Required EUREC4A Storm Resolving Model Output

June 26, 2023

Output data are required for the common analysis domain spanning 10 N to 20 N and 48 W to 61 W. Unless stated otherwise hourly data is required. Below you find the list of the data we would like to receive. If not all the data can be delivered, we would also welcome a subset of the required fields and fluxes.

2D Fields

Table 1 contains the 2D Surface and TOA fields. As a rule of thumb it is preferred that instantaneous values for the fields are sufficient while hourly averaged values for the fluxes are preferred as these show significantly variability at subhourly timescales. If averaged values are not possible, then please provide instantaneous values but please do indicate that you have done so.

Table 1: required 2D Surface, TOA Output Variables (60 min interval).

Variable Name	Description	Units	Range	Height	Notation
psl	sea level pressure	Pa	inst.	0 m	P_s
sst	Sea Surface Temperature	K	inst.	0 m	T_s
hfss	Surface Sensible Heat flux	$\mathrm{W\,m^{-2}}$	av	0 m	$\rho c_p \overline{w'T'}_\mathrm{s}$
hfls	Surface Latent Heat flux	$\mathrm{W\,m^{-2}}$	av	0 m	$\rho L_v \overline{w'q'_v}_\mathrm{s}$
ewss	Eastward surface stress	$\mathrm{kg\,m^{-1}\,s^{-2}}$	av	0 m	$\rho \overline{u'w'}_\mathrm{s}$
nsss	Northward surface stress	$\mathrm{kg\,m^{-1}\,s^{-2}}$	av	0 m	$\rho \overline{v'w'}_\mathrm{s}$
rlds	Surface downwelling longwave flux	$\mathrm{W\,m^{-2}}$	av	0 m	$F_\mathrm{rad,s,lw,dwn}$
rlus	Surface upwelling longwave flux	$\mathrm{W\,m^{-2}}$	av	0 m	$F_\mathrm{rad,s,lw,up}$
rsds	Surface downwelling shortwave flux	$\mathrm{W\,m^{-2}}$	av	0 m	$F_\mathrm{rad,s,sw,dwn}$
rsus	Surface upwelling shortwave flux	$\mathrm{W\,m^{-2}}$	av	0 m	$F_\mathrm{rad,s,sw,up}$
rsdscs	Surface downwelling shortwave flux - clear sky	$\mathrm{W\,m^{-2}}$	av	0 m	$F_\mathrm{rad,s,sw,dwn,cls}$
rsuscs	Surface upwelling shortwave flux - clear sky	$\mathrm{W\,m^{-2}}$	av	0 m	$F_\mathrm{rad,s,sw,up,cls}$
rldscs	Surface downwelling longwave flux - clear sky	$\mathrm{W\,m^{-2}}$	av	0 m	$F_\mathrm{rad,s,lw,dwn,cls}$
rluscs	Surface upwelling longwave flux - clear sky	$\mathrm{W\,m^{-2}}$	av	0 m	$F_\mathrm{rad,s,lw,up,cls}$
rsdt	TOA incoming shortwave flux	$\mathrm{W\,m^{-2}}$	av	TOA	$F_\mathrm{rad,toa,sw,in,}$
rsut	TOA outgoing shortwave flux	$\mathrm{W\,m^{-2}}$	av	TOA	$F_\mathrm{rad,toa,sw,out,}$
rlut	TOA outgoing longwave flux	$\mathrm{W\,m^{-2}}$	av	TOA	$F_\mathrm{rad,toa,lw,out,}$
rsutcs	TOA outgoing shortwave flux - clear sky	$\mathrm{W\,m^{-2}}$	av	TOA	$F_\mathrm{rad,toa,sw,out,cls}$
rlutcs	TOA outgoing longwave flux - clear sky	$\mathrm{W\,m^{-2}}$	av	TOA	$F_\mathrm{rad,toa,lw,out,cls}$

Table 2 contains the required vertical integrated values of cloud and humidity related properties. Since we are interested in the spatio-temporal development of these variables these 2D fields are requested every 5 minutes.

Table 2: required 2D high temporal resolution output Variables (5 min interval).

