```
<?xml version="1.0"?>

<!--
  Simplified AM3 xml (20120618_ssam revision, siena_201204)
  For more info: http://wiki.gfdl.noaa.gov/index.php/2012_GFDL_Summer_School_101
-->

<experimentSuite rtsVersion="4" xmlns:xi="http://www.w3.org/2003/XInclude">

  <property name="RELEASE"  value="siena_201204"/>
  <property name="FRE_STEM" value="ssam2012/$(RELEASE)"/>
  <property name="ANALYSIS_SWITCH"  value="on"/>

  <setup>
    <platform name="ncrc2.intel">
      <project>gfdl_YOURGROUPLETTER_c2</project>
<!-- Please use the assigned group letter you are given -->
      <directory stem="$(FRE_STEM)">
        <src>$HOME/$(stem)/$(name)/src</src>
        <scripts>$HOME/$(stem)/scripts/$(platform)-$(target)</scripts>
        <stdout>/lustre/ltfs/scratch/$USER/$(stem)/$(name)/$(platform)-$(target)/stdout</stdout>
      </directory>
      <property name="F2003_FLAGS" value="-DINTERNAL_FILE_NML"/>
      <property name="CM3_INPUT_ROOT" value="/ncrc/home1/Larry.Horowitz/fms/riga/input" />
      <property name="SSAM_INPUT_ROOT" value="/ncrc/home2/Ni-Zhang.Golaz/ssam2012/input" />
      <property name="FMS_ARCHIVE_ROOT" value="/lustre/ltfs/scratch/Larry.Horowitz/archive" />
      <csh><![CDATA[
        source $MODULESHOME/init/csh

        module use -a /ncrc/home2/fms/local/modulefiles
        module unload PrgEnv-pgi PrgEnv-pathscale PrgEnv-intel PrgEnv-gnu PrgEnv-cray
        module unload netcdf fre fre-commands
        module load PrgEnv-intel/4.0.30
        module swap intel intel/12.0.5.220
        module load fre/bronx-2
        module list

        setenv F_UFMTENDIAN big
        setenv KMP_STACKSIZE 2g
        setenv MPICH_ENV_DISPLAY
        setenv MPICH_CPUMASK_DISPLAY
        setenv MPICH_GNI_LOCAL_CQ_SIZE  131072
      ]]></csh>
    </platform>

    <platform name="gfdl.ncrc2-intel">
      <directory stem="$(FRE_STEM)">
      </directory>
      <property name="F2003_FLAGS" value="-DINTERNAL_FILE_NML"/>
      <property name="CM3_INPUT_ROOT" value="/home/cm3/ipcc_ar5/input" />
      <property name="SSAM_INPUT_ROOT" value="/home/niz/ssam2012/input" />
      <property name="FMS_ARCHIVE_ROOT" value="/archive"/>
      <csh><![CDATA[
        source $MODULESHOME/init/csh
        module use -a /home/fms/local/modulefiles
        module purge
        module load fre/bronx-2
        module load fre-analysis
```

```
      ]]>
    </csh>
  </platform>

 </setup>

<!--
AM3 AMIP experiment with time-varying forcing.
-->
 <experiment name="c48L48_am3p10">
  <description>
Based on c48L48_am3p9, but
- new dynamical core from siena_201204
- misc physics bug fixes
- tropchem_driver_nml: retain_cm3_bugs = .false.
- tropchem_driver_nml: check_convergence = .true.
