single_vs_double_precision_timemeanprofile

June 6, 2024

[1]:
```
import xarray as xr
import numpy as np
import matplotlib.pyplot as plt
import sys
```

[2]:
```
output_dir1 = './output32'
output_dir2 = './output64'
case_output = '/output_twpice_SCM_RAP'

f32 = output_dir1 + case_output + '/output.nc'
f64 = output_dir2 + case_output + '/output.nc'

ds32 = xr.open_dataset(f32)
ds64 = xr.open_dataset(f64)
```

[3]:
```
ds32.identical(ds64)
```

[3]:
```
False
```

[4]:
```
print("single precision var is red, double precision var is blue")
# compare variables across full run
for var in ds32.variables:
    #print(var)
    if ('time' in var):
        continue
    if (not ds32[var].identical(ds64[var])):
        if ('time_inst_dim' in ds32[var].dims):
            if len(ds32[var].shape) == 2:
                continue
            fig, axes = plt.subplots(nrows=1, ncols=2, figsize=(12, 4))
            ds32[var].mean(dim="time_inst_dim").plot(ax=axes[0],c='r')
            ds64[var].mean(dim="time_inst_dim").plot(ax=axes[0],c='b')
            axes[0].set_title(var+' mean profile')
            (ds64[var].mean(dim="time_inst_dim")-ds32[var].
 ↪mean(dim="time_inst_dim")).plot(ax=axes[1])

            axes[1].set_title(var+' profile difference')
            plt.show()
```

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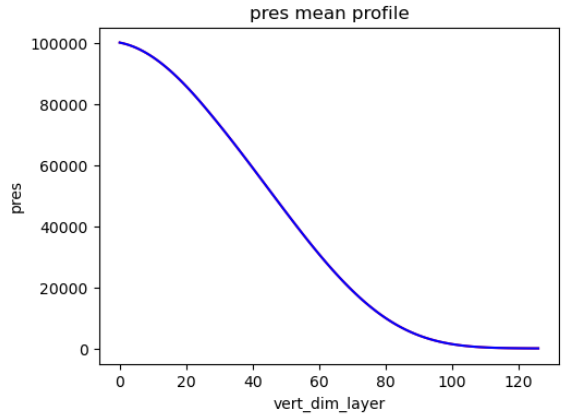
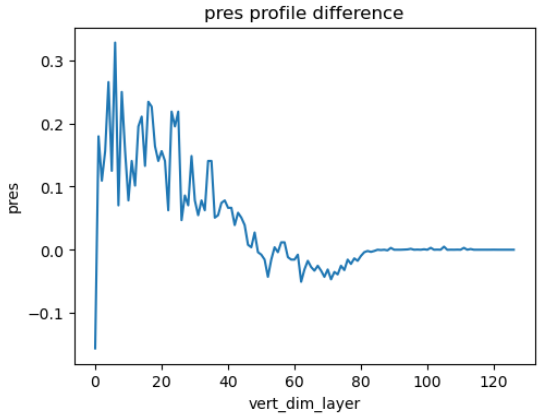
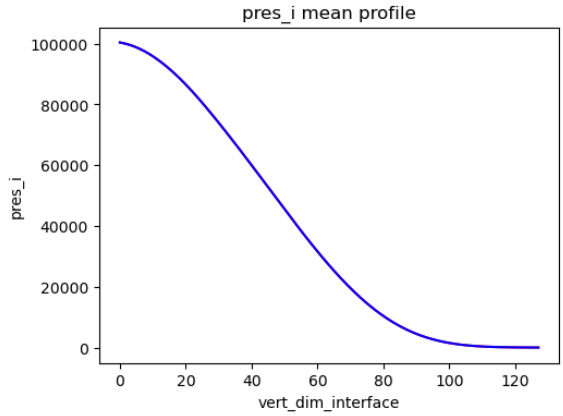
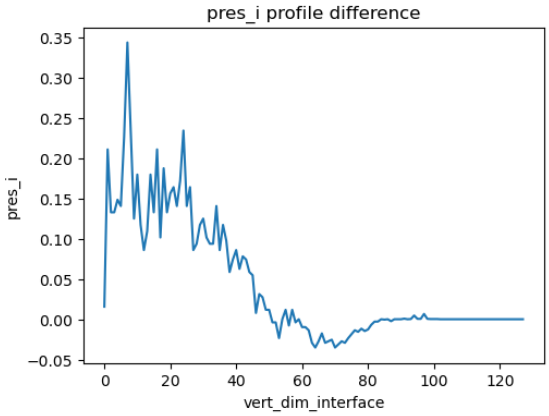
        elif ('time_rad_dim' in ds32[var].dims):
            if len(ds32[var].shape) == 2:
                continue
            fig, axes = plt.subplots(nrows=1, ncols=2, figsize=(12, 4))
            ds32[var].mean(dim="time_rad_dim").plot(ax=axes[0],c='r')
            ds64[var].mean(dim="time_rad_dim").plot(ax=axes[0],c='b')
            axes[0].set_title(var+' mean profile')
            (ds64[var].mean(dim="time_rad_dim")-ds32[var].
↪mean(dim="time_rad_dim")).plot(ax=axes[1])
