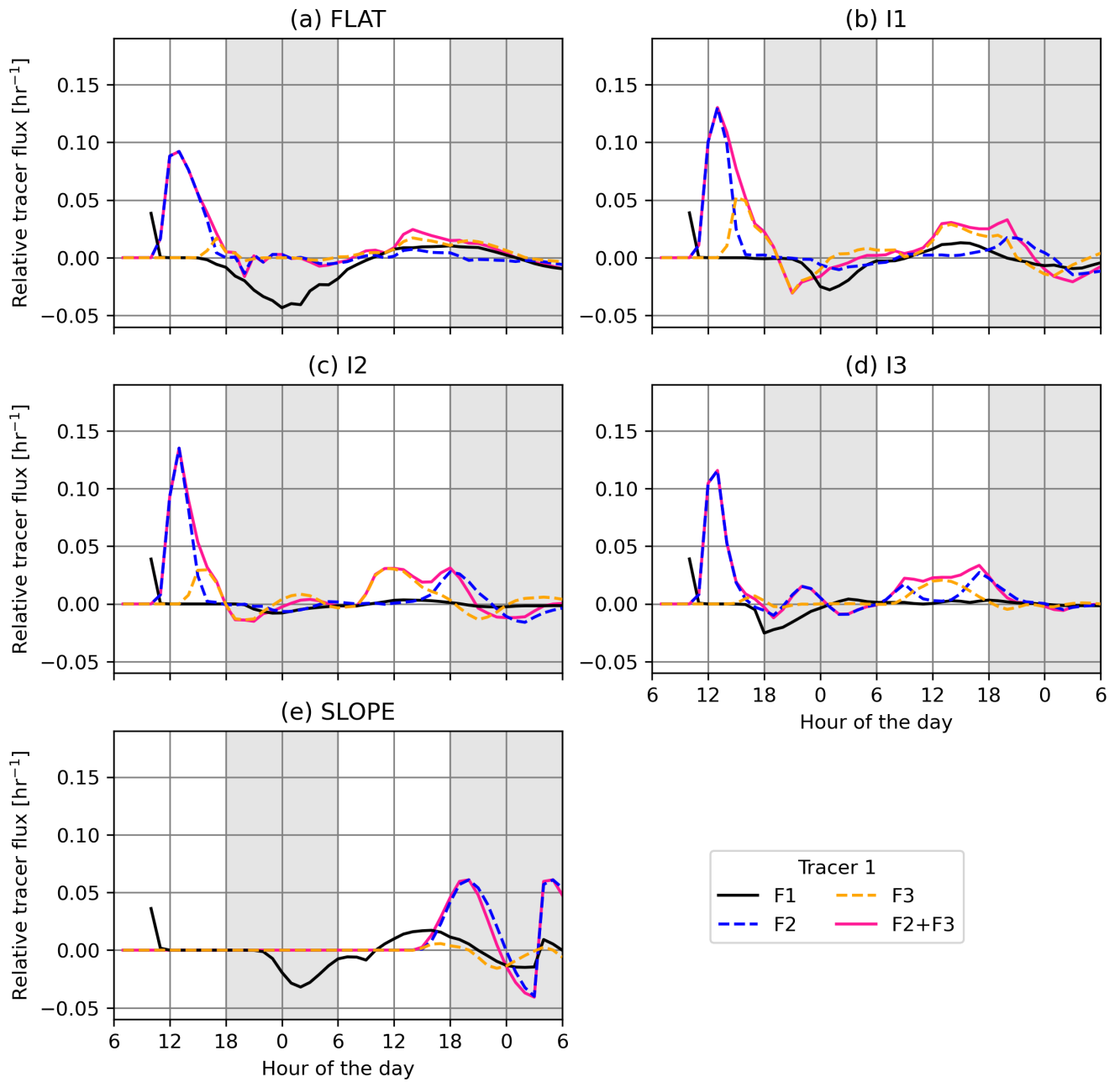
**Figure S5.** Same as Fig. 4 in the main text but for the second night of the simulation at 03:00-04:00.



**Figure S6.** Potential temperature (upper row) and along-valley wind (lower row) profiles along  $x = 0$  km **a)** at the plain  $y = -50$  km **b)** valley entrance  $y = 0$  km **c)** mid-way of the valley  $y = 50$  km at 15:00-16:00 on the first day of the simulation.