  </description>

  <component name="fms" paths="shared">
    <source>
      <codeBase version="$(RELEASE)"> shared </codeBase>
    </source>
    <compile>
      <cppDefs>$(F2003_FLAGS) -Duse_libMPI -Duse_netCDF </cppDefs>
    </compile>
  </component>
  <component name="atmos_phys" requires="fms" paths="atmos_param atmos_shared">
    <source>
      <codeBase version="$(RELEASE)"> atmos_shared atmos_param_am3 </codeBase>
    </source>
    <compile>
      <cppDefs>$(F2003_FLAGS) </cppDefs>
    </compile>
  </component>
  <component name="atmos_dyn" requires="fms atmos_phys" paths="atmos_coupled atmos_cubed_sphere">
    <source>
      <codeBase version="$(RELEASE)">
         atmos_coupled cubed_sphere_coupled
      </codeBase>
    </source>
    <compile>
      <cppDefs>$(F2003_FLAGS) -DSPMD -DUSE_OCEAN_BGC</cppDefs>
    </compile>
  </component>
  <component name="ice" requires="fms" paths="ice_sis ice_param">
    <source>
      <codeBase version="$(RELEASE)"> ice_sis ice_param </codeBase>
    </source>
    <compile>
      <cppDefs>$(F2003_FLAGS) -Duse_netCDF</cppDefs>
    </compile>
  </component>
  <component name="land" requires="fms" paths="land_lad2">
    <source>
      <codeBase version="$(RELEASE)"> land_lad2 </codeBase>
    </source>
    <compile>
      <cppDefs>$(F2003_FLAGS) -DUSE_LOG_DIAG_FIELD_INFO</cppDefs>
```

```
        <csh> <![CDATA[
cat >Makefile.cpp <<EOF
CPPDEFS = $(F2003_FLAGS) -DUSE_LOG_DIAG_FIELD_INFO
FRETARGET = $(target)
ifneq (\$(findstring hdf5,\${FRETARGET}),)
else
  CPPDEFS += -Duse_LARGEFILE
endif
EOF
echo vpath %.F90 `find $cwd/land_lad2 -type d` >> Makefile.cpp
echo cpp_land/%.f90: %.F90 >> Makefile.cpp
/bin/echo -e '\tcpp ${CPPDEFS} -C -v -I shared/include -o $@ $<' >> Makefile.cpp
mkdir -p cpp_land
foreach foo ( `find land_lad2 -type f -name \*.F90` )
  make -f Makefile.cpp cpp_land/$foo:t:r.f90
end
find cpp_land -type f -name \*.f90 > pathnames_land
        ]]></csh>
      </compile>
    </component>
    <component name="ocean" requires="fms ocean_shared" paths="mom4p1">
      <source>
        <codeBase version="$(RELEASE)"> mom4p1_coupled </codeBase>
      </source>
      <compile>
        <cppDefs>$(F2003_FLAGS) -DUSE_OCEAN_BGC</cppDefs>
      </compile>
    </component>
    <component name="ocean_shared" requires="fms" paths="ocean_shared">
      <source>
        <codeBase version="$(RELEASE)"> ocean_shared </codeBase>
      </source>
      <compile>
        <cppDefs>$(F2003_FLAGS) -DUSE_OCEAN_BGC</cppDefs>
      </compile>
    </component>
    <component name="coupler" requires="fms atmos_phys atmos_dyn ice land ocean ocean_shared" paths="coupler">
      <source>
        <codeBase version="$(RELEASE)"> coupler </codeBase>
      </source>
      <compile>
        <cppDefs>$(F2003_FLAGS) </cppDefs>
      </compile>
    </component>

    <input>
      <namelist file="$(SSAM_INPUT_ROOT)/c48L48_am3p10.nml"/>
      <namelist file="$(SSAM_INPUT_ROOT)/mom4p1_22jun2012.ssam.nml"/>

      <namelist name="coupler_nml">
        months = $months,
        days   = $days,
        current_date = 2000,1,1,0,0,0,
        calendar = 'julian'
        dt_atmos = 1800,
        dt_cpld  = 7200,
        use_lag_fluxes = .true.
        concurrent = .false.