            axes[1].set_title(var+' profile difference')
            plt.show()
        elif ('time_swrad_dim' in ds32[var].dims):
            if len(ds32[var].shape) == 2:
                continue
            fig, axes = plt.subplots(nrows=1, ncols=2, figsize=(12, 4))
            ds32[var].mean(dim="time_swrad_dim").plot(ax=axes[0],c='r')
            ds64[var].mean(dim="time_swrad_dim").plot(ax=axes[0],c='b')
            axes[0].set_title(var+' mean profile')
            (ds64[var].mean(dim="time_swrad_dim")-ds32[var].
↪mean(dim="time_swrad_dim")).plot(ax=axes[1])
            axes[1].set_title(var+' profile difference')
            plt.show()
        elif ('time_lwrad_dim' in ds32[var].dims):
            if len(ds32[var].shape) == 2:
                continue
            fig, axes = plt.subplots(nrows=1, ncols=2, figsize=(12, 4))
            ds32[var].mean(dim="time_lwrad_dim").plot(ax=axes[0],c='r')
            ds64[var].mean(dim="time_lwrad_dim").plot(ax=axes[0],c='b')
            axes[0].set_title(var+' mean profile')
            (ds64[var].mean(dim="time_lwrad_dim")-ds32[var].
↪mean(dim="time_lwrad_dim")).plot(ax=axes[1])
            axes[1].set_title(var+' profile difference')
            plt.show()
        elif ('time_diag_dim' in ds32[var].dims):
            if len(ds32[var].shape) == 2:
                continue
            fig, axes = plt.subplots(nrows=1, ncols=2, figsize=(12, 4))
            ds32[var].mean(dim="time_diag_dim").plot(ax=axes[0],c='r')
            ds64[var].mean(dim="time_diag_dim").plot(ax=axes[0],c='b')
            axes[0].set_title(var+' mean profile')
            (ds64[var].mean(dim="time_diag_dim")-ds32[var].
↪mean(dim="time_diag_dim")).plot(ax=axes[1])
            axes[1].set_title(var+' profile difference')
            plt.show()
        else:
            print(ds32[var])
            sys.exit()
```

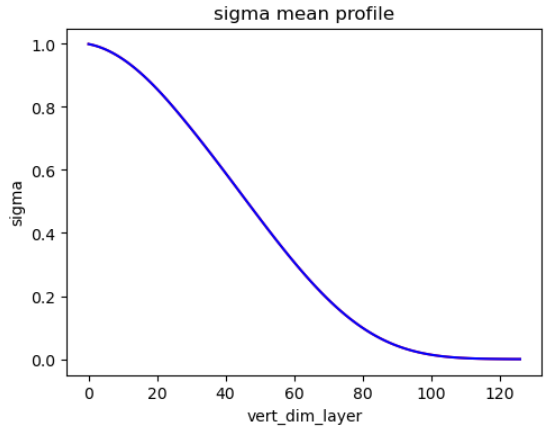
single precision var is red, double precision var is blue

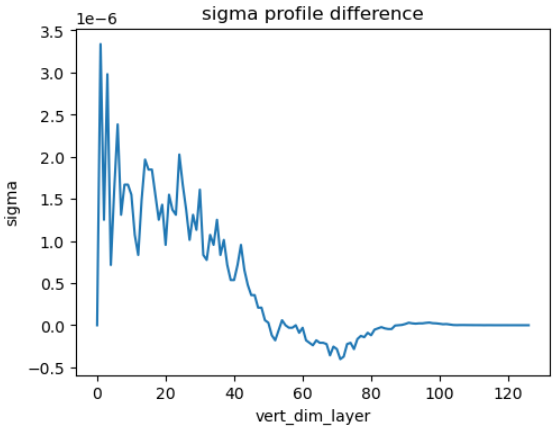


