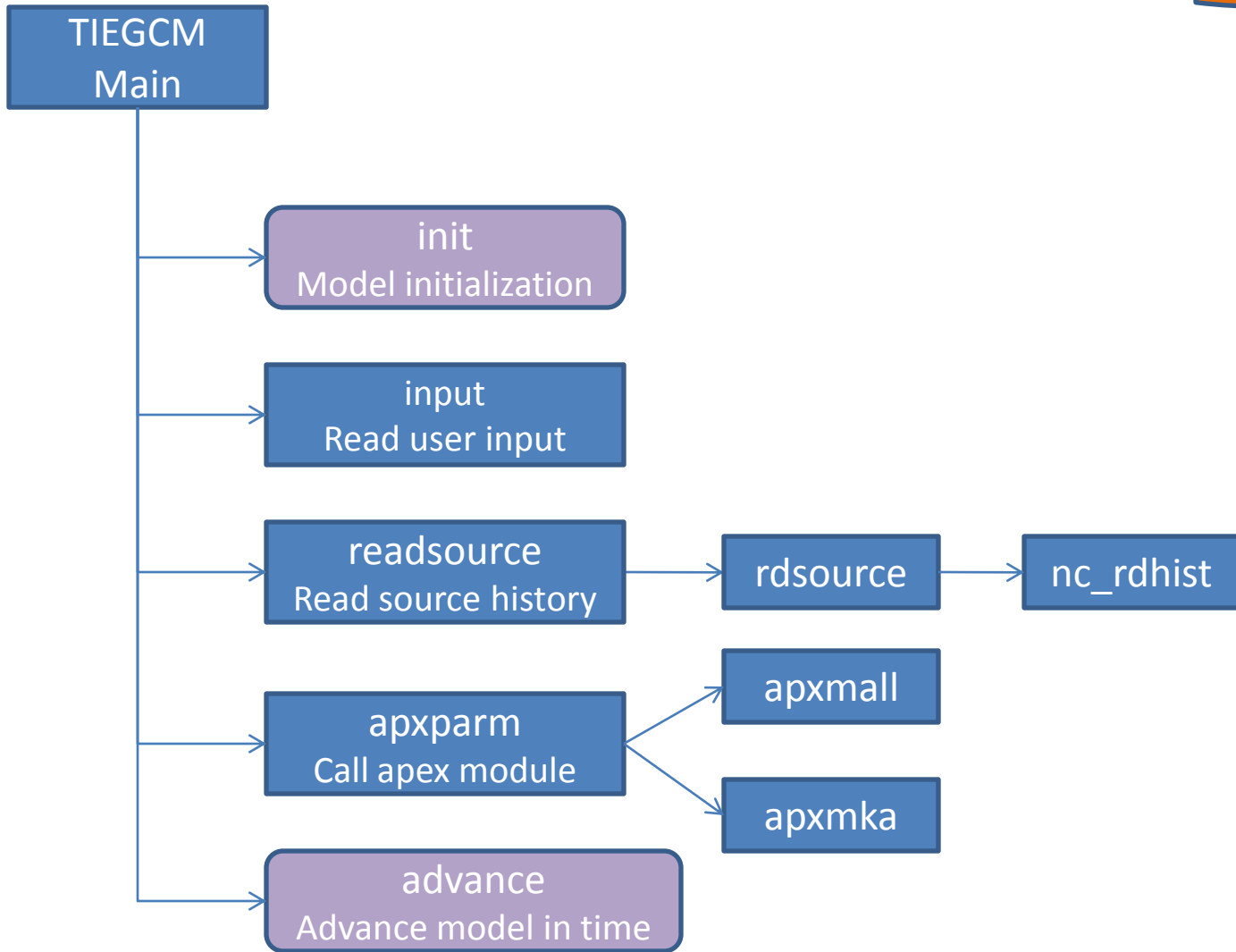
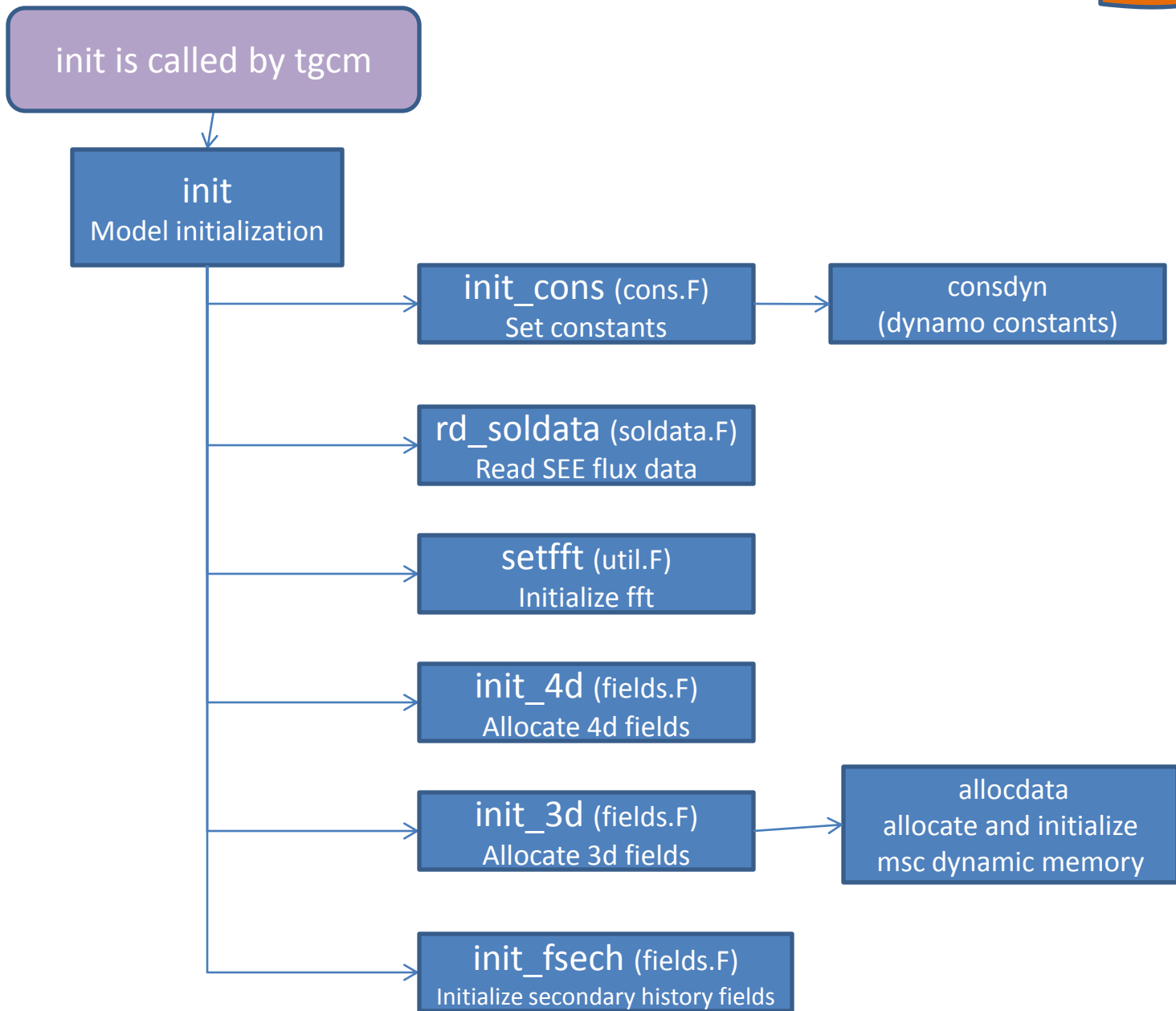