```

```
  do_ocean = .false.
  atmos_npes = $npes
  atmos_nthreads = $nthreads
</namelist>
<namelist name="fms_nml">
  domains_stack_size = 2115200,
  print_memory_usage = .false.
  clock_grain = 'MODULE'
</namelist>
<namelist name="fms_io_nml">
  threading_read  = 'multi',
  threading_write = 'single',
  fileset_write   = 'single'
  max_files_r = 100,
  max_files_w = 100,
</namelist>
<namelist name="xgrid_nml">
  make_exchange_reproduce = .true.
  interp_method = 'second_order'
</namelist>
<namelist name="diag_manager_nml">
  mix_snapshot_average_fields = .false.,
  max_input_fields = 1100,
  max_output_fields = 1500
  max_axes = 150
  max_num_axis_sets = 50
  max_files = 40
  issue_oor_warnings = .false.
</namelist>
<namelist name="topography_nml">
  topog_file = 'INPUT/navy_topography.data.nc',
</namelist>
<namelist name="fv_core_nml">
  layout   = $fv_layout
  io_layout = $fv_io_layout
  npx      = 49,
  npy      = 49,
  ntiles   = 6,
  npz      = 48,
  n_split  = 8,
  a2b_ord  = 4,
  adjust_dry_mass = $adjust_dry_mass,
  consv_te = 0.7,
  fill = .true.
  print_freq = 0,
  grid_type = 0,
  old_divg_damp = .true.,
  nord = 0,
  dddmp = 0.0,
  d2_bg = 0.0075,
  d4_bg = 0.00,
  tau = 0.
</namelist>
<namelist name="atmosphere_nml">
  physics_window = $physics_window
</namelist>
<namelist name="ice_model_nml">
  spec_ice = .true.,
```

```
      alb_sno = 0.80
      t_range_melt = 10.0
      layout = $ice_layout
      io_layout = $ice_io_layout
    </namelist>
    <namelist name="land_model_nml">
      layout   = $land_layout
      io_layout = $land_io_layout
      tau_snow_T_adj = 604800.,
    </namelist>
    <namelist name="ocean_model_nml">
      dt_ocean =7200,
      time_tendency='twolevel'
      vertical_coordinate='zstar'
      baroclinic_split = 1
      surface_height_split = 1
      barotropic_split = 80
      debug=.false.
      layout = $ocean_layout
      io_layout = $ocean_io_layout
    </namelist>
    <csh><![CDATA[
# ocean model data set
cd INPUT
cp roughness_amp.nc foo
rm -f roughness_amp.nc
chmod u+w foo
ncrename -v h_amp,roughness_amp foo roughness_amp.nc
rm -f foo
if (-e ocean_topog.nc) then
  cp ocean_topog.nc topog.nc
  rm -f ocean_topog.nc
endif

# Possible domain decomposition below. One thread up to 432 PE, two threads above.
# Note: options below only represent a subset of all possible options.

if ( "$npes" == "96" ) then
  set nthreads = "1"
  set physics_window = "0,0"
  set fv_layout    =   "2,8"; set fv_io_layout    =  "1,8"
  set land_layout  =   "2,8"; set land_io_layout  =  "1,8"
  set ocean_layout =  "4,24"; set ocean_io_layout =  "1,24"
  set ice_layout   =  "4,24"; set ice_io_layout   =  "1,24"
else if ( "$npes" == "144" ) then
  set nthreads = "1"
  set physics_window = "0,0"
  set fv_layout    =  "2,12"; set fv_io_layout    = "1,12"
  set land_layout  =  "2,12"; set land_io_layout  = "1,12"
  set ocean_layout =  "6,24"; set ocean_io_layout = "1,24"
  set ice_layout   =  "6,24"; set ice_io_layout   = "1,24"
else if ( "$npes" == "288" ) then
  set nthreads = "1"
  set physics_window = "0,0"
  set fv_layout    =  "4,12"; set fv_io_layout    = "1,12"
  set land_layout  =  "4,12"; set land_io_layout  = "1,12"