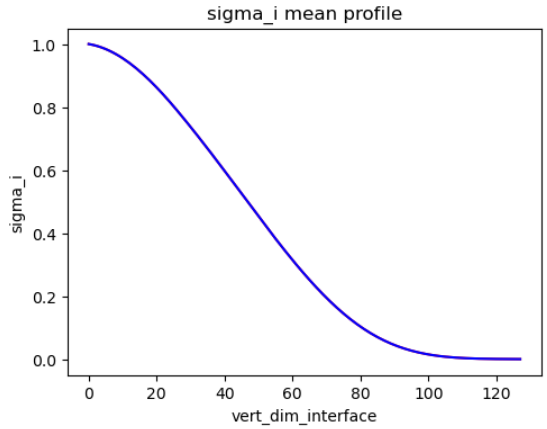








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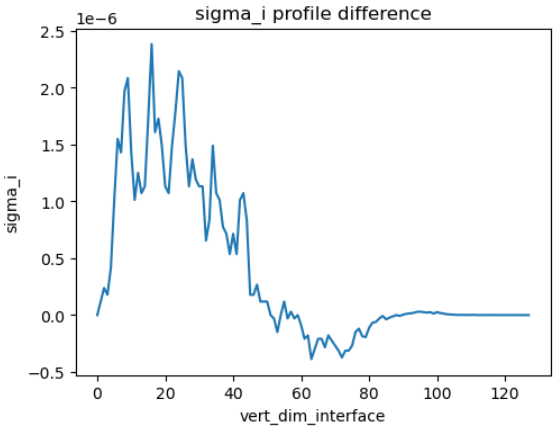
sigma_i
vert_dim_interface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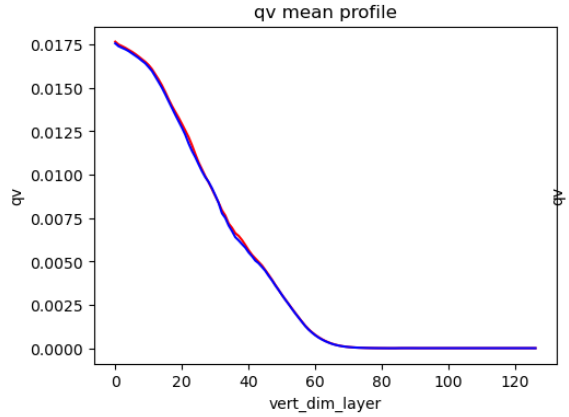
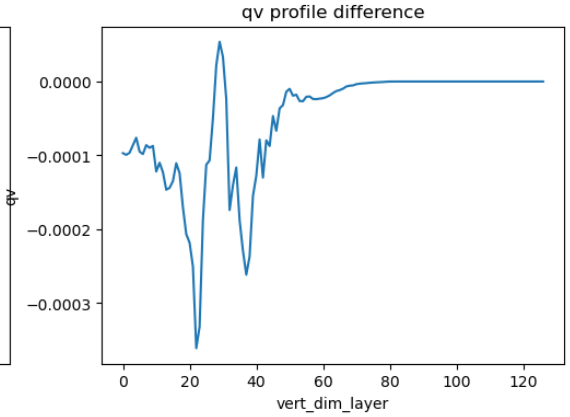
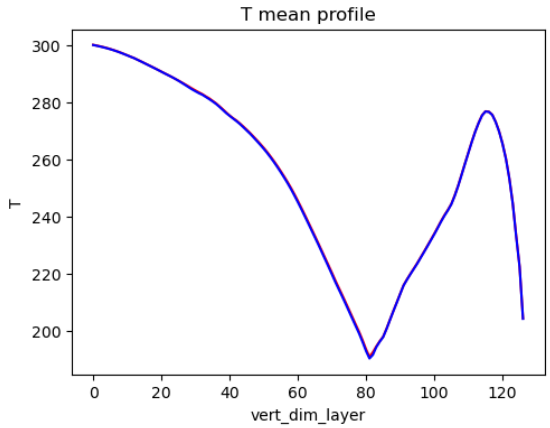
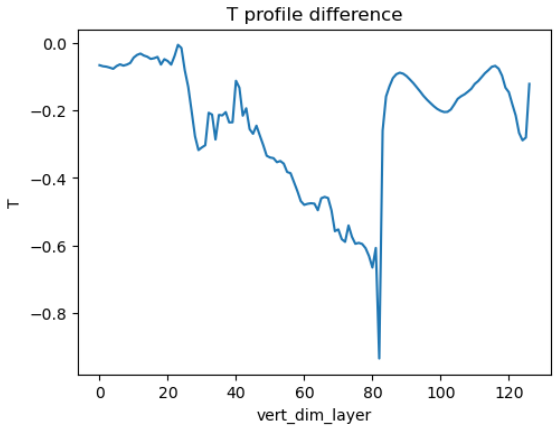
1e−6
sigma_i
vert_dim_interface


qv mean profile
qv
vert_dim_layer


qv profile difference
qv
vert_dim_layer


T mean profile
T
vert_dim_layer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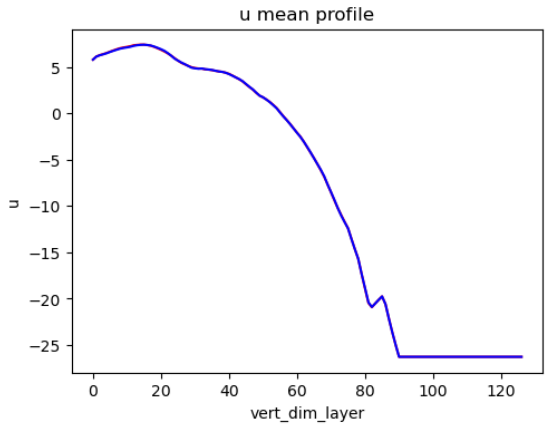
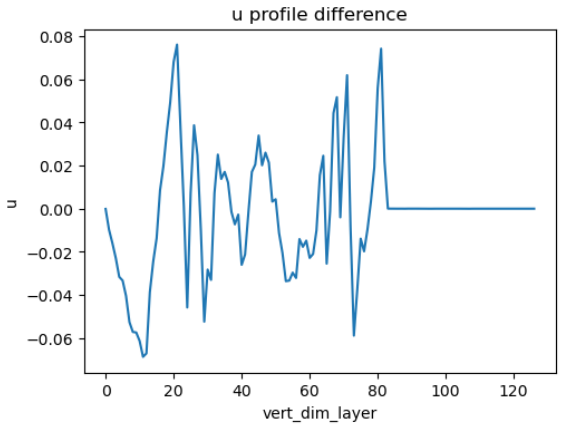
T
vert_dim_layer


u mean profile
u
vert_dim_layer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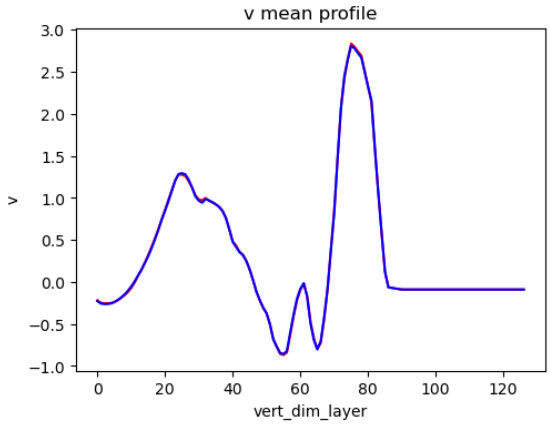
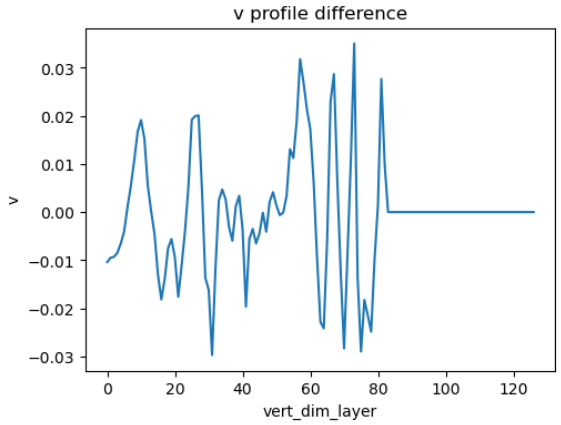
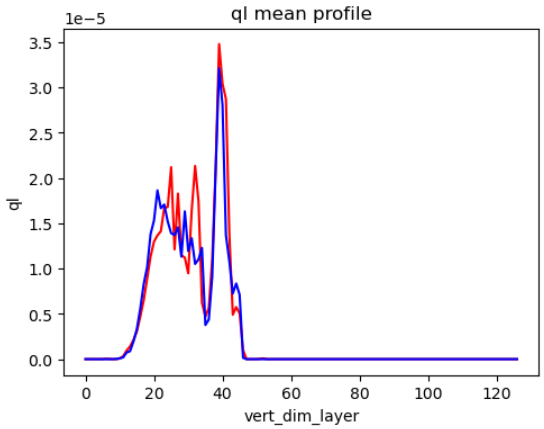
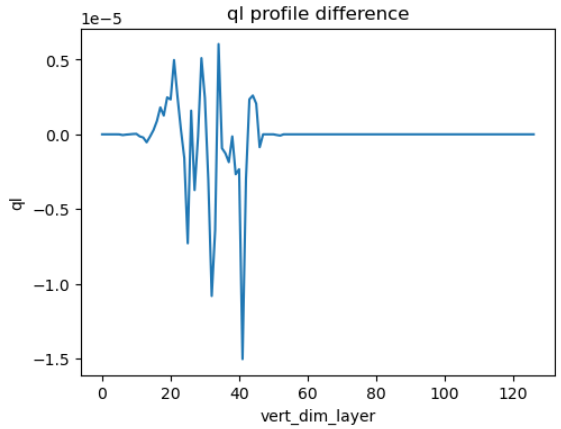

v mean profile
v
vert_dim_layer


v profile difference
v
vert_dim_layer


ql mean profile
1e−5
ql
vert_dim_layer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1e−5
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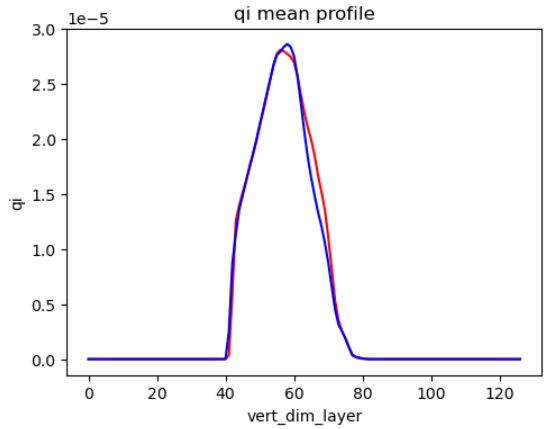
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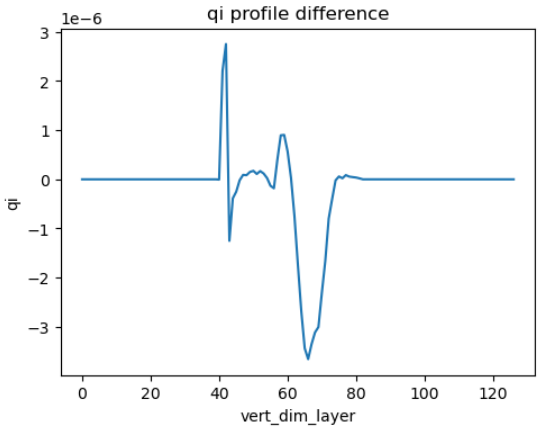
1e−5
qi
vert_dim_layer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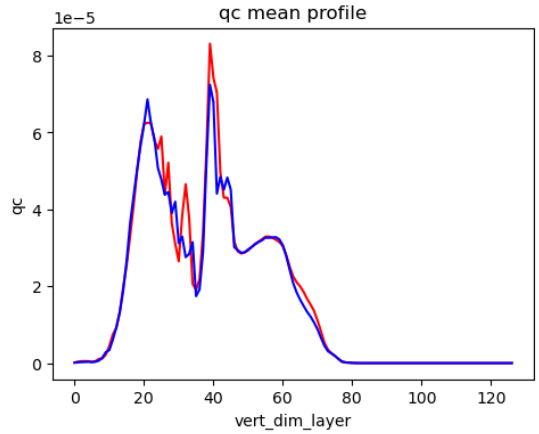
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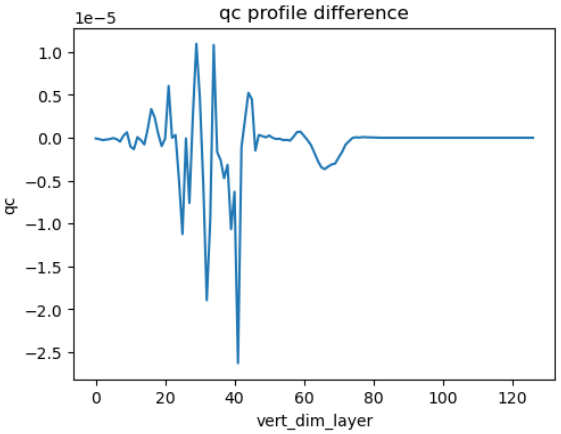
qc profile difference
1e−5
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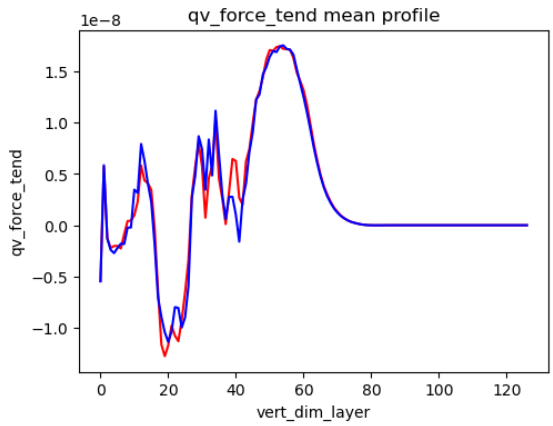
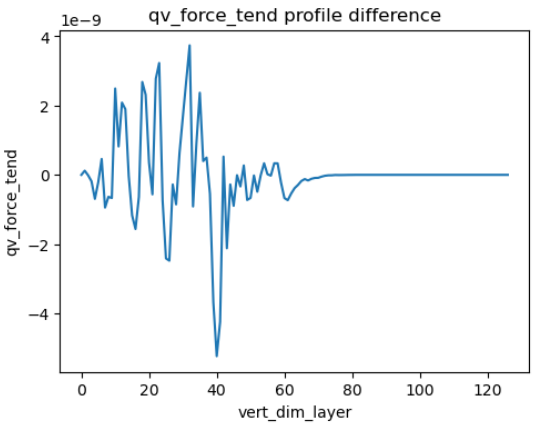
vert_dim_layer


qv_force_tend mean profile
1e−8
qv_force_tend
vert_dim_layer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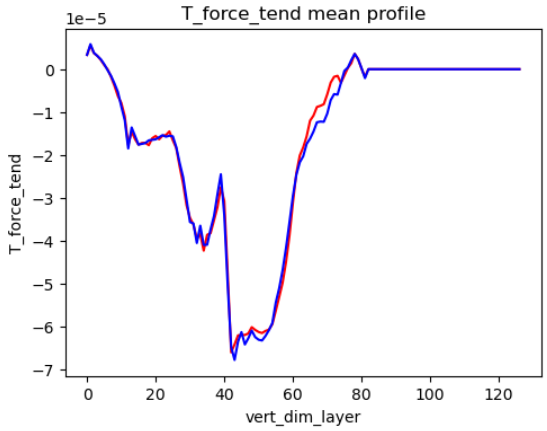
qv_force_tend
vert_dim_layer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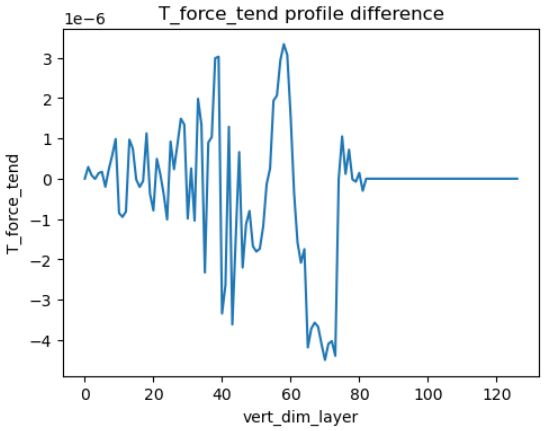
T_force_tend
vert_dim_layer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T_force_tend
