Offtrac2 Tutorial

Revised: 28 July 2015

Source code available at: https://github.com/ashao/Offtrac2

# Overview of major overhaul of Offtrac

* Very few parameters need to be changed at compile time via the “init.h”
* The same executable can be used to do any available tracer run
* Input parameters are now readin via a namelist file which contains the option name and a value
  + Includes whether using hindcast/climatological fields
  + Timestep either 5-day or monthly
  + Which tracers to include in the run
  + Cold/start or restart
* Removal of a number of “ifdef” pragmas to clarify execution
* Added a timekeeper module that tracks the model’s timestep
* Tracers should now be added as mostly self-contained modules (see ideal age, CFCs, Ar, N2 as examples) with hooks into the main code for easier readability
* Complete tracer suite:
  + TTD via boundary propagator
  + Ideal Age
  + CFC-11, CFC-12, SF6
  + Argon
  + Nitrogen
* The Gibbs Seawater routines are now included and available for use

# Quick-start guide

## Cold-Start

The example here will use the Offtrac executable to do an boundary propagator run from a cold start (e.g. initialized everywhere to zero).

1. SSH into a gaggle

ssh USER@gaggle.ocean.washington.edu

1. SSH into a compute node (i.e. node002)

ssh node002

1. Load the netCDF module

module load netcdf/gcc/64/4.3.0

1. Navigate to the branch directory

cd /ltraid3/ashao/uw-apl/development/offtrac2/

1. Modify the existing Makefile as required for your modeling environment

vim Makefile

1. Modify some of the compile time options in the src/init.h file as needed

vim src/init.h

1. Compile Offtrac using the GNU ‘make’ command

Make

1. Create an ‘in’ file with the runtime options (here input.clim.ttd). See the Appendix A, the function *set\_run\_parameters* ininitialize.c or the structure definition in initialize.h for more options
2. timestep 5day

syear 0

sinterval 0

eyear 500

einterval 0

forcing\_path /ltraid3/ashao/uw-apl/data/offtrac/input/

normalyear\_path /ltraid4/ashao/HIM/hyak\_store/HINDCAST.2015.May/NORMALYEAR/

wrint 73

ntime\_climatology 73

outputfile ttd.clim

do\_ttd 1

ttd 1

ttd\_restart 1

num\_ttd\_intervals 73

1. Run Offtrac redirecting the input and output

./offtrac input.clim.ttd > run.log &

1. Monitor output with by running tail on run.log

tail run.log

# Appendix A: Namefile Options

## Required

|  |  |  |
| --- | --- | --- |
| Keyword | Description/Options | Example |
| timestep | The type of time step to use  5day: 5-day time step  month: Monthly time step | 73 |
| syear | Starting year to initialize the timekeeper  0 means that the time variable start at year 0  OR  An actual year (e.g. 1990) if you want to start on a calendar date | 0 |
| sinterval | Starting interval  An interval is the index of the timestep based on the C indexing convention. For example an ‘sinterval’ of 1 with a ‘month’ timestep starts the model in February | 0 |
| eyear | End year to stop the integration | 100 for a hundred year long integration  OR  An actual calendar year to stop |
| einterval | Ending interval  An interval is the index of the timestep based on the C indexing convention. For example an ‘einterval’ of 1 with a ‘month’ timestep ends the model in February | 0 to end at the beginning of the year |
| forcing\_path | Path to the main offtrac configuration files (e.g. topo.nc, metrics.nc) but NOT the physical model fields | /ltraid3/ashao/uw-apl/data/offtrac/input/ |
| normalyear\_path | Path to the transport, T, S fields | /ltraid4/ashao/HIM/hyak\_store/HINDCAST.2015.May/NORMALYEAR/ |
| wrint | Write and averaging interval  1: Write after every interval  12: Annual average for monthly timestep  73: Annual average for 5-day timestep | 73 |
| ntime\_climatology | The length of the climatology  12: For a monthly, normalyear  240: For a monthly, 20-year block from HIM  73: For a 5-day normalyear | 73 |
| outputfile | Prefix for the output file. Final outpufile will be  “outputfile.eyear.einterval.nc’ | ttd.clim |

## Optional keywords

Most of the keywords here are binary options (i.e. True=1, False=0). If any keyword is not explicitly specified, it defaults to 0

|  |  |  |
| --- | --- | --- |
| Keyword | Description/Options | Example |
| restart\_flag | Specify whether to initialize tracers from a restart file (Requires ‘restartfile’ to be set | 0 |
| restartfile | Specify the path to the restart file  Must contain all the tracers to be simulated | (blank) |
| use\_hindcast | Specify whether hindcast fields should be used (Requires hindcast\_path to be defined) | 1 |
| hindcast\_path | Path to the physical fields from thet hindcast run | 73 |

## Tracer dependent

Most of the keywords here are binary options (i.e. True=1, False=0). If any keyword is not explicitly specified, it defaults to 0

|  |  |  |
| --- | --- | --- |
| Keyword | Description/Options | Example |
| do\_ttd | Specify whether to use a boundary propagator tracer | 1 |
| ttd | Include the TTD variable in the output | 1 |
| ttd\_restart | Write the TTD variable in the restart file at the end of the run | 1 |
| num\_ttd\_intervals | Number of intervals that the surface should be set to 1.0 for the TTD boundary propagator tracer | 73 |
| do\_age | Specify whether to use the ideal age tracer | 0 |
| age | Include the ideal age variable in the output | 0 |
| age\_restart | Write the ideal age variable in the restart file output | 0 |
| do\_cfcs | Specify whether CFC-11, CFC-12, and SF6 should be simulated | 0 |
| cfc11 | Output CFC-11 volumetric concentrations | 0 |
| cfc12 | Output CFC-12 volumetric concentrations | 0 |
| sf6 | Output SF6 volumetric concentrations | 0 |
| pcfc11 | Output CFC-11 partial pressures | 0 |
| pcfc12 | Output CFC-12 partial pressures | 0 |
| psf6 | Output SF6 partial pressures | 0 |
| do\_n2 | Specify whether to use a nitrogen tracer | 0 |
| n2 | Include the nitrogen concentrations in the output | 0 |
| n2sol | Include the nitrogen saturation concentration in the output | 0 |
| n2\_restart | Write the nitrogen variable in the restart file output | 0 |
| do\_ar | Specify whether to use a argon tracer | 0 |
| ar | Include the argon concentrations in the output | 0 |
| arsol | Include the argon saturation concentration in the output | 0 |
| ar\_restart | Write the argon variable in the restart file output | 0 |