  set ocean_layout = "12,24"; set ocean_io_layout = "1,24"
  set ice_layout   = "12,24"; set ice_io_layout   = "1,24"
```

```
else if ( "$npes" == "432" ) then
  set nthreads = "1"
  set physics_window = "0,0"
  set fv_layout    =  "6,12"; set fv_io_layout    = "1,12"
  set land_layout  =  "6,12"; set land_io_layout  = "1,12"
  set ocean_layout = "18,24"; set ocean_io_layout = "1,24"
  set ice_layout   = "18,24"; set ice_io_layout   = "1,24"
else if ( "$npes" == "576" ) then
  set nthreads = "2"
  set physics_window = "12,2"
  set fv_layout    =  "4,12"; set fv_io_layout    = "1,12"
  set land_layout  =  "4,12"; set land_io_layout  = "1,12"
  set ocean_layout = "12,24"; set ocean_io_layout = "1,24"
  set ice_layout   = "12,24"; set ice_io_layout   = "1,24"
else if ( "$npes" == "864" ) then
  set nthreads = "2"
  set physics_window = "8,2"
  set fv_layout    =  "6,12"; set fv_io_layout    = "1,12"
  set land_layout  =  "6,12"; set land_io_layout  = "1,12"
  set ocean_layout = "18,24"; set ocean_io_layout = "1,24"
  set ice_layout   = "18,24"; set ice_io_layout   = "1,24"
else if ( "$npes" == "1152" ) then
  set nthreads = "2"
  set physics_window = "6,2"
  set fv_layout    =  "8,12"; set fv_io_layout    = "1,12"
  set land_layout  =  "8,12"; set land_io_layout  = "1,12"
  set ocean_layout = "24,24"; set ocean_io_layout = "1,24"
  set ice_layout   = "24,24"; set ice_io_layout   = "1,24"
else if ( "$npes" == "1728" ) then
  set nthreads = "2"
  set physics_window = "4,2"
  set fv_layout    = "12,12"; set fv_io_layout    = "1,12"
  set land_layout  = "12,12"; set land_io_layout  = "1,12"
  set ocean_layout = "36,24"; set ocean_io_layout = "1,24"
  set ice_layout   = "36,24"; set ice_io_layout   = "1,24"
else
  if ( $echoOn ) unset echo
  echo "*ERROR*: npes == '$npes' is not supported in xml."
  if ( $echoOn ) set echo
  exit 1
endif

@ npes = $npes / $nthreads
alias runCommand "aprun -d $nthreads -n $npes ./$executable:t"

    ]]></csh>
    <csh type="always"><![CDATA[

cd INPUT
# adjustment of dry mass first time only
set adjust_dry_mass = `/ncrc/home1/Larry.Horowitz/bin/adjust_dry_mass.csh`

    ]]></csh>
      <dataFile label="input" target="INPUT/" chksum="" size="" timestamp="">
        <dataSource platform="$(platform)">$(FMS_ARCHIVE_ROOT)/cm3/ipcc_ar5/input/common/hadisst.186912-
201108.tar</dataSource>
      </dataFile>
      <dataFile label="input" target="INPUT/" chksum="" size="" timestamp="">
```

```
        <dataSource platform="$(platform)">$
(FMS_ARCHIVE_ROOT)/cm3/ipcc_ar5/input/common/sea_esf_dec2011.cpio</dataSource>
      </dataFile>
      <dataFile label="input" target="INPUT/" chksum="" size="" timestamp="">
        <dataSource platform="$(platform)">$
(FMS_ARCHIVE_ROOT)/cm3/ipcc_ar5/input/common/navy_topography.data.nc</dataSource>
      </dataFile>
      <dataFile label="input" target="INPUT/" chksum="" size="" timestamp="">
        <dataSource platform="$(platform)">$
(FMS_ARCHIVE_ROOT)/cm3/ipcc_ar5/input/common/mom4.dec2009.cpio</dataSource>
      </dataFile>
      <dataFile label="input" target="INPUT/" chksum="" size="" timestamp="">
        <dataSource platform="$(platform)">$