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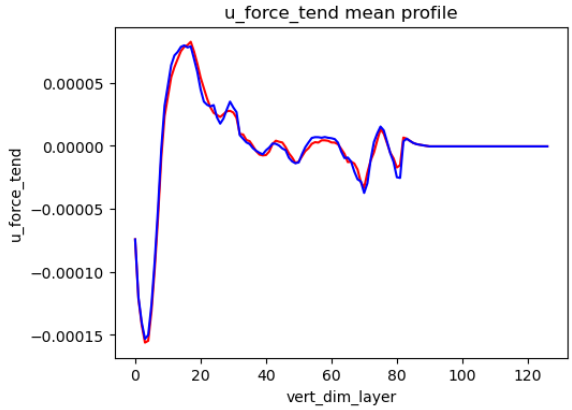
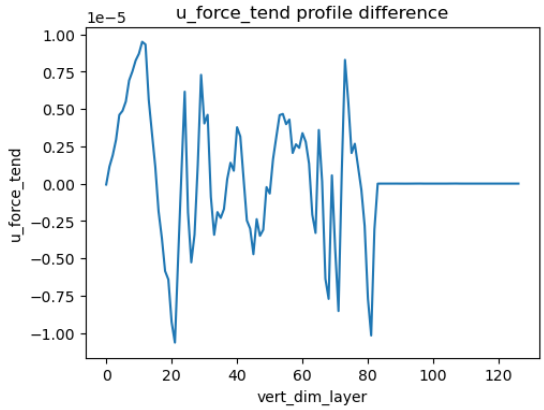

u_force_tend mean profile
u_force_tend
vert_dim_layer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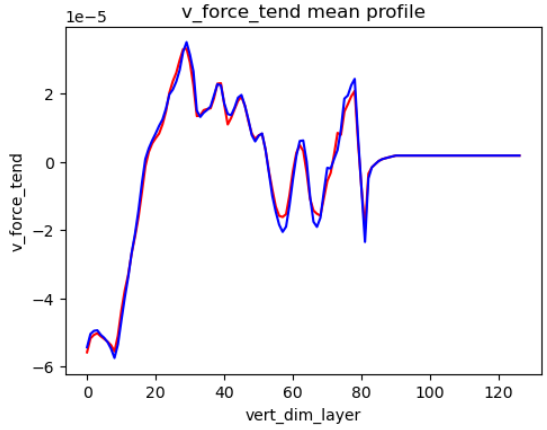
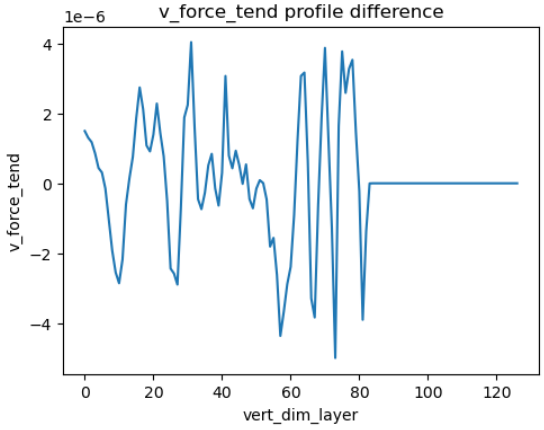
u_force_tend
vert_dim_layer


v_force_tend mean profile
1e−5
v_force_tend
vert_dim_layer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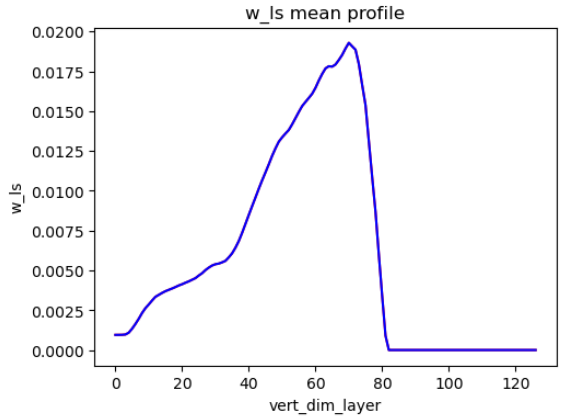
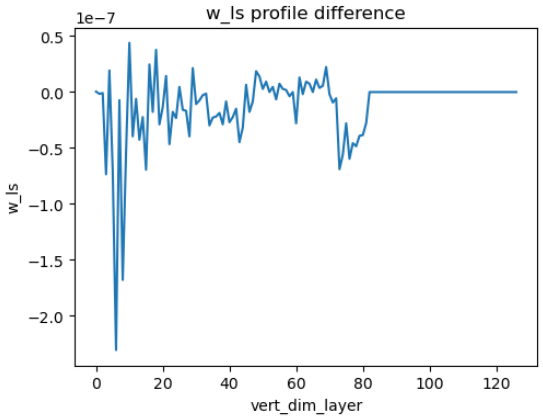
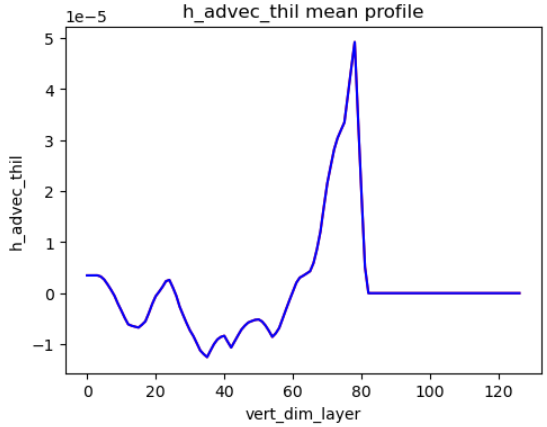
1e−6
v_force_tend
vert_dim_layer


w_ls mean profile
w_ls
vert_dim_layer


w_ls profile difference
1e−7
w_ls
vert_dim_layer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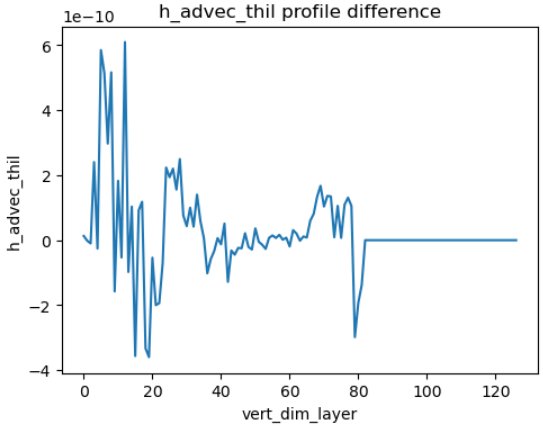
1e−5
h_advec_thil
vert_dim_layer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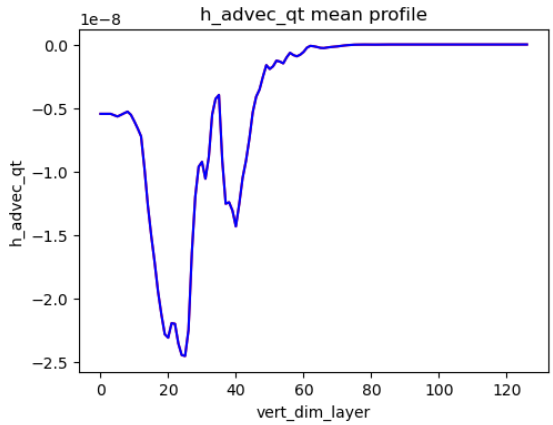
h_advec_thil
vert_dim_layer


h_advec_qt mean profile
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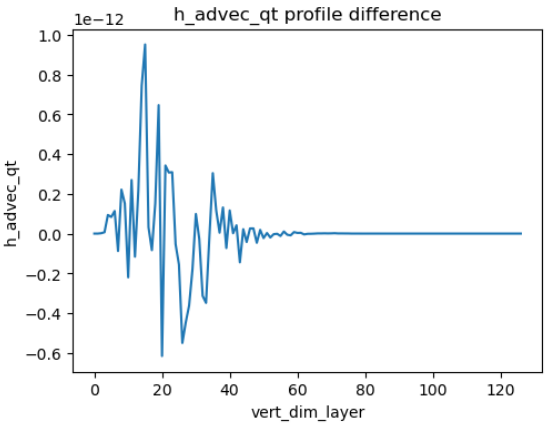
h_advec_qt
vert_dim_layer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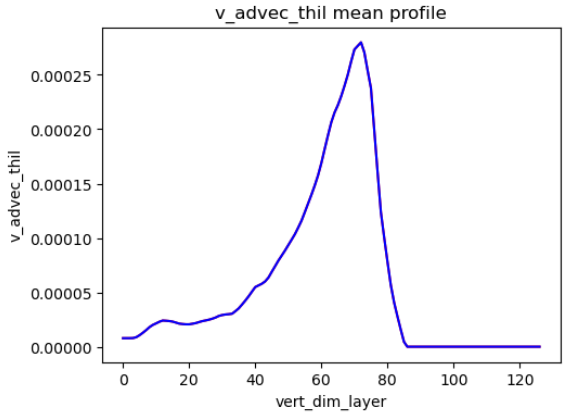
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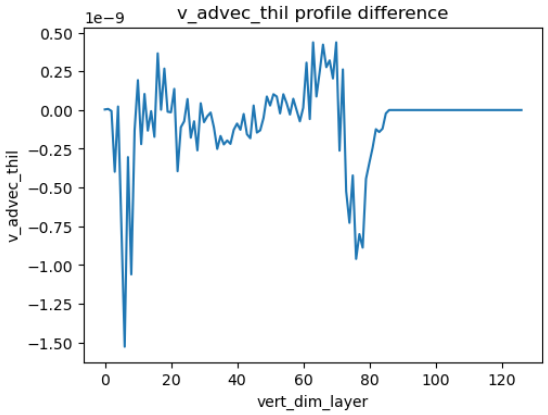
v_advec_thil
vert_dim_layer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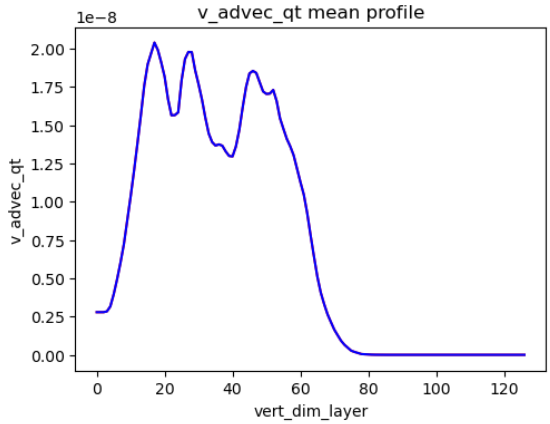
v_advec_thil
vert_dim_layer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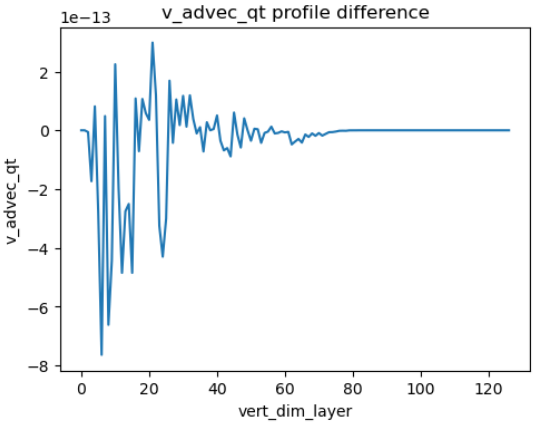
vert_dim_layer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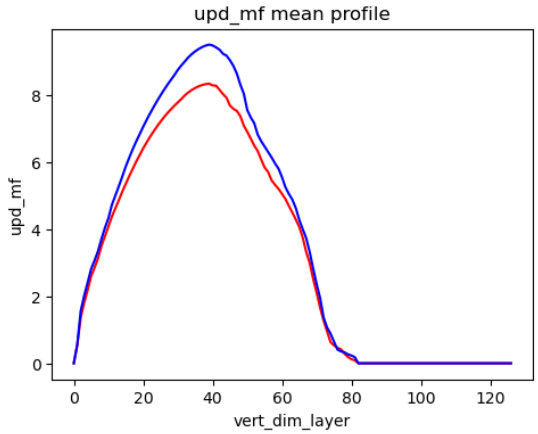
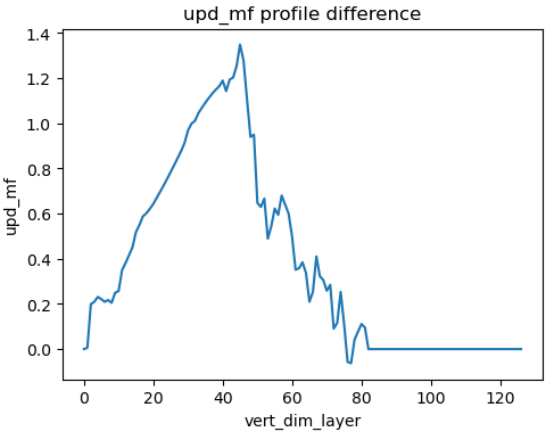
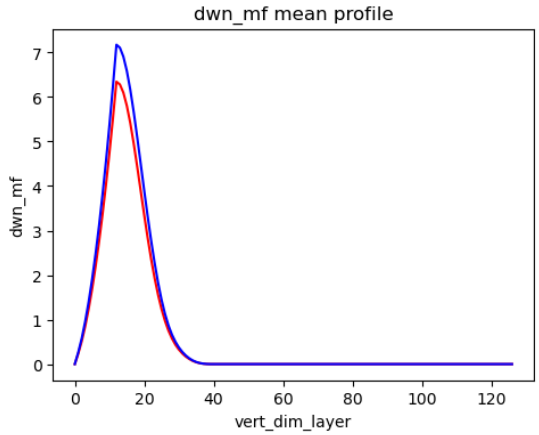
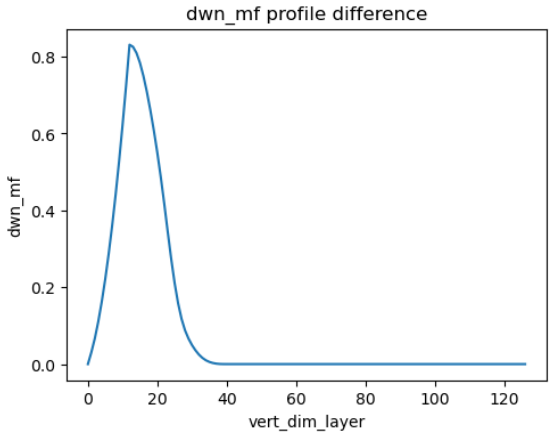
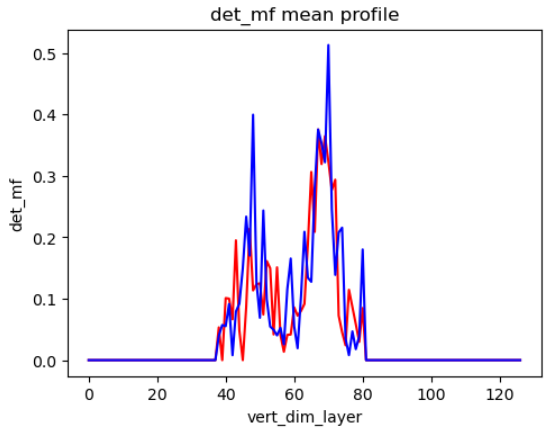
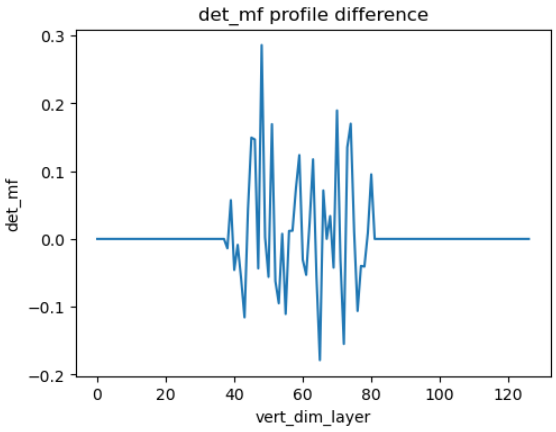

upd_mf mean profile
upd_mf
vert_dim_layer

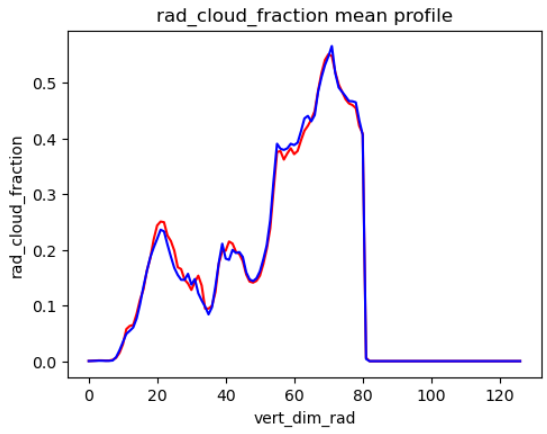

upd_mf profile difference
upd_mf
vert_dim_layer