# TIEGCM Code Structure

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advance is called by tgcm

Advance (advance.F)  
Advance the model in time

Time-step loop

sunloc (locate sun's longitude)

getgpi (read GPI data)

getimf (read IMF data)

getgswm (read GSWM data)

aurora\_cons (update auroral constants)

init\_sflux (update solar flux data)

ssflux

efield (calculate electric field)

addiag (calculate geopotential Z,ZG, mbar, etc.)

lbc\_gswm\_addiag

hdif1,hdif2 (horizontal diffusion)

lsqdsq

weimer05 (Weimer potential model)

heelis (Heelis potential model)

dynamics (dynamics and chemistry module)

magpres\_grav (magnetic pressure and gravity)

prep\_dynamo (prepare for dynamo)

dynamo (electrodynamics module)

outhist (write to netCDF output files)



dynamics is called by  
advance

dynamics  
Dynamics and chemistry driver

bndcmp (composition lower boundary)

cpktkm (specific heat, molecular visc)

swdot (omega)

ionvel (drift velocities)

chapman (line integrals)

chemrates\_tdep (chemical rates)

qrj (ionization and heating)

qinite (night-time ionization)

aurora (auroral parameterization)

oplus (update O+)

elden (electron density)

lamdas (ion drag coefficients)

filter

trsolv

filter

vquart

Minor species composition

[qjinno](#), [qjion](#)  
(ion heating and O2 dissociation)

qjoule\_ti (ion joule heating)

settei (ion and electron temperature)

newton, newto3p  
(implicit and explicit cooling)

hdif3 (horizontal diffusion, stage 3)

qjoule\_tn (joule heating for TN)

dt (neutral temperature TN)

duv (neutral winds U, V)

comp (major composition O2, O)