Short Name	Long Name	Units	Range	Notation
tcc	Total Cloud Cover	$[0 \dots 1]$	inst.	
lcc	Low Cloud Cover	$[0 \dots 1]$	inst.	cloud cover below 680 hP
hcc	High Cloud Cover	$[0 \dots 1]$	inst.	cloud cover above 680 hP
prw	water vapor path	$\mathrm{kg\,m^{-2}}$	inst.	$\int q_\mathrm{v} \rho \, \mathrm{d}z$
clwvi	condensed water path	$\mathrm{kg\,m^{-2}}$	inst.	$\int q_\mathrm{c} \rho \, \mathrm{d}z$
clivi	ice water path	$\mathrm{kg\,m^{-2}}$	inst.	$\int q_\mathrm{i} \rho \, \mathrm{d}z$
rwp	rain water path	$\mathrm{kg\,m^{-2}}$	inst.	$\int q_\mathrm{r} \rho \, \mathrm{d}z$
CAPE	Conditional Available Potential Energy	$\mathrm{m^2 s^{-2}}$	inst.	CAPE
u10m	10 m eastward wind	$\mathrm{m\,s^{-1}}$	inst.	u_10m
v10m	10 m northward wind	$\mathrm{m\,s^{-1}}$	inst.	v_10m
t10m	10 m temperature	K	inst.	T_10m
q10m	10 m specific humidity	$\mathrm{kg\,kg^{-1}}$	inst.	q_10m
zml	Mixed layer height	m	inst.	z_ML
pr	Surface precipitation	$\mathrm{kg\,m^{-2}\,s^{-1}}$	av	R_s

2D fields at designated heights

Table 3 contains a number of essential fields at designated heights: the middle of the subcloud layer, near cloud base height, near cloud top height, just above cloud top height and the middle of the troposphere.

Table 3: required 2D fields at specified levels (60 min interval)

Short Name	Long Name	Units	Range	Levels
u2d	zonal component wind	$\mathrm{m\,s^{-1}}$	inst.	970, 900, 850, 700, 500 hPa
v2d	meridional component wind	$\mathrm{m\,s^{-1}}$	inst.	970, 900, 850, 700, 500 hPa
t2d	temperature	K	inst.	970, 900, 850, 700, 500 hPa
q2d	specific humidity	$\mathrm{kg\,kg^{-1}}$	inst.	970, 900, 850, 700, 500 hPa
w2d	vertical velocity	m/per/second	inst.	970, 900, 850, 700, 500 hPa
g2d	geopotential height	m	inst.	970, 900, 850, 700, 500 hPa
ql2d	liquid water	$\mathrm{kg\,kg^{-1}}$	inst.	970, 900, 850, hPa
r2d	rain water	$\mathrm{kg\,kg^{-1}}$	inst.	970, 900, 850, hPa
rh2d	relative humidity	$[\dots]$	inst.	970, 900, 850, 700, 500 hPa

High resolution Profiles

For models that can flexibly write high-frequency grid-point output, we request vertical profiles at a 5-minute frequency of the variables listed in Table 4, within a square of 100 x 100 km2 around the centre of the EUREC4A circle (centre at 57.72 W ,13.30 N) .

Table 4: required high frequency profile output at the EUREC4A circle (5 min interval)

Short Name	Long Name	Units	Range
u	zonal component wind	$m\,s^{-1}$	inst.
v	meridional component wind	$m\,s^{-1}$	inst.
t	temperature	K	inst.
q	specific humidity	$kg\,kg^{-1}$	inst.
w	vertical velocity	$m\,s^{-1}$	inst.
clwc	liquid water	$kg\,kg^{-1}$	inst.

3D Output

Storage of some 3d fields is desirable but also requires enormous storage capacities and is not easy to handle. We therefore propose to output the 3d fields of the variables listed in table 5 for the common analysis domain spanning 10 N to 20 N and 48 W to 61 W at a 6 hourly output frequency

Table 5: Required 3d Output fields at a 6 hourly frequency

Short Name	Long Name	Units	Range
u3d	zonal component wind	$m\,s^{-1}$	inst.
v3d	meridional component wind	$m\,s^{-1}$	inst.
t3d	temperature	K	inst.
q3d	specific humidity	$kg\,kg^{-1}$	inst.
w3d	vertical velocity	$m\,s^{-1}$	inst.
clwc3d	liquid water	$kg\,kg^{-1}$	inst.