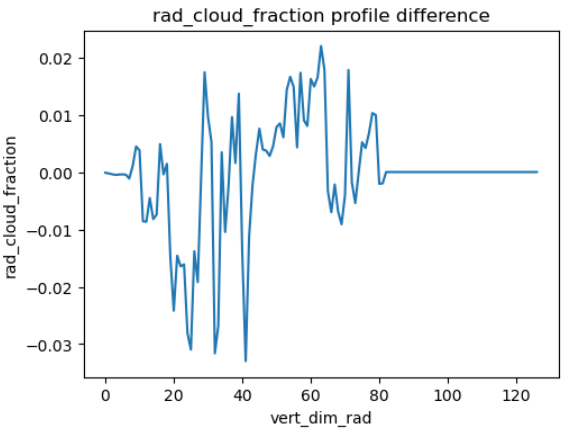

dwn_mf mean profile
dwn_mf
vert_dim_layer


dwn_mf profile difference
dwn_mf
vert_dim_layer


det_mf mean profile
det_mf
vert_dim_layer


det_mf profile difference
det_mf
vert_dim_layer


rad_cloud_fraction mean profile
rad_cloud_fraction
vert_dim_rad


rad_cloud_fraction profile difference
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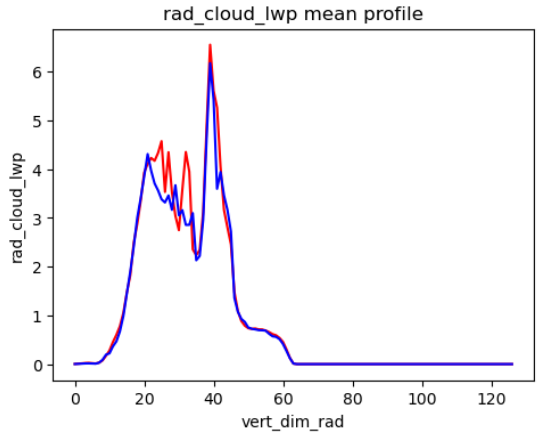
vert_dim_rad


rad_cloud_lwp mean profile
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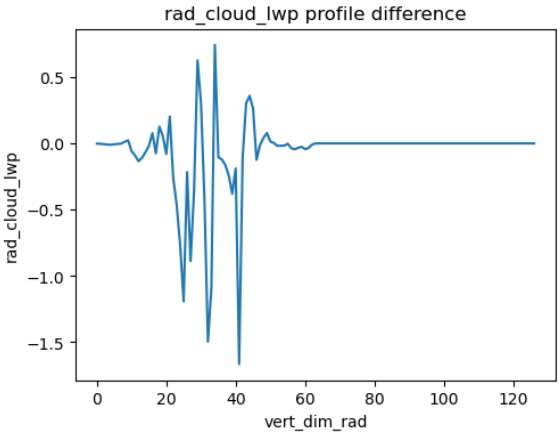
vert_dim_rad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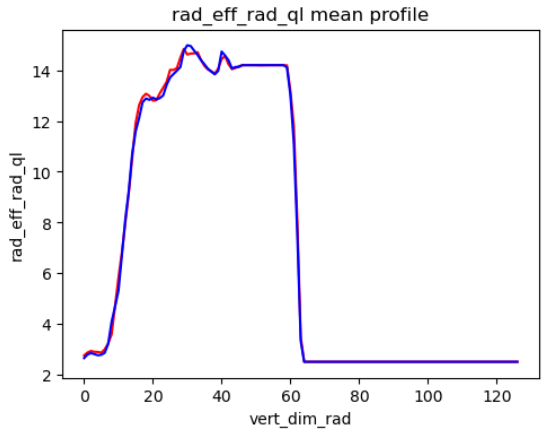
rad_cloud_lwp
vert_dim_rad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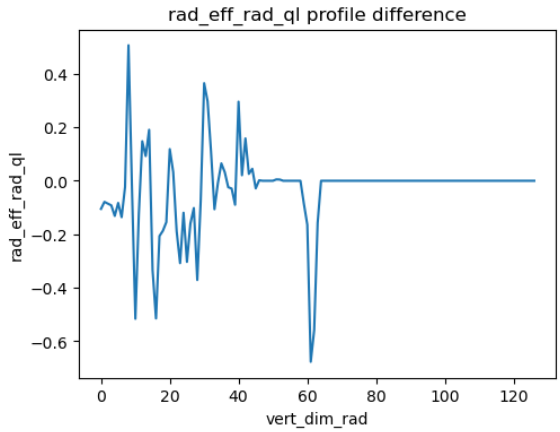
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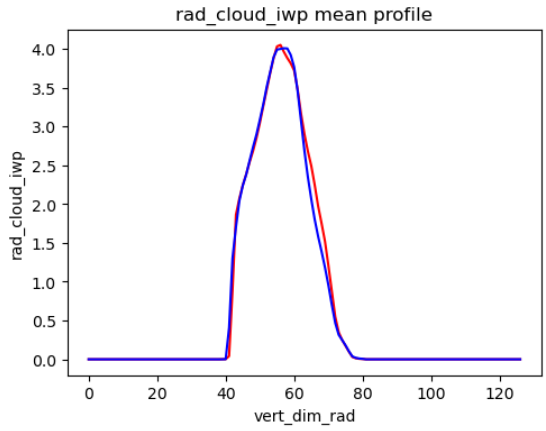
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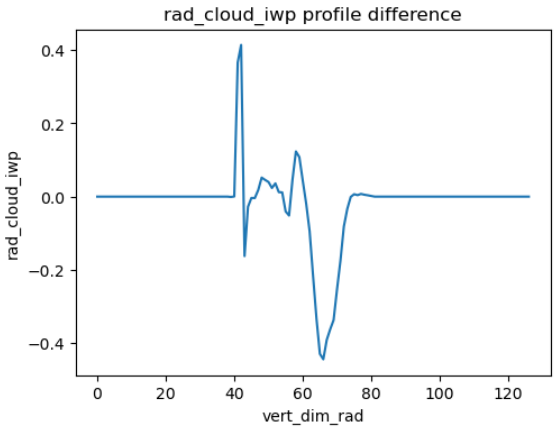
rad_cloud_iwp
vert_dim_rad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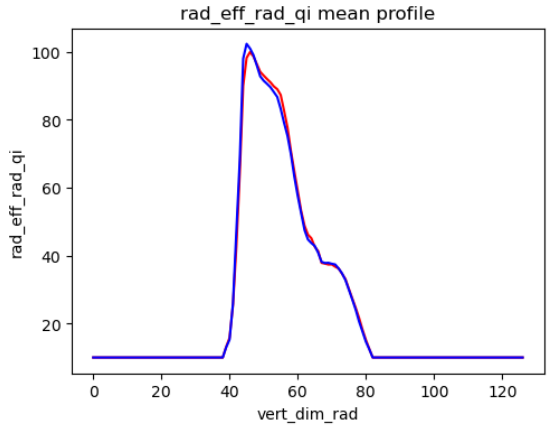
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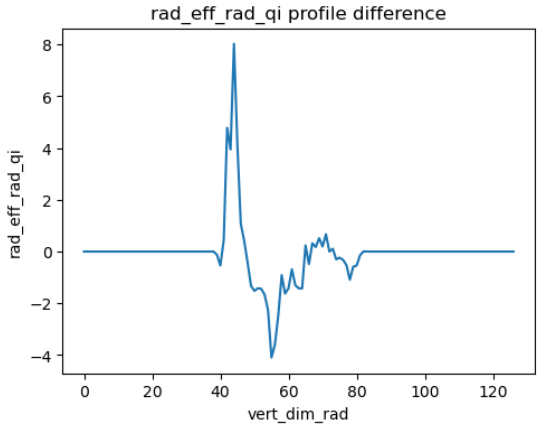
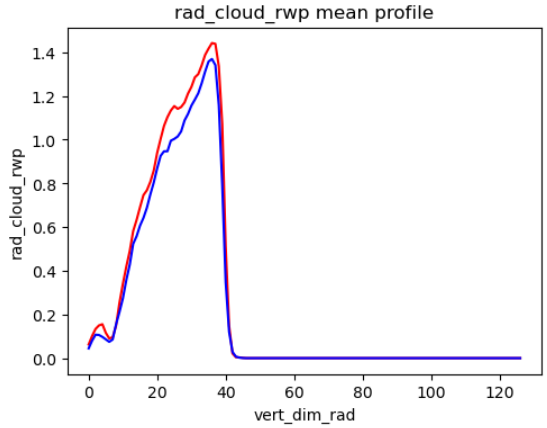
vert_dim_rad


rad_eff_rad_qi profile difference
rad_eff_rad_qi
vert_dim_rad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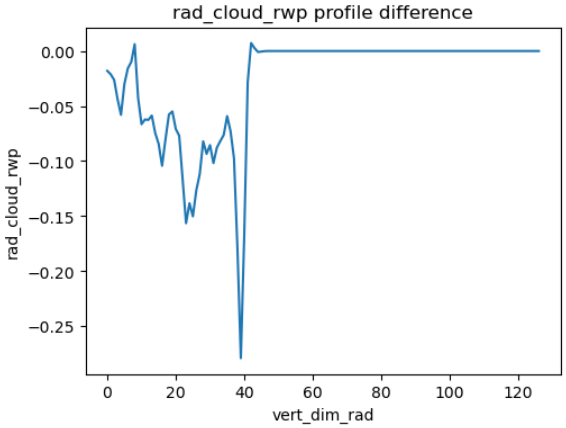
rad_cloud_rwp
vert_dim_rad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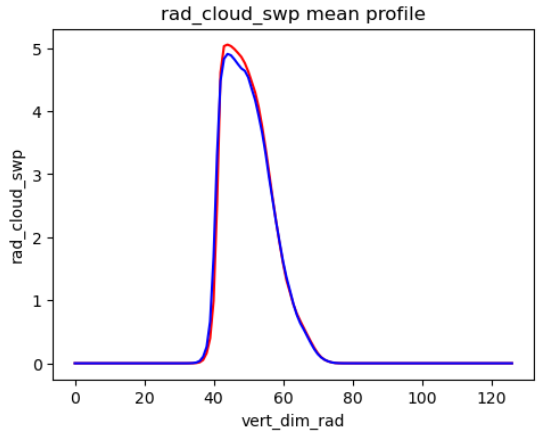
vert_dim_rad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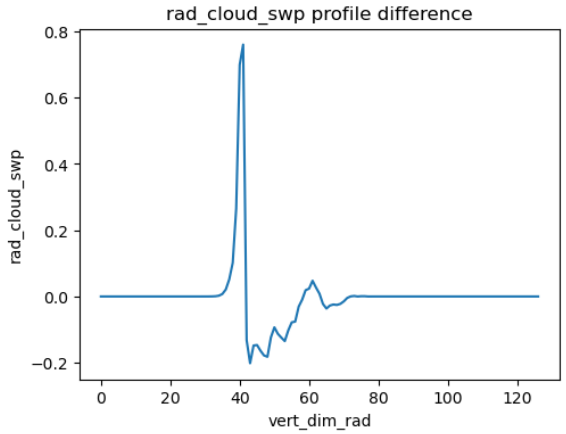
vert_dim_rad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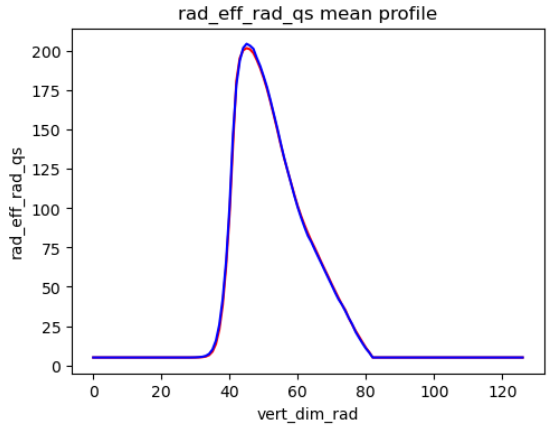
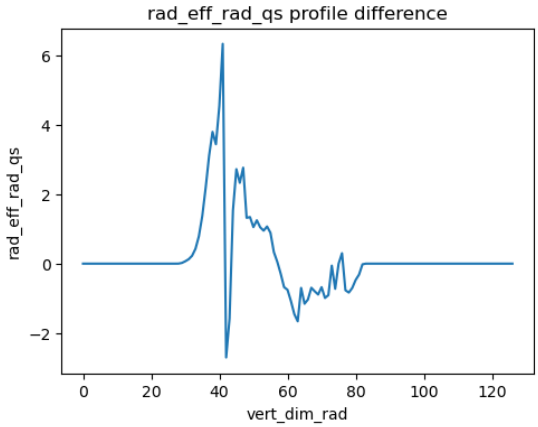
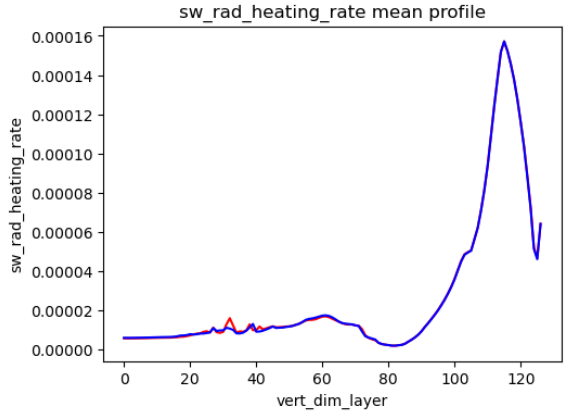
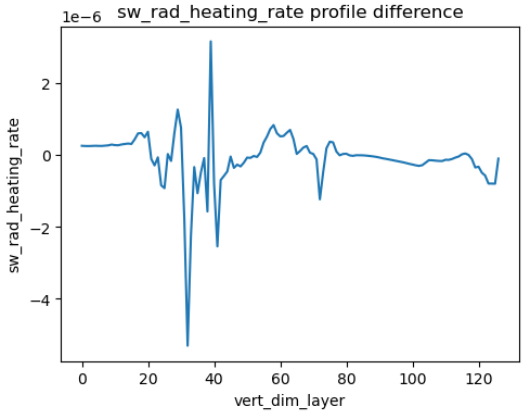
vert_dim_rad


rad_eff_rad_qs mean profile
rad_eff_rad_qs
vert_dim_rad


rad_eff_rad_qs profile difference
rad_eff_rad_qs
vert_dim_rad