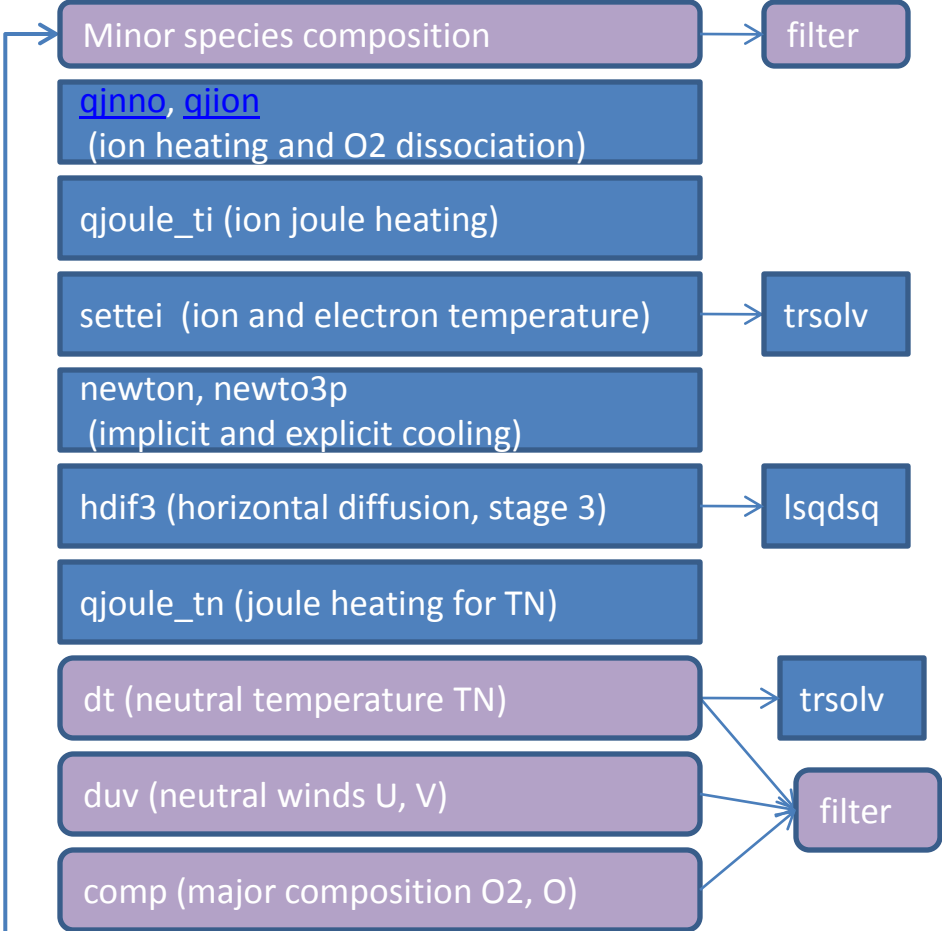
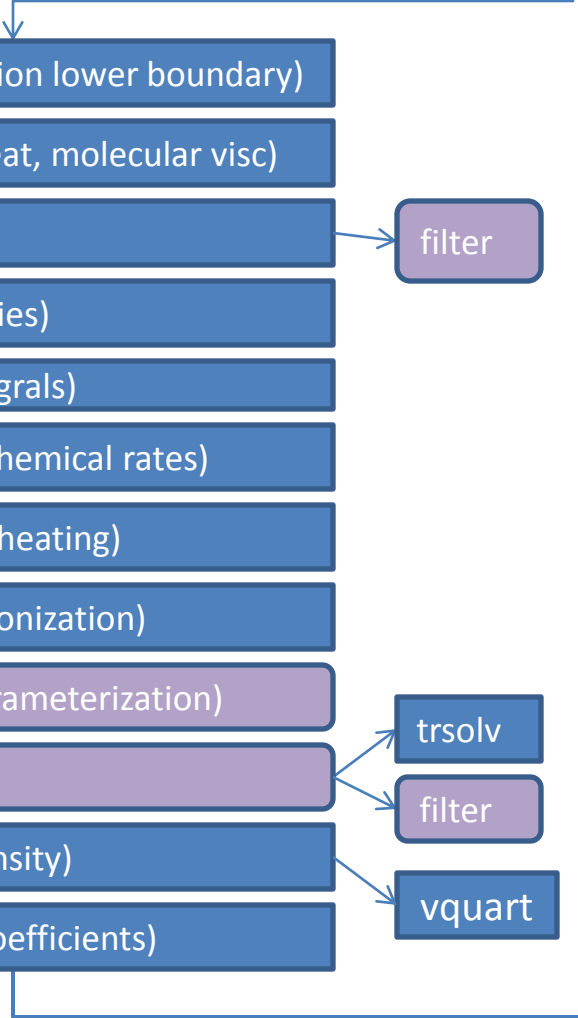
filter

