Setup / Initialization

input_data.f90

input_data
Call Check_Slfac
hours_since_1900
yyyymmddhhmm_since_1900
Call help_input
Call read_t_list
Call get_ESP
Call PJ_Set_Proj_Params
Call LatLonChecker
Call xyChecker
Call Allocate_Source_eruption
hours_since_1900
Xmltime
hours_since_1900
Call MR_Read_Met_Template
Call MR_Allocate_MetFileList
Call Allocate_Tephra
Call Calculate_Tephra_Shape
Call Sort_Tephra_Size
Call vprofchecker
Call Allocate_Diff
LatLonChecker
XyChecker
Vprofchecker

ash_mod.f90

MODULE precis_param
MODULE global_param
MODULE io_data
MODULE mesh
MODULE solution
MODULE time_data
MODULE wind_grid

alloc_arrays.f90

alloc_arrays
Call Allocate_AdvectionHorz
Call Allocate_Output_Vars
Call Allocate_Source_grid
dealloc_arrays
Call Dealloc_Source
Call Deallocate_AdvectionHorz
Call Deallocate_Output_Vars
Call Deallocate_Diff
Call Deallocate_Airports

calc_mesh.f90

calc_mesh_params
Call MR_Set_CompProjection
Call MR_Initialize_Met_Grids
get_minmax_lonlat
Call lproj_inv

atmosphere.f90

MODULE atmosphere
Allocate_Atmosphere_Met
Deallocate_Atmosphere_Met
Set_Atmosphere_Meso
 Call MR_Read_3d_MetP_Variable
Dens_IdealGasLaw
Visc_Sutherland
lambda_MeanFreePath

Tephra.f90

MODULE Tephra
Allocate_Tephra
Allocate_Tephra_Met
Deallocate_Tephra
Deallocate_Tephra_Met
Set_Vf_Meso
 Call Regrid_MetP_to_CompGrid
Calculate_Tephra_Shape
Sort_Tephra_Size
 Call partition_gsbins
partition_gsbins
Collapse_GS
vset_WH
vset_WH_slip
vset_WH_PCM
vset_Gans
vset_Stokes
vset_Stokesslip
vset_Stokes_Cloud

Airports.f90

MODULE Airports
Allocate_Airports
Deallocate_Airports
ReadAirports
 Include data
 Call lproj
Call Allocate_Airports
 Call lproj
bilinear_thickness

VotW.f90

MODULE VotW_ESP
get_ESP
 Include data

Aux_data/VotW_LatLon_v12.h

Aux_data/VotW_LocESP_v12.h

Aux_data/VotW_NameNum_v12.h

Help.f90

help_input

Aux_data/GlobalAirports_LatLon_ewert.h

Aux_data/GlobalAirports_CodeLoc_ewert.h

Set Met. Values / Calc. dt

MesoInterpolater.f90

MesoInterpolater
 Call MR_Read_HGT_arrays
 Call MR_Read_3d_Met_Variable_to_CompGrid
 Call MR_Read_UV_MetGridRelative
 Call Set_Atmosphere_Meso
 Call Set_Vf_Meso
 Call umbrella_winds

umbrella_winds.f90

umbrella_winds

adjust_dt.f90

adjust_dt

Source

Source.f90

MODULE Source
Allocate_Source_eruption
Allocate_Source_grid
Allocate_Source_time
Deallocate_Source
SourceNodes
MassFluxCalculator

set_bc.f90

set_bc

Advection

AdvectionHorz.f90

MODULE AdvectionHorz
Allocate_AdvectionHorz
 Call Allocate_CTU
 Call Allocate_SL
Deallocate_AdvectionHorz
 Call Deallocate_CTU
 Call Deallocate_SL
AdvectHorz
 Call advect_xy
 Call advect_x
 Call advect_y
 Call semi_lagrange_ll
 Call semi_lagrange_xy

AdvectionHorz_DCU.f90

MODULE AdvectionHorz_DCU
advect_x
advect_y

AdvectionHorz_CTU.f90

MODULE AdvectionHorz_CTU
Allocate_CTU
Deallocate_CTU
advect_xy
 Call x_face_flux
 Call y_face_flux
 Call sphere_update
 Call update_xy
x_face_flux
y_face_flux
sphere_update
update_xy

