ERCore User Manual

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1 Introduction

This is a user manual. For techincal description see the other document.

ERCore is a lagrangian model that for every model time step computes positions of a number of particles. Each particle can have the following status:

- 0: Not released
- 1: Released and active
- -1: Stuck to shoreline or bottom
- -2: Dead

whereas status 0 and -2 will never appear in the output files.

For each model time step, new particle positions are computed from the "active" pool (status 1) and stored in an array with ($\texttt{nbuff} \times 3$) where colums are x, y and z coordinates. This buffef array should be big enough to accomodate all particles in the computational pool, but small enough to maintain memory and performance. With that in mind, the model reuses array position of "dead" particles (status -2). `nbuff` is defined for each release (see table 1).

1.1 Coordinates

ERCore can use any system of coordinates, provided they are consistent in all input and configuraton data. See zinvert = True..

1.2 Date and time format

Internally, the model uses time in NCEP/CF convention decimal time (matlab time?) which is the "number of days since 1-1-1" and can be computed with:

```
netCDF4.date2num(t0, units='days since 0001-01-01 00:00:00', calendar='standard')
```

or

```
_DT0_=datetime.datetime(2000,1,1)
_NCEPT0_=730120.99999
ncep2dt=lambda t:_DT0_+datetime.timedelta(t-_NCEPT0_)
dt2ncep=lambda t: (1.+t.toordinal()+t.hour/24.+t.minute/1440.+t.second/86400.)
```

Input dates can be either:

- CF decimal time
- datetime python objects, or
- strings like "%Y%m%d_%Hz" or "%Y-%m-%d %H:%M:%S".

2 Materials

ERCore allows for releases of different particle types, called "materials". The base class, from which all materials inherit, defines the basic options for a release, as listed in table 1.

Table 1: Common options for all materials. *Note: particle vertical level Z is positive upwards with sea surface = 0, i.e. -10 is 10 m below sea surface.

Keyword	Type	Default	Description
id	str		Unique id for release
outfile	str	None	Filename of output file
P0	[float,float,float]	[0,0,0]	Initial position of release*
movers	list	[]	List of mover id strings
reactors	list	[]	List of reactor id strings
diffusers	list	[]	List of diffuser id strings
stickers	list	[]	List of sticker id strings
unstick	boolean	0	
tstart	datetime/int	0	Starting time for release
tend	datetime/int	1.e10	Ending time for release
tstep	float	0.	Timestep of release
tstep_release	float	0.	
nbuff	int		Total number of particles in buffer
spawn	int	1	Number of spawned particles (per day)
reln	int	0	Number of particles per release
R0	float	1.	Total release of material
Q0	float	1.	Flux of material (per day)
is3d	boolean	True	
geod	boolean	False	

2.1 PassiveTracer

The most simple material is the inert passive tracer (`class PassiveTracer`), which can only be advected and diffused, without other sinks and sources. `PassiveTracer`

particles enter the computational pool by being released, and can leave by either being transported out of the spatial domain or by interception with shoreline or depth ("stickers", see section **??**).