trsolv

lsqdsq

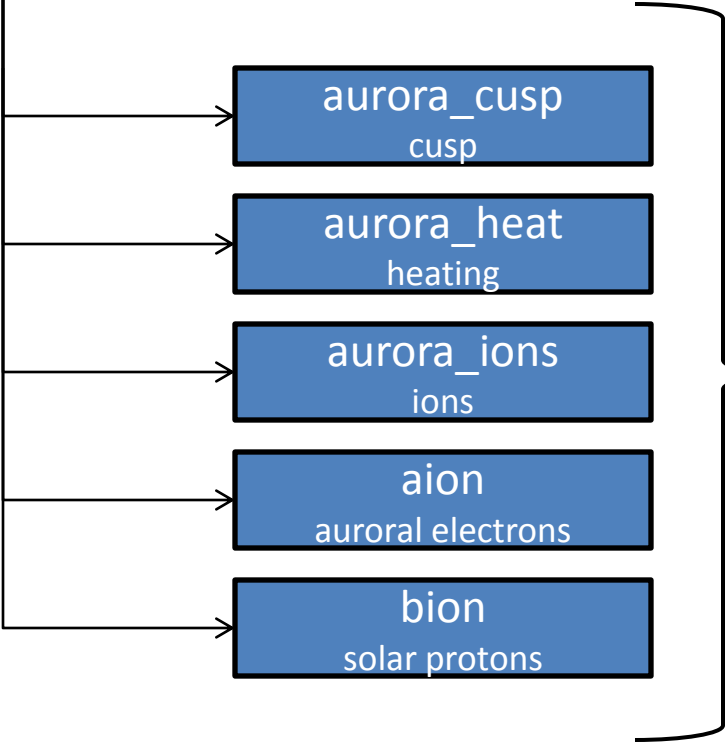
trsolv

filter



aurora is called by dynamics

aurora  
Aurora parameterization



all in aurora.F

oplus is called by dynamics