AdvectionHorz_SL.f90

MODULE AdvectionHorz_SL
Check_SLfac
Allocate_SL
Deallocate_SL
Semi_lagrange_ll
semi_lagrange_xy

AdvectionVert_DCU.f90

MODULE AdvectionVert_DCU
advect_z

Diffusion

Diffusion.f90

MODULE Diffusion
Allocate_Diff
Deallocate_Diff
DiffuseHorz
 Call diffCN_x
 Call diffCN_y
 Call diff_x
 Call diff_y
DiffuseVert
 Call diffCN_z
 Call diff_z
diff_x
diff_y
diff_z
diffCN_x
 Call sptsv / dptsv
diffCN_y
 Call sptsv / dptsv
diffCN_z
 Call sptsv / dptsv

ASH3D.F90

Call input_data
Call ReadAirports
Call alloc_arrays
Call calc_mesh_params
Call load_concen
Call Allocate_Atmosphere_Met
Call Allocate_Tephra_Met
Call Allocate_Output_UserVars
Call MesoInterpolater
Call output_results
Call Allocate_Source_time
Call MassFluxCalculator

Loop over time:
 Call MesoInterpolater
 Call adjust_dt
 Call MassFluxCalculator
 Call SourceNodes
 Call set_bc
 Call AdvectHorz
 Call advect_z
 Call DiffuseVert
 Call DiffuseHorz
 Call Gen_Output_Vars
 Call FirstAsh
 Call vprofilewriter
 Call output_results
 Call TimeStepTotals
 Call Collapse_GS
End loop over time

Call Gen_Output_Vars
Call output_results
Call TimeStepTotals
Call dealloc_arrays

Test Output Criteria

Output_Vars.f90

MODULE Output_Vars
Allocate_Output_Vars
Allocate_Output_UserVars
Deallocate_Output_Vars
Deallocate_Output_UserVars
ThicknessCalculator
DbZCalculator
 Call AshLoadCalculator
ConcentrationCalculator
AshLoadCalculator
Get_Output_Vars
 Call ThicknessCalculator
 Call AshLoadCalculator
 Call ConcentrationCalculator
Calc_Vol_Aloft
Calc_Vol_Deposit
Calc_Vol_Outflow

FirstAsh.f90

FirstAsh

TimeStepTotals.f90

TimeStepsTotals
 Call Calc_Vol_Aloft
 Call Calc_Vol_Deposit
 Call Calc_Vol_Outflow
yyyymmddhhmm_since_1900

Output

output.f90

output_results
 Call Set_OutVar_Specs
 Call OpenFile_KML
 Call create_netcdf_file
 Call write_2D_ASCII
 Call write_2D_KML
 Call write_3D_ASCII
 Call write_3D_Binary
 Call append_to_netcdf
 Call vprofileclose
 Call OpenFile_KML
 Call Write_2D_KML
 Call Close_KML
 Call write_2D_ASCII
 Call Write_PointData_Airports_KML
 Call Write_PointData_Airports_ASCII

write_NETCDF.f90

create_netcdf_file
 Call GetLog
 yyyymmddhhmm_since_1900
 Call dbzCalculator
append_to_netcdf
 Call dbzCalculator
read_t_list
load_concen

write_ASCII.f90

Vprofileopener
Vprofilewriter
Vprofilecloser
write_2D_ASCII
write_3D_ASCII
write_PointData_Airports_ASCII

write_BINARY.f90

write_3D_Binary

write_KML.f90

MODULE Output_KML
Set_OutVar_Specs
OpenFile_KML
 Call PlotModelBoundary
 Call lproj_inv
Write_2D_KML
 Call lproj_inv
Write_PointData_Airports_KML
 Call lproj_inv
Close_KML
PlotModelBoundary
 Call lproj_inv
month

Optional Modules

Topography.f90

MODULE Topography
input_data_Topo
Allocate_Topo
Prep_output_Topo
Deallocate_Topo
get_topo
 Call get_minmax_lonlat
 Call load_topo
 Call interp_topo
 Call smoothTopo
load_topo
interp_topo
SmoothTopo

land_cover.f90

MODULE land_cover
input_data_LC
Allocate_LC
Prep_outpt_LC
Deallocate_LC
load_LC
 Call get_minmax_lonlat
assign_LC

Testcases.f90

set_TestCase_windfield
 Call set_LL_wind
set_LL_wind
DistSource
Testcase_CalcErrors
 Call back_rotate
MMS_TrueSol
MMS_Source
back_rotate