sw_rad_heating_rate mean profile
sw_rad_heating_rate
vert_dim_layer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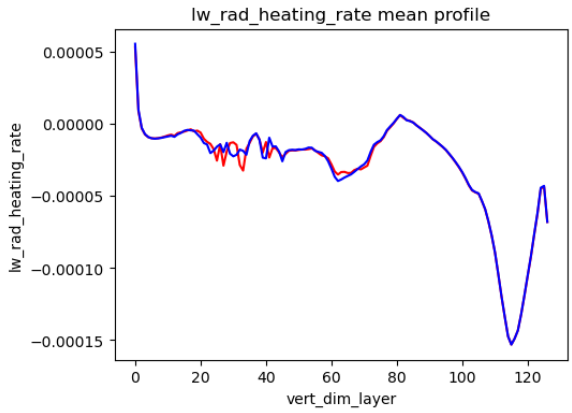
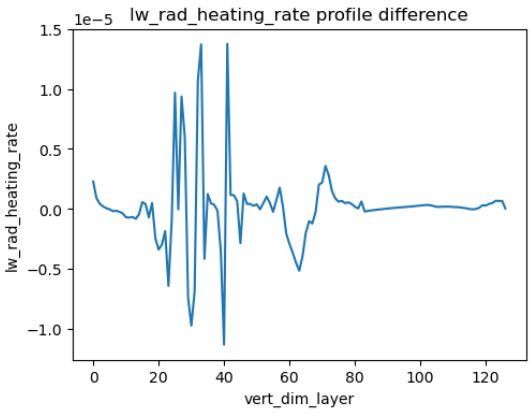
sw_rad_heating_rate profile difference
sw_rad_heating_rate
vert_dim_layer


lw_rad_heating_rate mean profile
lw_rad_heating_rate
vert_dim_layer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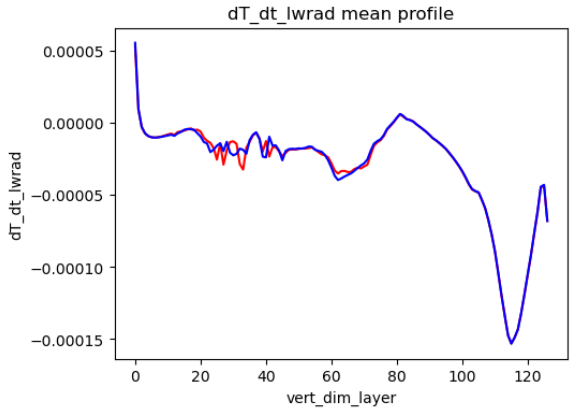
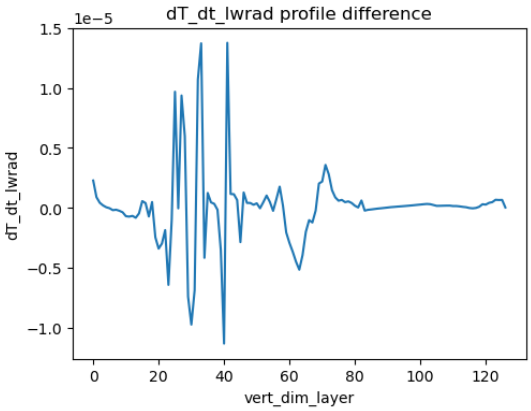
lw_rad_heating_rate
vert_dim_layer


dT_dt_lwrad mean profile
dT_dt_lwrad
vert_dim_layer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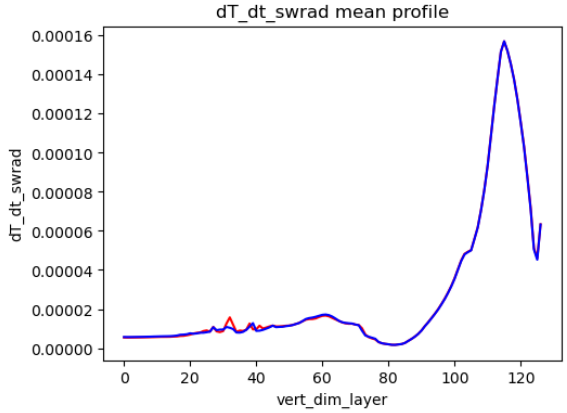
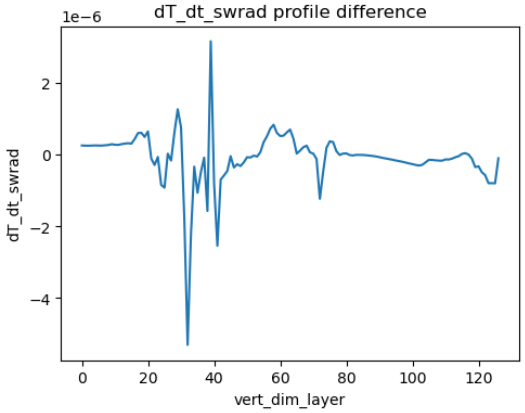
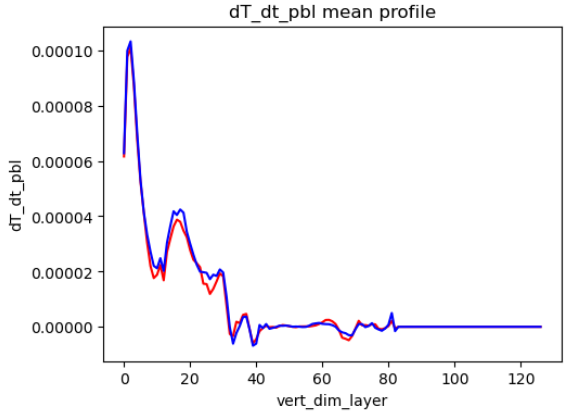
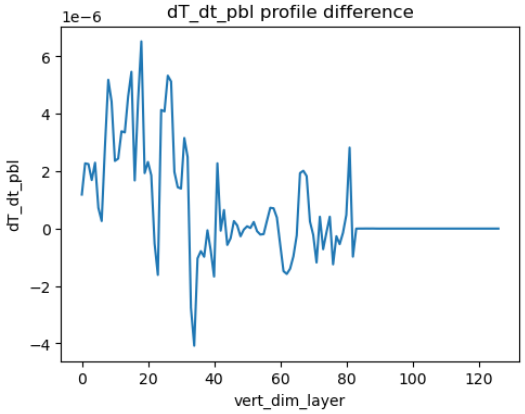
dT_dt_lwrad
vert_dim_layer


dT_dt_swrad mean profile
dT_dt_swrad
vert_dim_layer


dT_dt_swrad profile difference
1e−6
dT_dt_swrad
vert_dim_layer


dT_dt_pbl mean profile
dT_dt_pbl
vert_dim_layer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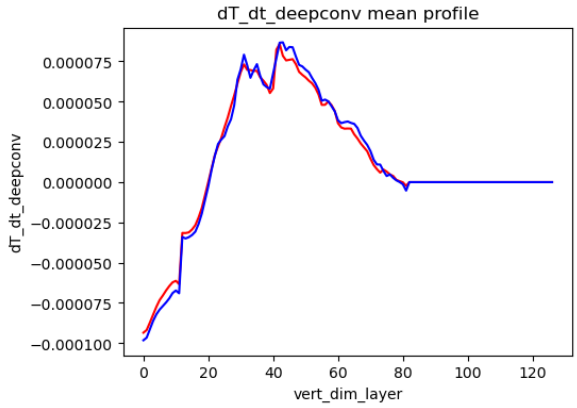
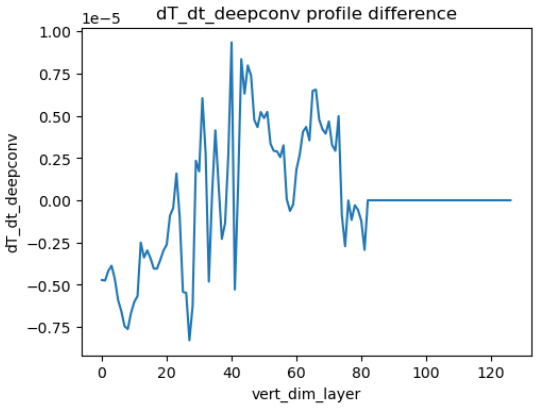
dT_dt_pbl
vert_dim_layer


dT_dt_deepconv mean profile
dT_dt_deepconv
vert_dim_layer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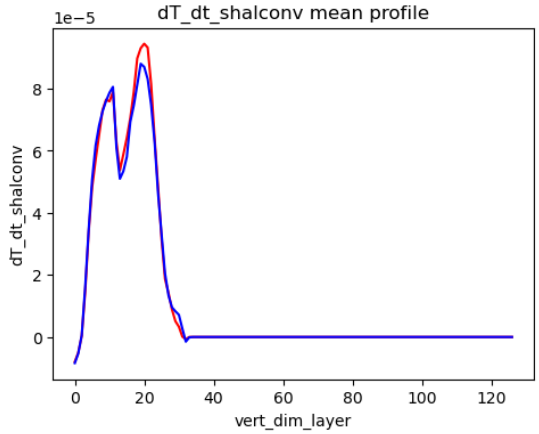
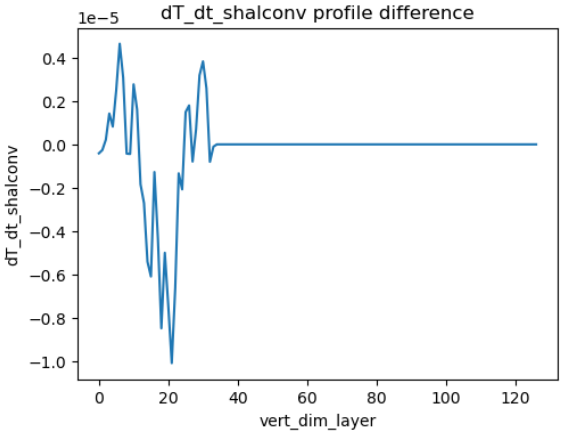
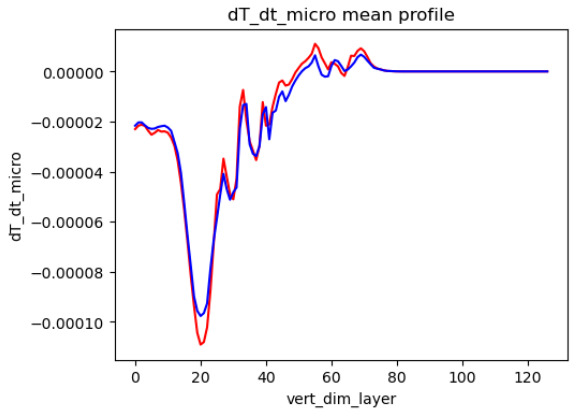
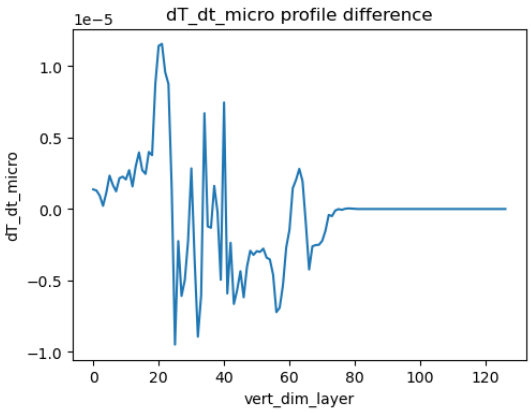
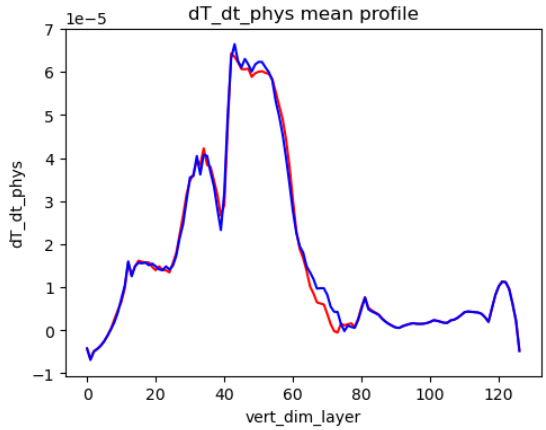
1e−5
dT_dt_deepconv
vert_dim_layer


dT_dt_shalconv mean profile
1e−5
dT_dt_shalconv
vert_dim_layer


dT_dt_shalconv profile difference
1e−5
dT_dt_shalconv
vert_dim_layer


dT_dt_micro mean profile
dT_dt_micro
vert_dim_layer


dT_dt_micro profile difference
1e−5
dT_dt_micro
vert_dim_layer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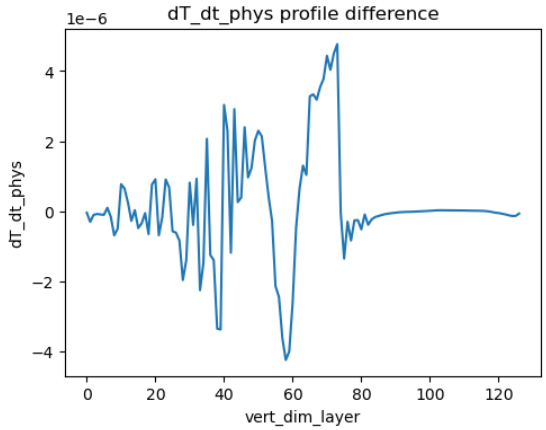
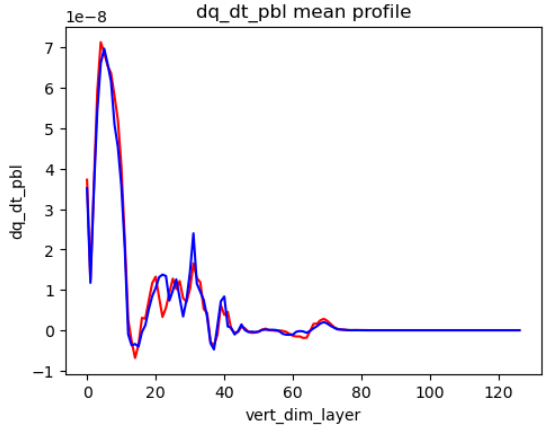
vert_dim_layer


dT_dt_phys profile difference
1e−6
dT_dt_phys
vert_dim_layer


dq_dt_pbl mean profile