oplus  
Update O+

oplus\_flux  
O+ number flux

divb  
divergence

rrk  
Diffusion coefficients

diffus  
 $(d/(h*dz)*tp+m*g/r)*en$

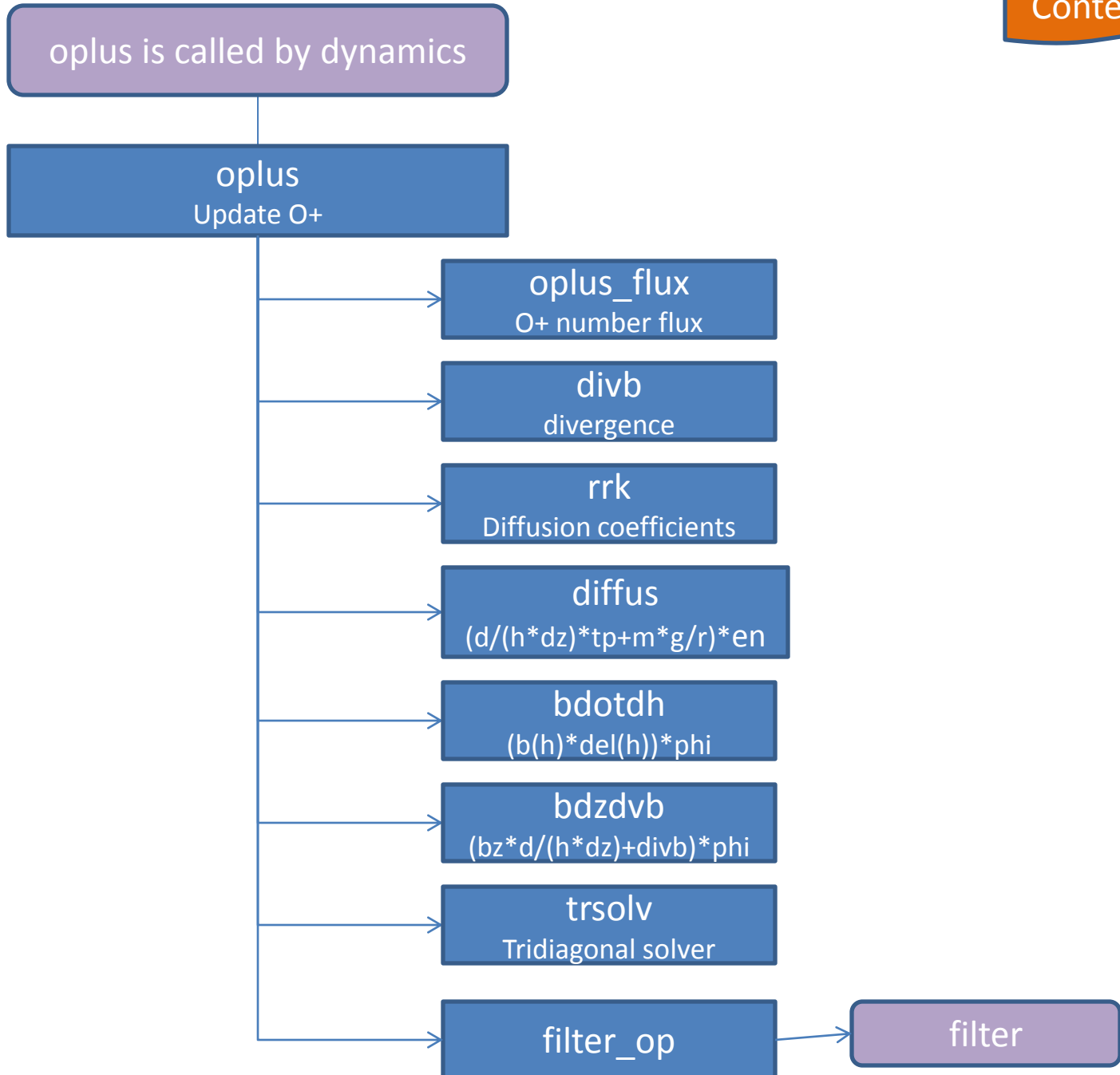
bcdotdh  