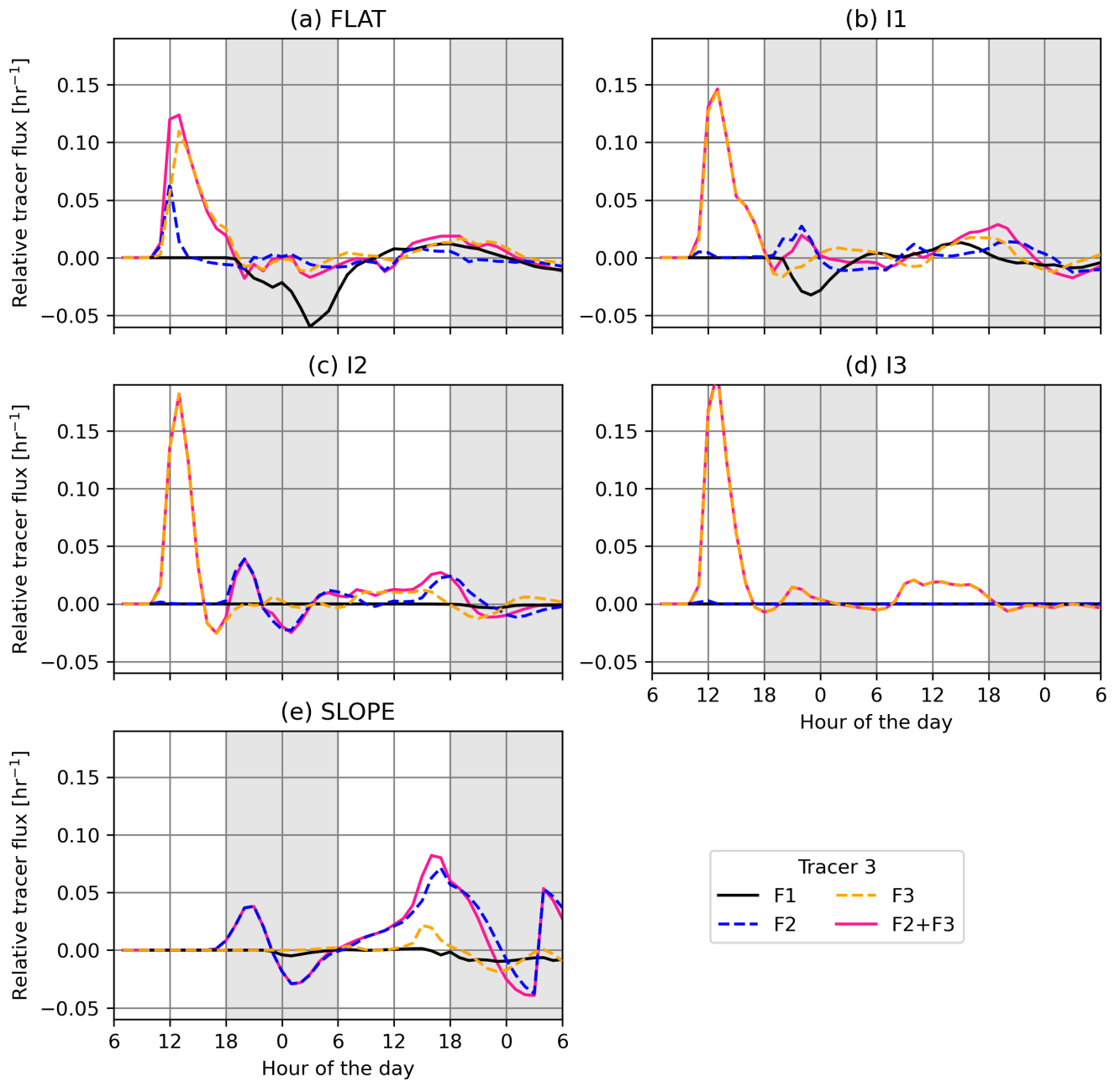


**Figure S7.** Same as Supplementary Figure S6 but at 03:00-04:00 on the first night of the simulation.

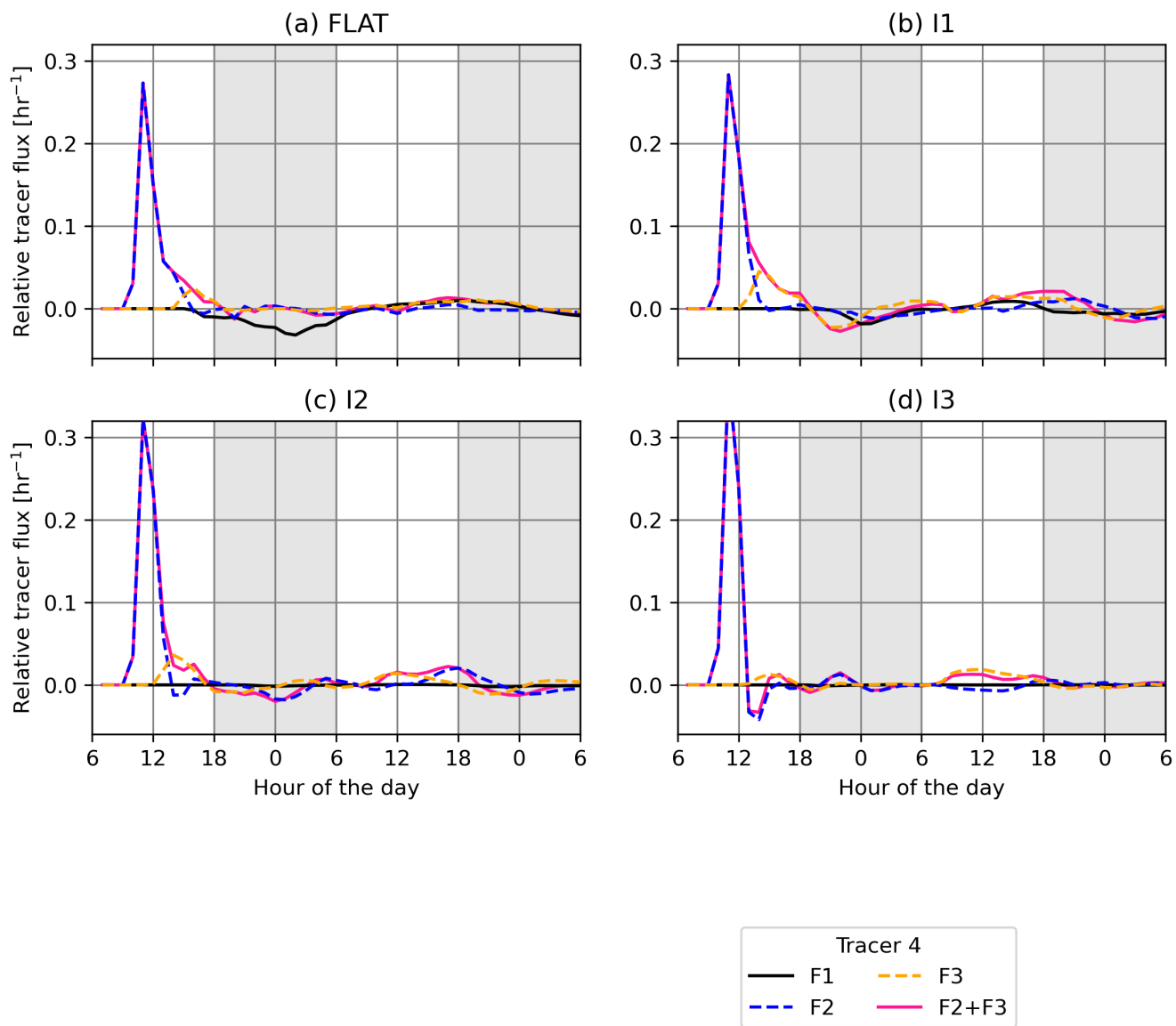


**Figure S8.** Same as Fig. 8 but for tracer 1





**Figure S9.** Same as Fig. 8 but for tracer 3



**Figure S10.** Same as Fig. 8 but for tracer 4. Note that the y-scale is different compared to Figures 8 and Supplementary Figures S8 and S9.