Supplement to 'EMPOL 1.0: A new parameterization of pollen emission in numerical weather prediction models'

EMPOL is an integral part of the NWP model system COSMO-ART. It is written in Fortran. The model is distributed over two different channels: COSMO can be obtained from the German Weather Service (DWD). The ART part of COSMO-ART can be obtained from Dr. Bernhard Vogel, Institute for Meteorology and Climate Research, Karlsruhe Institute of Technology (KIT).
Contact email COSMO: cosmo-licence@cosmo-model.org
Contact email ART: bernhard.vogel@kit.edu

Table 1 gives an overview about the necessary input and model fields that have to be provided when implementing the emission parameterization EMPOL into a different NWP model system.

Table 1: Parameters and their units used in the emission parameterization EMPOL. The letter in the third column gives practical information about the parameters: 'I' - the parameter has to be provided as an input field. 'M' - the parameter should be taken from the NWP model (at best from the model level that corresponds to the emission height). 'T' - the parameter can or needs to be tuned. 'C' - the parameter is calculated within EMPOL.

Parameter	Unit	Info	Description
$Q_{pollen,day}$	m^{-2}	T	total amount of pollen that can be released per day under perfect conditions
$Q_{pollen,\Delta t}$	m^{-2}	T	amount of pollen that can be released per time step under perfect conditions
R_{pollen}	m^{-2}	C	content of the pollen reservoir, current time step
$R_{pollen,old}$	m^{-2}	C	content of the pollen reservoir, previous time step
$R_{pollen,sum}$	m^{-2}	C	total amount of released pollen since midnight
ΔR_{pollen}	m^{-2}	C	pollen released during the current time step
$F_{E,pollen}$	$m^{-2}\ s^{-1}$	C	emission flux of pollen grains
C_{pollen}	m^{-3}	C	pollen concentration
Ψ_{random}	-	T	loss of pollen from the reservoir due to random processes
Ψ_{precip}	-	T	loss of pollen from the reservoir due to precipitation
Φ_{plant}	-	C	plant-dependent influences on pollen emission
Φ_{met}	-	C	meteorological influences on pollen emission
Φ_{biol}	-	C	biological influences on pollen emission
$f_{R,T}$	-	T	fraction of open flowers as a function of temperature
$f_{R,RH}$	-	T	fraction of open flowers as a function of relative humidity
$f_{E,TKE}$	-	T	fraction of emitted pollen as a function of turbulent kinetic energy
$f_{E,RH}$	-	T	fraction of emitted pollen as a function of relative humidity
$f_{Q,cov}$	-	I	fraction of the grid box covered with the specific plant
$f_{Q,seas}$	-	I	mathematical description of the course of the pollen season
$f_{Q,alt}$	-	I	productiviy of the plants as a function of altitude
T	K	M	temperature at the lowest model level
rh	%	M	relative humidity at the lowest model level
TKE	$m^2\ s^{-2}$	M	turbulent kinetic energy at the lowest model level
Δt	s	M	time step of the simulation
p	$kg\, m^{-2}\ s^{-1}$	M	sum of convective and grid-scale precipitation