 $(b(h)*del(h))*phi$

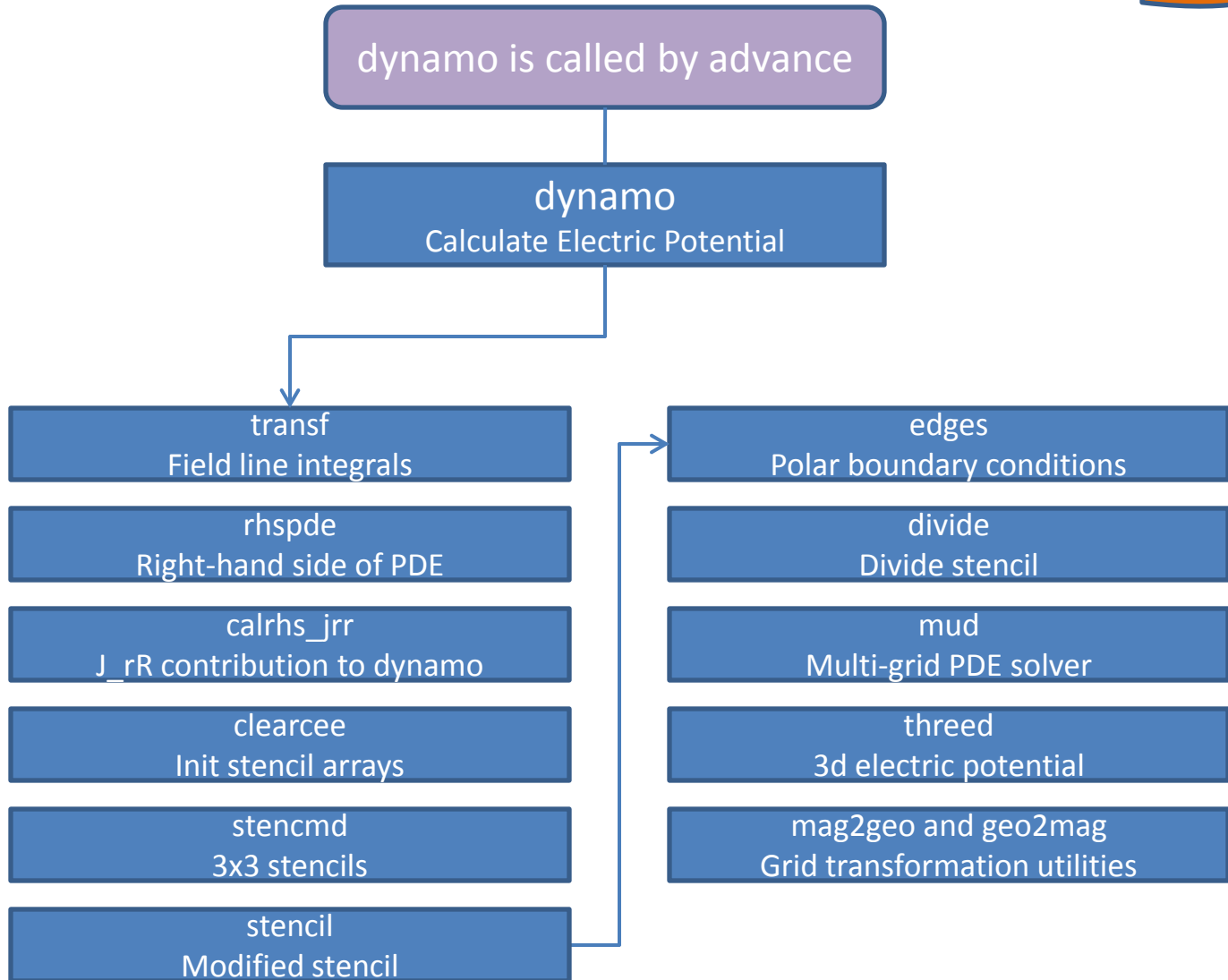
bdzdvb  
 $(bz*d/(h*dz)+divb)*phi$

trsolv  
Tridiagonal solver

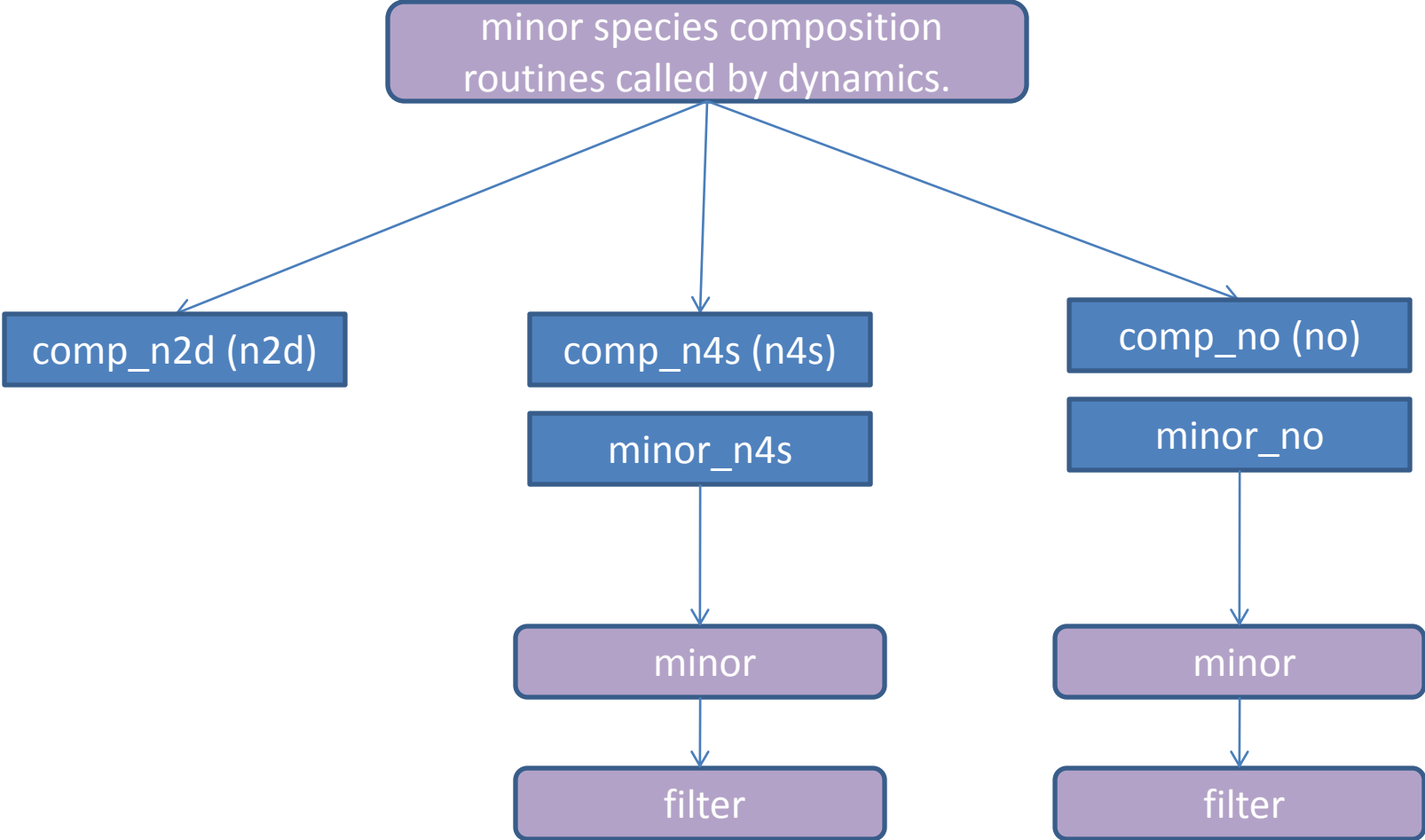
filter\_op

filter