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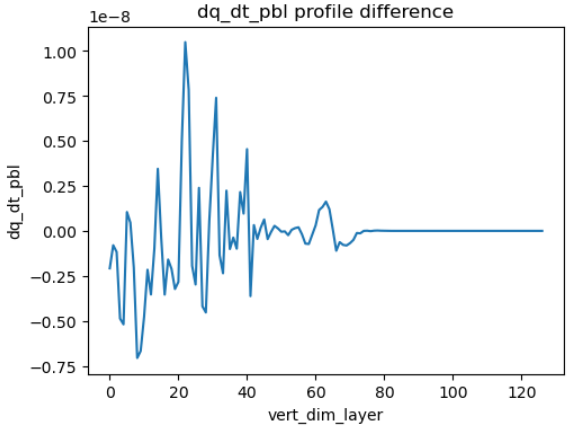
vert_dim_layer


dq_dt_pbl profile difference
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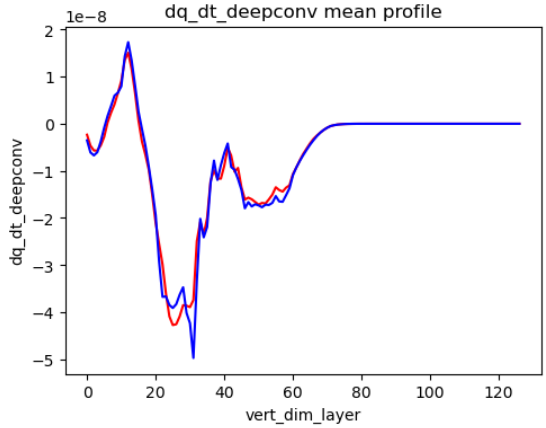
dq_dt_pbl
vert_dim_layer


dq_dt_deepconv mean profile
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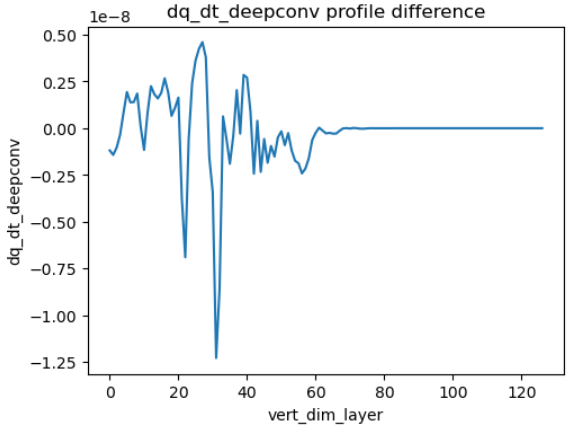
dq_dt_deepconv
vert_dim_layer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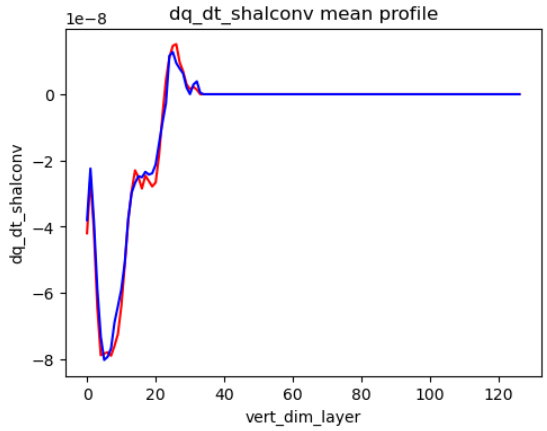
dq_dt_deepconv
vert_dim_layer


dq_dt_shalconv mean profile
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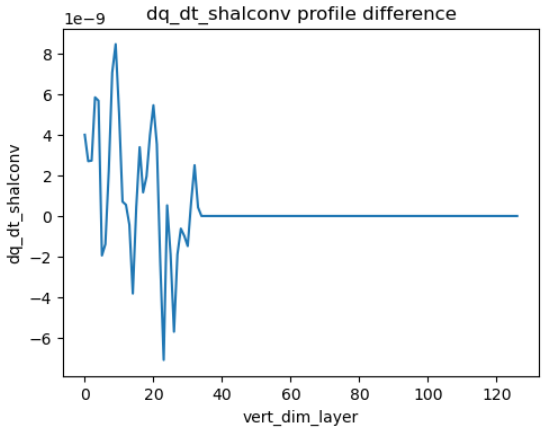
dq_dt_shalconv
vert_dim_layer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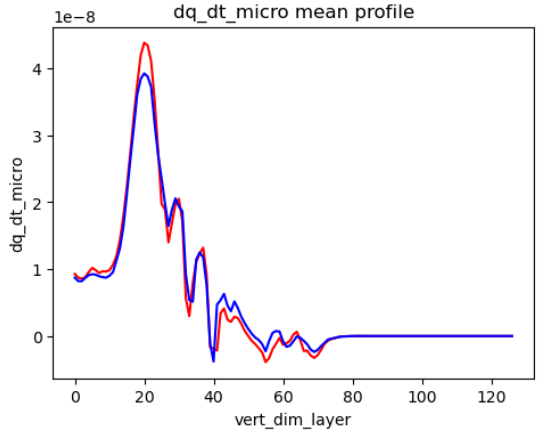
dq_dt_micro mean profile
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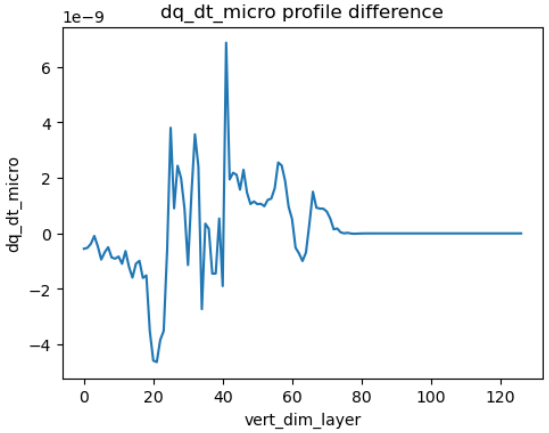
dq_dt_micro
vert_dim_layer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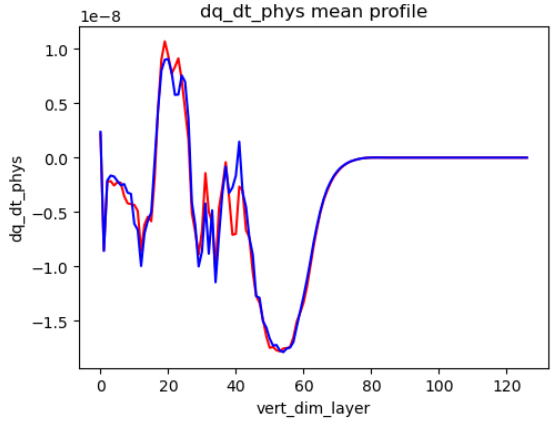
dq_dt_micro
vert_dim_layer


dq_dt_phys mean profile
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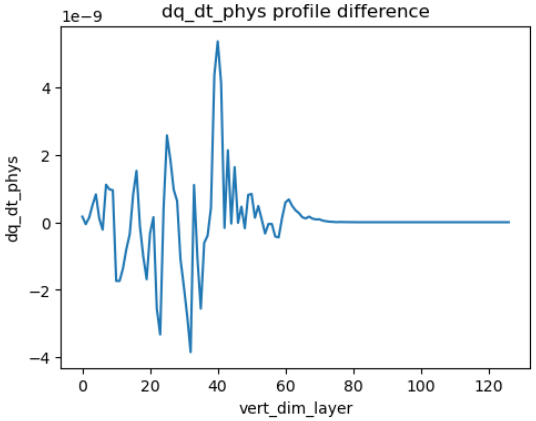
dq_dt_phys
vert_dim_layer


dq_dt_phys profile difference
1e−9
dq_dt_phys
vert_dim_layer


doz_dt_pbl mean profile
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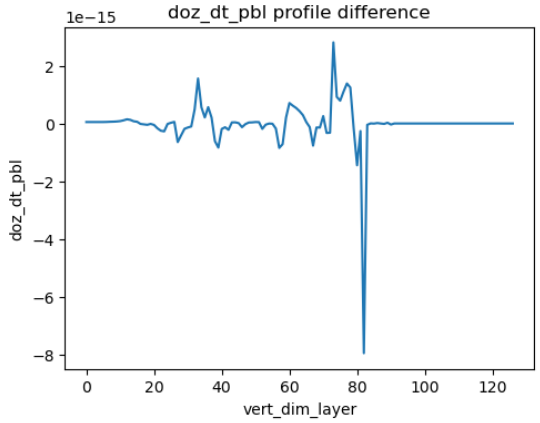
doz_dt_pbl
vert_dim_layer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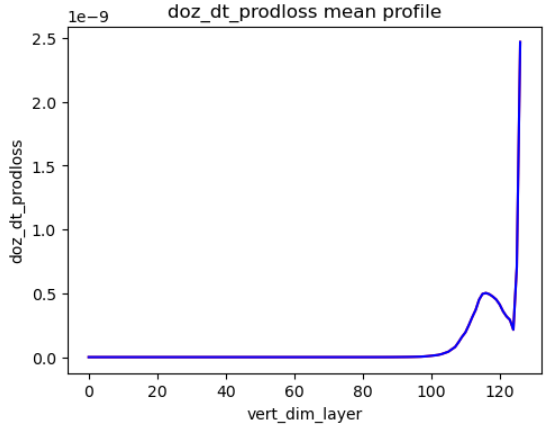
vert_dim_layer


doz_dt_prodloss mean profile
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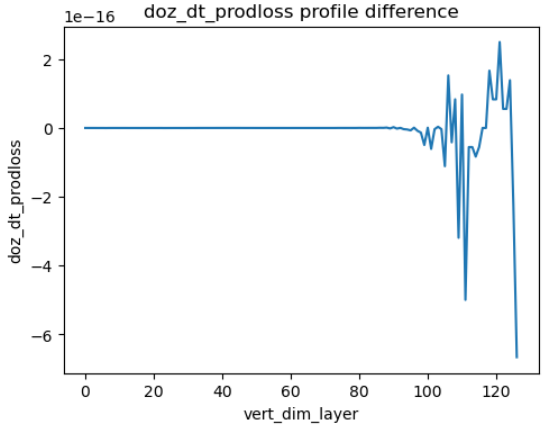
doz_dt_prodloss
vert_dim_layer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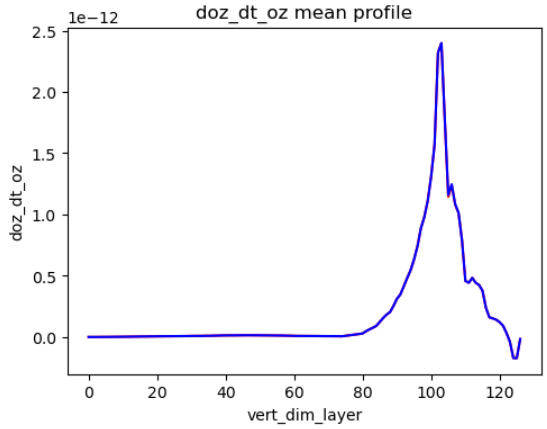
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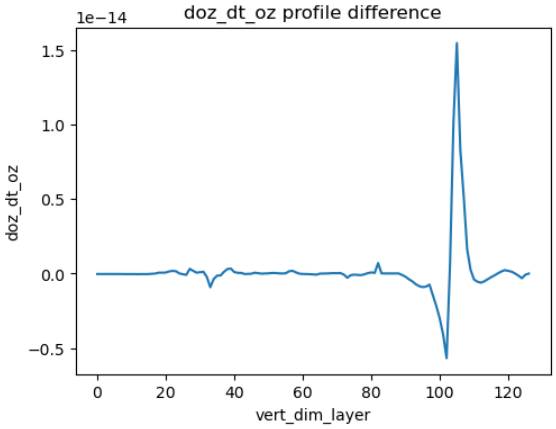
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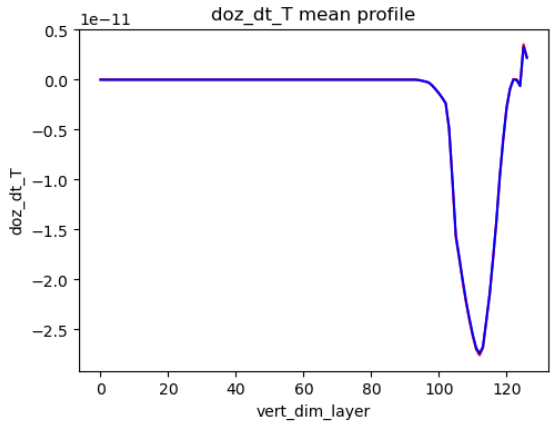
vert_dim_layer


doz_dt_T mean profile