Sigma_Altitude.f90

Source_Satellite.f90

MODULE Source_Satellite
input_data_SRC_SAT
Allocate_Source_Satellite
Prep_outpt_SrcSat
Deallocate_SrcSat
Read_SatMassLoading
Gaussian_Frac

Source_Resuspension.f90

MODULE Source_Resuspension
input_data_Source_Resuspension
Allocate_Source_Resuspension
Prep_outpt_Source_Resuspension
Deallocate_Source_Resuspension
Read_Deposit_Perimeter
 Call lproj
Set_Resup_Meso
 Call MR_Regrid_Met2d_to_Comp2d
 Call MR_Read_2d_Met_Variable_to_CompGrid
Set_Resusp_Flux
Set_concen_Resusp
IsIn
IsOdd

Source_Gas.f90

MODULE Source_Gas
input_data_Source_Gas
Allocate_Source_Gas
Prep_outpt_Source_Gas
Deallocate_Source_Gas
Read_Deposit_Perimeter
 Call lproj
Set_Gas_Meso
 Call MR_Regrid_Met2d_to_Comp2d
 Call MR_Read_2d_Met_Variable_to_CompGrid
Set_Gas_Flux
Set_concen_Gas

variable_diffusivity.f90

MODULE variable_diffusivity
input_data_VarDiff
Allocate_VarDiff_Met
Prep_output_VarDiff
Deallocate_VarDiff_Met
Eddy_diff
Calc_Vert_diff
Set_VarDiffH_Meso
 Call MR_Read_3d_MetP_Variables
 Call MR_DelMetP_Dx
 Call MR_DelMetP_Dy
 Call Eddy_diff
 Call MR_Regrid_MetP_to_CompGrid
Set_VarDiffV_Meso
 Call Calc_Ri
 Call Calc_SurfaceRoughnessLength
 Call Calc_SurfaceFrictionVelocity
 Call Calc_Boundary_Lengths
 Call Calc_Vert_Diff
 Call MR_Regrid_MetP_to_CompGrid
Calc_Ri
Calc_SurfaceRoughnessLength
 Call MR_Read_2d_Met_Variable
Calc_SurfaceFrictionVelocity
 Call MR_Read_2d_Met_Variable
Calc_Boundary_Lengths
 Call MR_Read_2d_Met_Variable
Fc
Fc_Piedelievre
Phi_WindShear_NonDim
MixLen_CAM3

WetDepo.f90

MODULE Wet_Deposition
input_data_WetDepo
Allocate_WetDepo_global
Allocate_WetDepo_Met
Prep_output_WetDepo
Deallocate_WetDepo_global
Deallocate_WetDepo_Met
Set_WetDepo_Meso
 Call MR_Read_2d_MetP_Variable
 Call MR_Regrid_Met2d_to_Comp2d
 Call Set_Cloud_Level
 Call MR_Read_MetP_To_CompGrid
 Call Set_Scav_Coeff
Set_Cloud_Level
 Call MR_Read_3d_MetP_Variable
Set_Scav_Coeff
Interpolate_WetDepo
Wet_Depo_Rainout
Ceffic
Get_Rain_diam_p0
Get_Rain_vel
ThicknessCalculator_WetDepo

ocean_currents.f90

MODULE ocean_currents
input_data_OSCAR
Allocate_OSCAR
Prep_output_OSCAR
Deallocate_OSCAR
Check_SurfaceVelocity
 hours_since_1900
 Call Read_SurfaceVelocity
Read_SurfaceVelocity
 Call rgrd2_sp
Set_SurfaceVelocity
 Call Read_SurfaceVelocity
advect_deposit

AdvectionHorz_CTU.f90

MODULE AdvectionHorz_CTU
Allocate_CTU
Deallocate_CTU
advect_xy
 Call x_face_flux
 Call y_face_flux
 Call sphere_update
 Call update_xy
x_face_flux
y_face_flux
sphere_update
update_xy

AdvectionHorz_SL.f90

MODULE AdvectionHorz_SL
Check_SLfac
Allocate_SL
Deallocate_SL
Semi_lagrange_ll
semi_lagrange_xy

AdvectionHorz_SL.f90

MODULE AdvectionHorz_SL
Check_SLfac
Allocate_SL
Deallocate_SL
Semi_lagrange_ll
semi_lagrange_xy