minor  
Called by minor composition routines

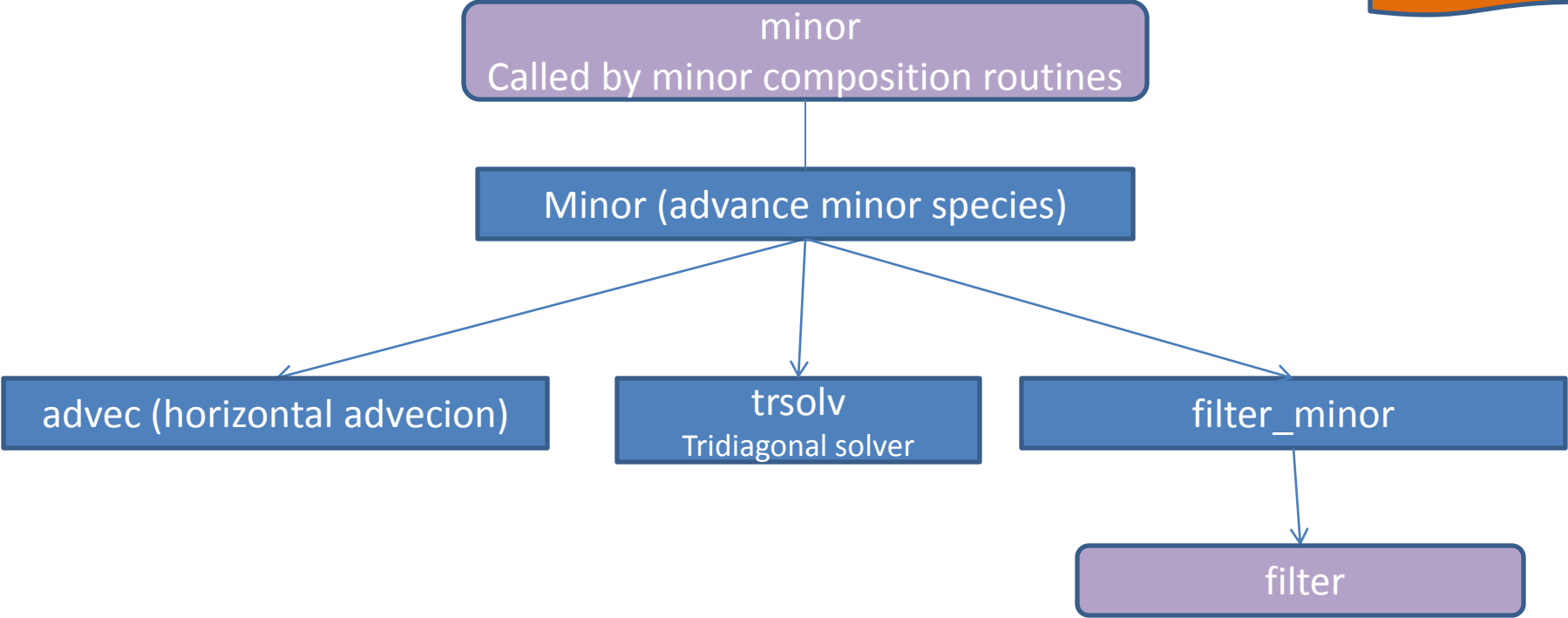
Minor (advance minor species)

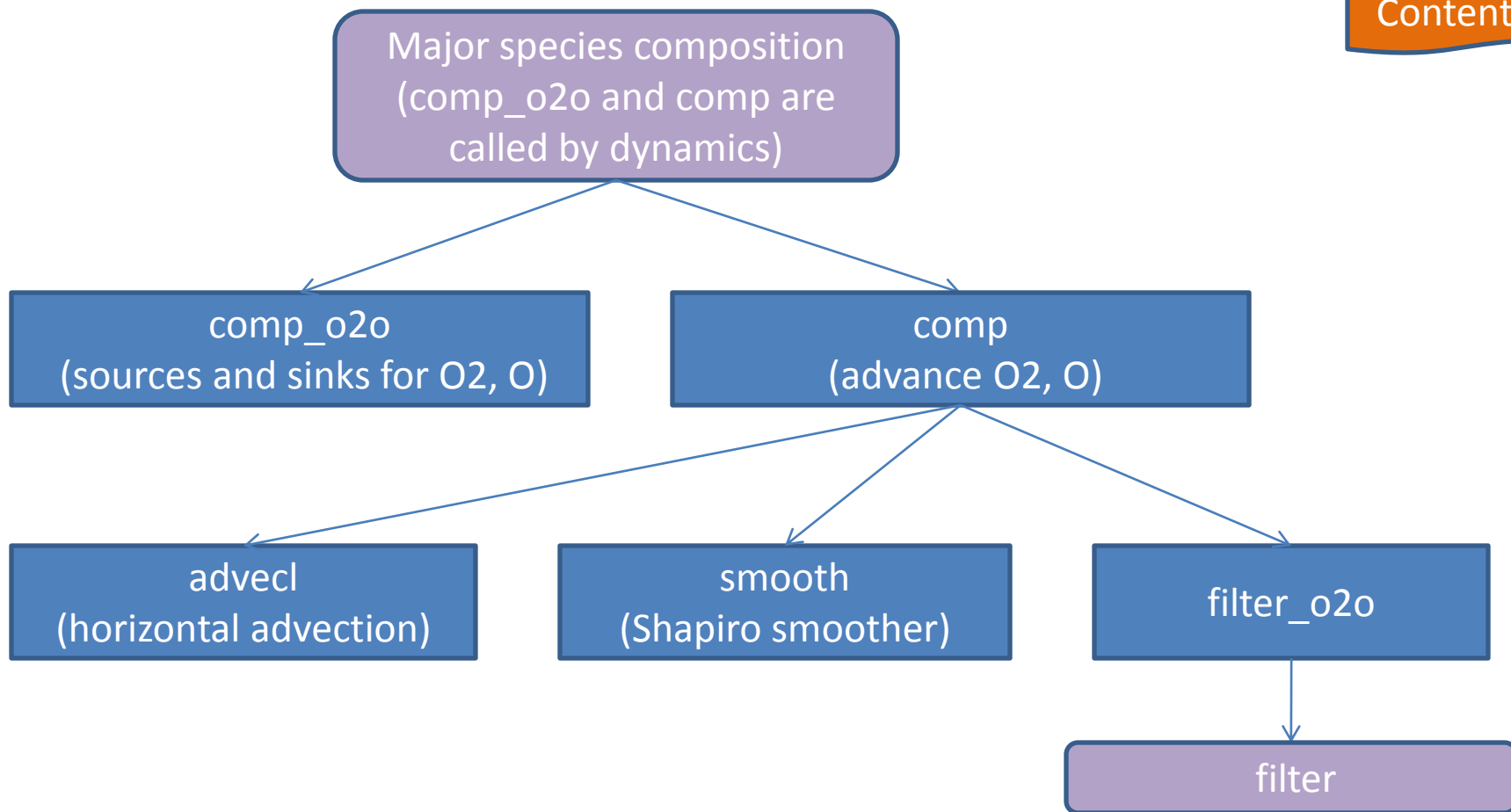
advec (horizontal adveccion)