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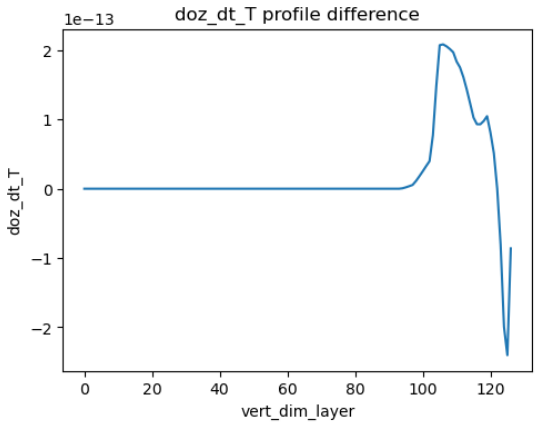
vert_dim_layer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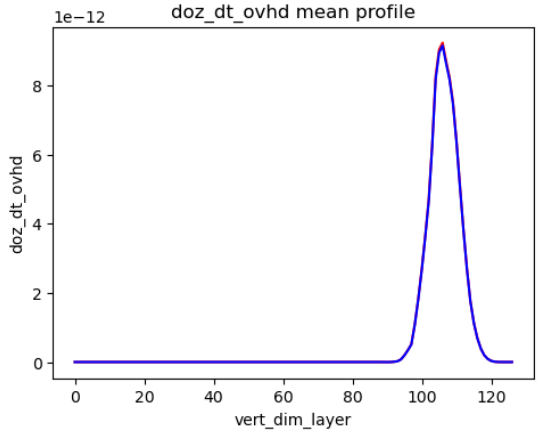
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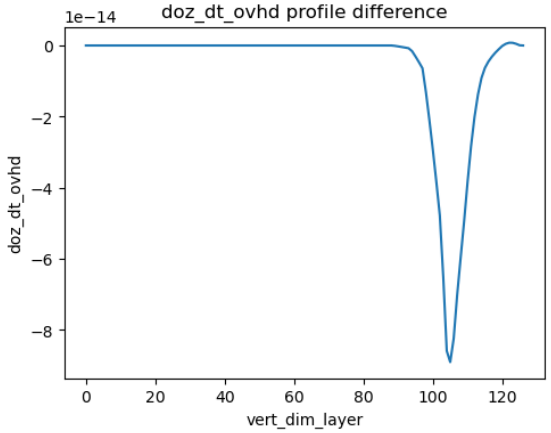
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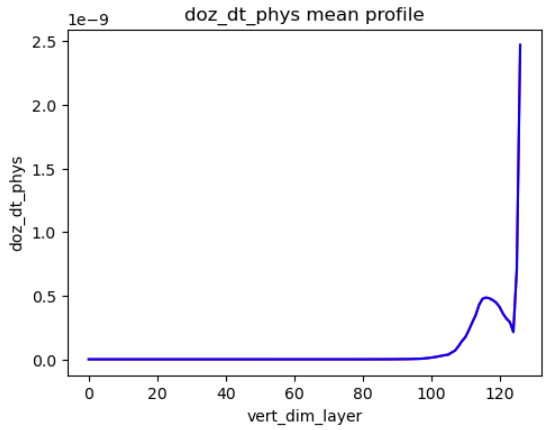
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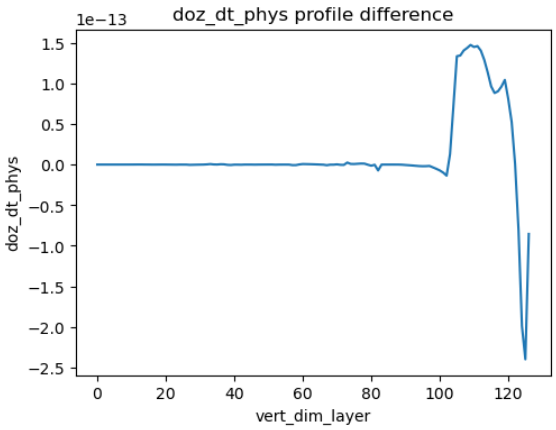
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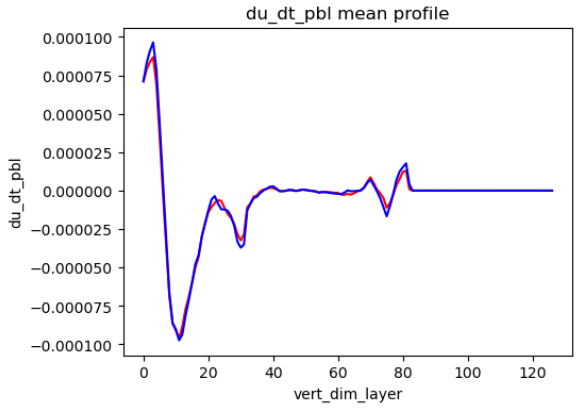
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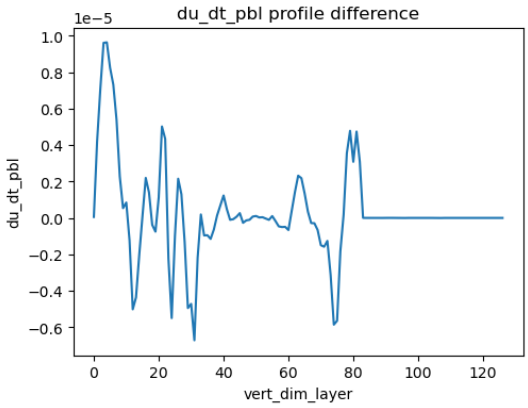
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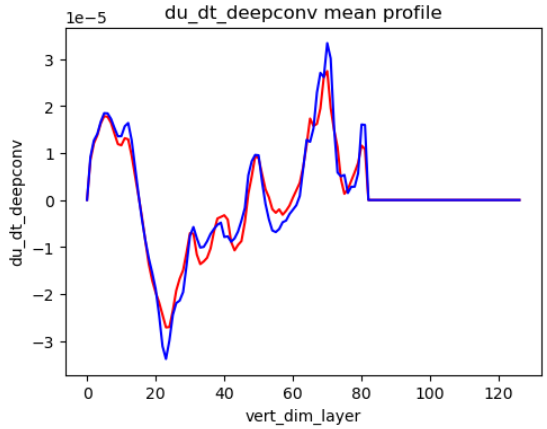
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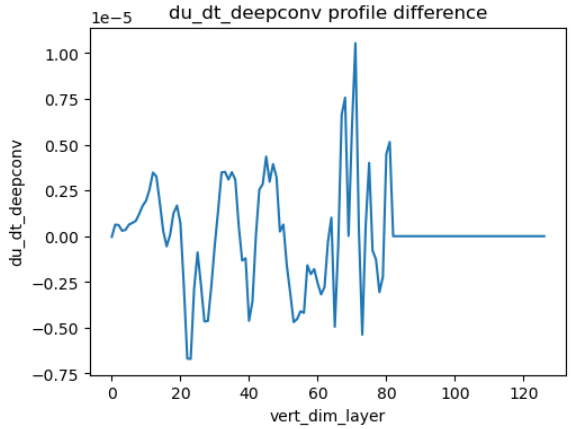
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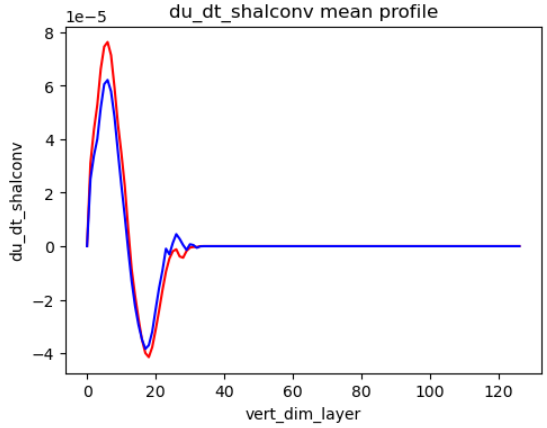
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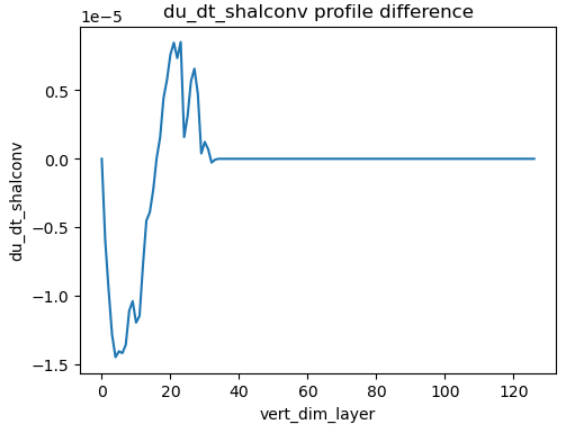
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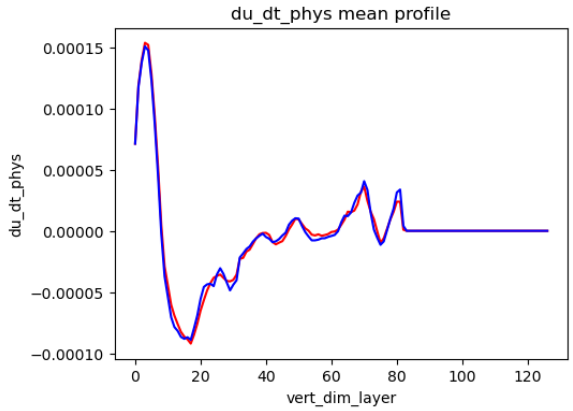
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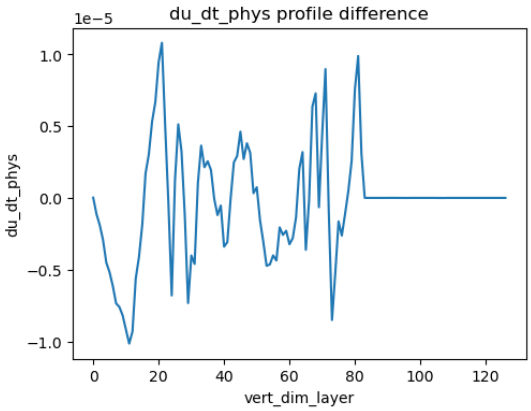
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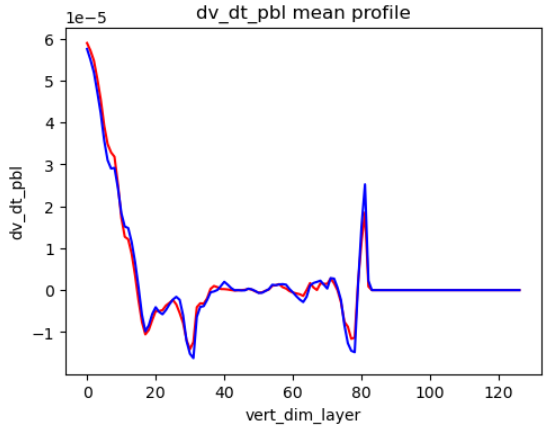
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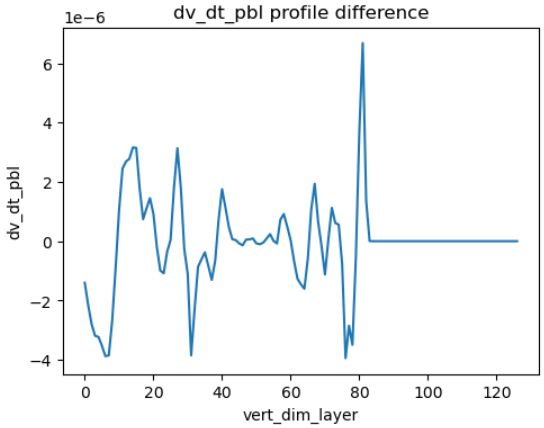
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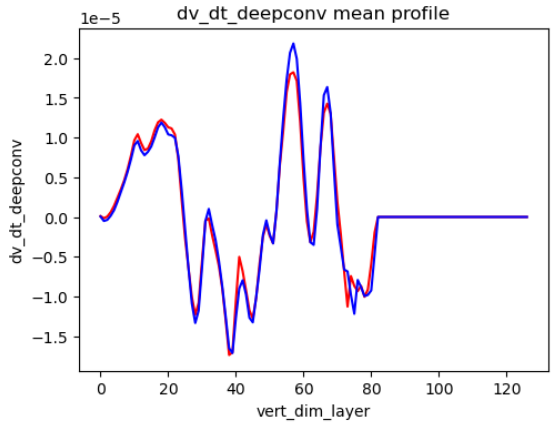
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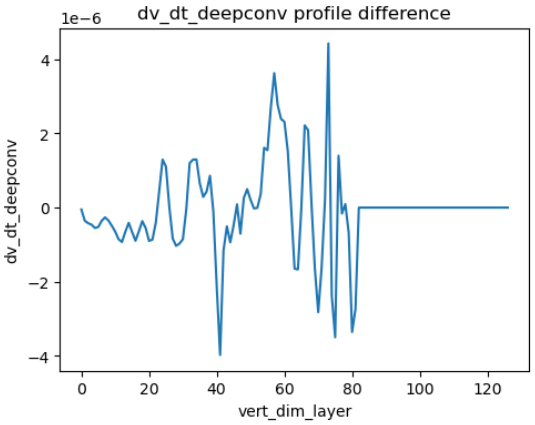
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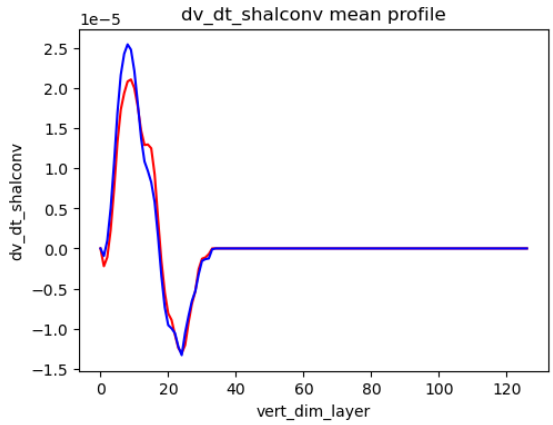
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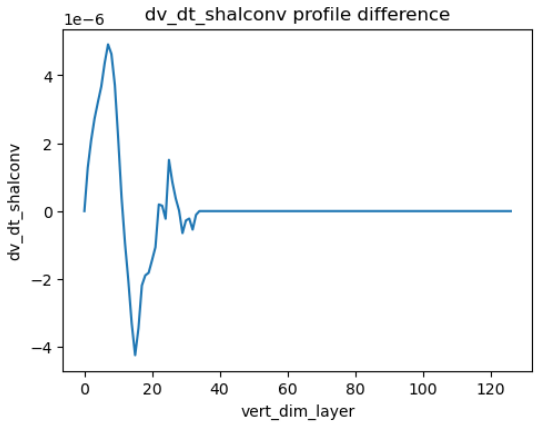
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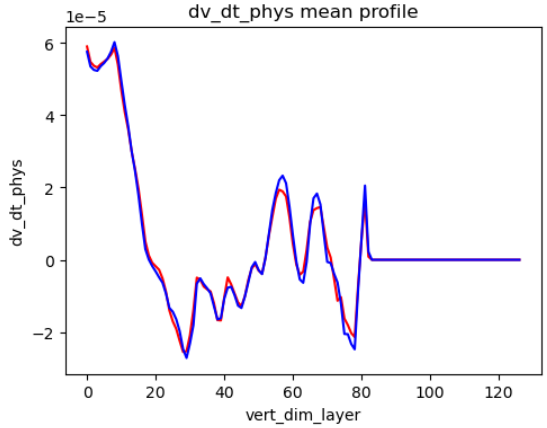
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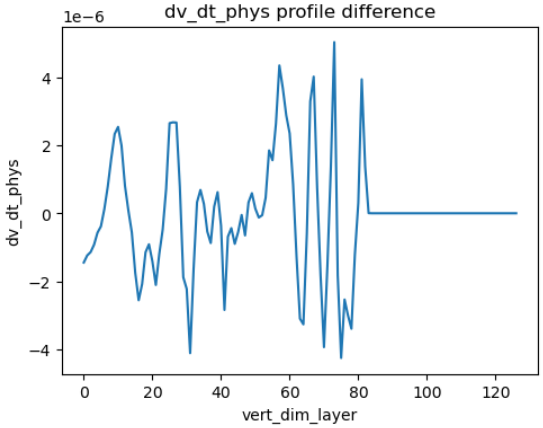
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