trsolv  
Tridiagonal solver

filter\_minor

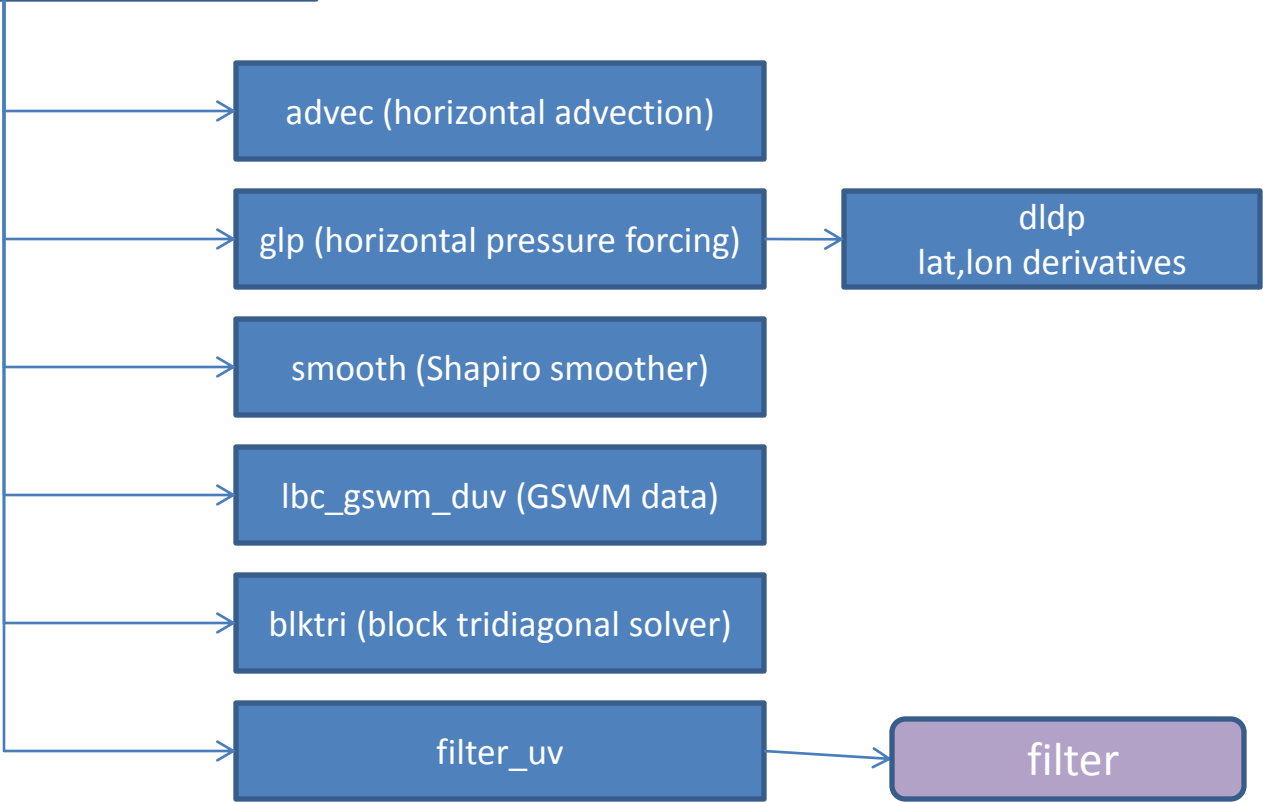
filter





duv is called by dynamics

duv  
Neutral winds U, V



outhist is called by advance

output  
Write to netcdf output files

output\_hist  
Write to primary history file

output\_sechist  
Write to secondary history file

copyhist  
Copy source history

define\_hist  
Define history structure

def\_fsech  
Define secondary history

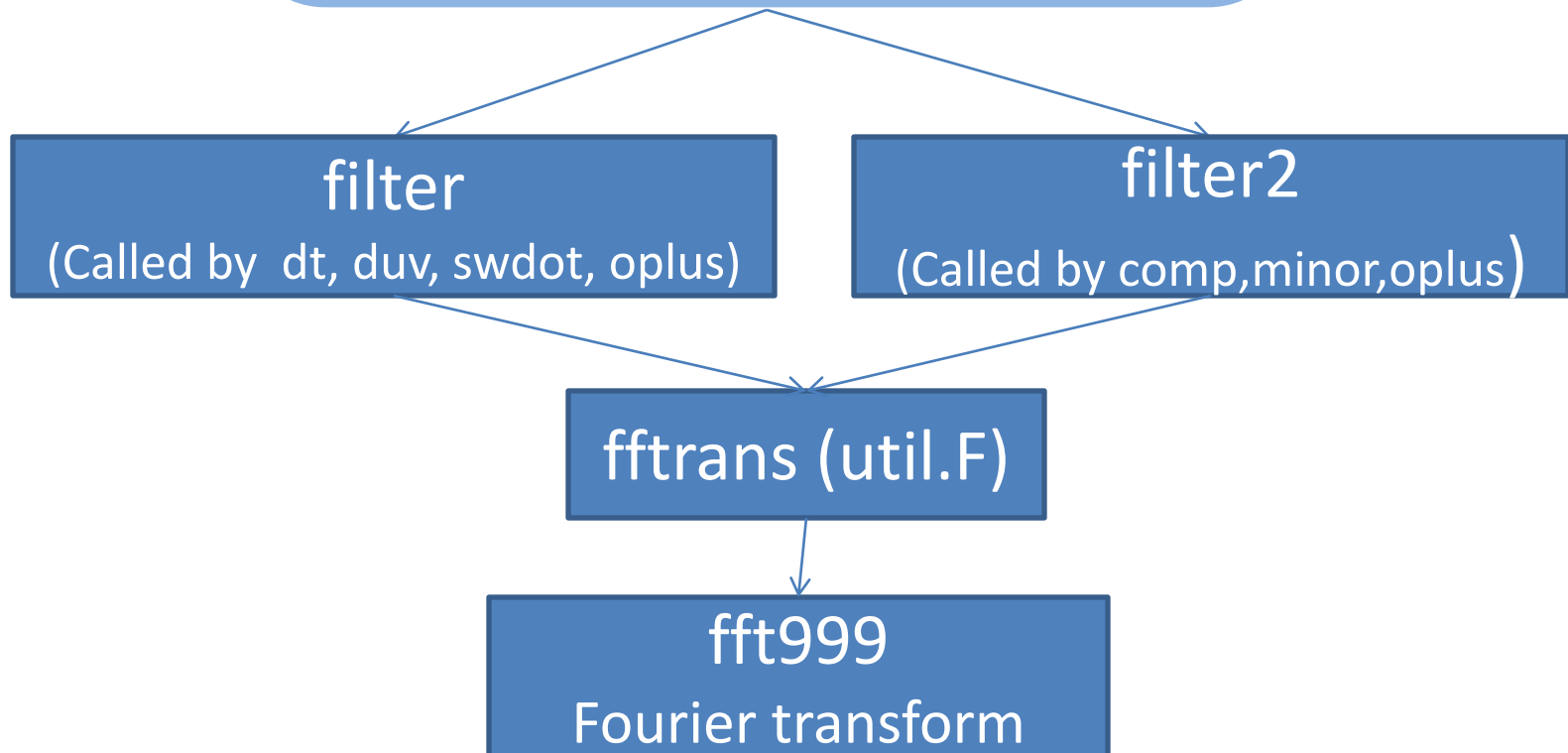
nc\_define  
Define netCDF file

nc\_wrhist  
Write history to netCDF file

savefile  
Save history file to MSS

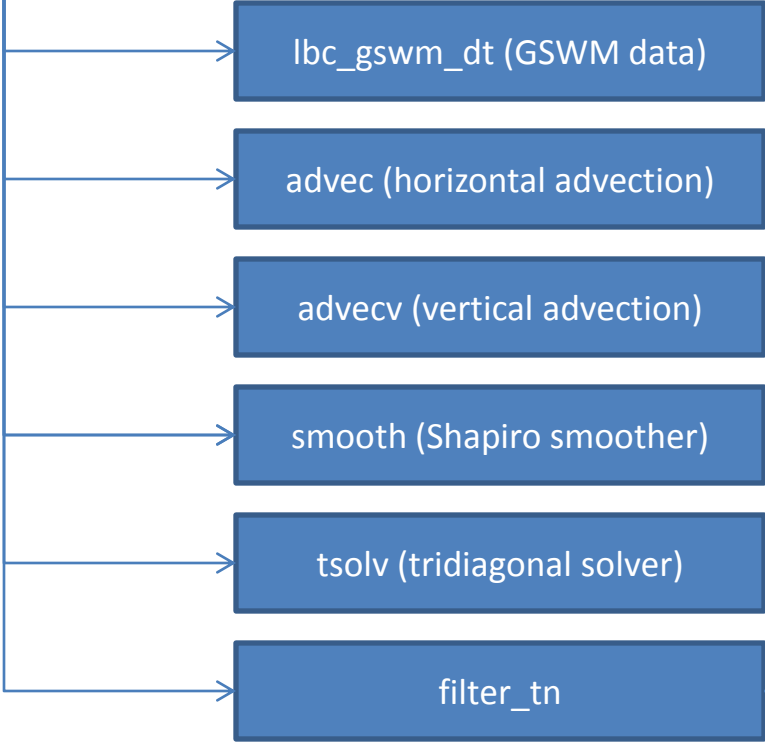
filter: Filter routines are called by:

- comp Major composition
- dt Neutral temperature
- duv Neutral winds
- minor Minor composition
- oplus O+
- swdot Vertical motion



dt is called by dynamics

dt  
Neutral Temperature TN



filter