(FMS_ARCHIVE_ROOT)/cm3/ipcc_ar5/input/common/land_LM3.dec2009.cpio</dataSource>
      </dataFile>
      <dataFile label="input" target="INPUT/" chksum="" size="" timestamp="">
        <dataSource platform="$(platform)">$
(FMS_ARCHIVE_ROOT)/cm3/ipcc_ar5/input/historical/landuse.nc</dataSource>
      </dataFile>
      <dataFile label="input" target="INPUT/" chksum="" size="" timestamp="">
        <dataSource platform="$(platform)">$
(FMS_ARCHIVE_ROOT)/cm3/ipcc_ar5/input/common/aerosol_inputs.dec2009.cpio</dataSource>
      </dataFile>
      <dataFile label="input" target="INPUT/" chksum="" size="" timestamp="">
        <dataSource platform="$(platform)">$
(FMS_ARCHIVE_ROOT)/cm3/ipcc_ar5/input/RCP/cmip5_rcp45.cpio</dataSource>
      </dataFile>
      <dataFile label="input" target="INPUT/" chksum="" size="" timestamp="">
       <dataSource platform="$(platform)">$
(FMS_ARCHIVE_ROOT)/cm3/ipcc_ar5/input/common/tropchem_oct2011.cpio</dataSource>
      </dataFile>
      <dataFile label="input" target="INPUT/" chksum="" size="" timestamp="">
        <dataSource platform="$(platform)">$
(FMS_ARCHIVE_ROOT)/cm3/ipcc_ar5/input/common/megan2.1_input.cpio</dataSource>
      </dataFile>
      <dataFile label="input" target="INPUT/" chksum="" size="" timestamp="">
        <dataSource platform="$(platform)">$
(FMS_ARCHIVE_ROOT)/cm3/ipcc_ar5/input/historical/emissions.1x1.1859_2020.tar</dataSource>
      </dataFile>
      <dataFile label="initCond" target="INPUT/" chksum="" size="" timestamp="">
        <dataSource platform="$(platform)">/lustre/ltfs/scratch/Ni-
Zhang.Golaz/ssam2012/input/siena_201204_20yr/restart/20000101.tar</dataSource>
      </dataFile>
      <dataFile label="gridSpec" target="INPUT/" chksum="" size="" timestamp="">
        <dataSource platform="$(platform)">$
(FMS_ARCHIVE_ROOT)/cm3/ipcc_ar5/input/common/C48.C48.tripolar.mosaic.cpio</dataSource>
      </dataFile>
      <dataFile label="fieldTable" target="INPUT/" chksum="" size="" timestamp="">
       <dataSource platform="$(platform)">$(CM3_INPUT_ROOT)/field_table/field_table_am3p8_o3s</dataSource>
      </dataFile>
      <dataFile label="fieldTable" target="INPUT/" chksum="" size="" timestamp="">
        <dataSource platform="$(platform)">$
(CM3_INPUT_ROOT)/field_table/field_table_MOM4p1_AMIP</dataSource>
      </dataFile>
      <dataFile label="dataTable" target="INPUT/" chksum="" size="" timestamp="">
        <dataSource platform="$(platform)">$(CM3_INPUT_ROOT)/data_table/data_table_AMIP</dataSource>
      </dataFile>
      <dataFile label="dataTable" target="INPUT/" chksum="" size="" timestamp="">
```

```
        <dataSource platform="$(platform)">$(CM3_INPUT_ROOT)/data_table/data_table_co2</dataSource>
      </dataFile>

    <diagTable file="/ncrc/home2/Ni-Zhang.Golaz/ssam2012/input/diagTable/c48L48_am3p10.diagTable_sim"/>

  </input>

  <runtime>

    <production simTime="11" units="years" npes="576" runTime="16:00:00">
      <segment simTime="12" units="months" runTime="05:20:00"/>
    </production>

    <regression name="basic">
      <run days="8" npes="288" runTimePerJob="00:45:00"/>
    </regression>

    <regression name="1day">
      <run days="1" npes="144" runTimePerJob="00:45:00"/>
    </regression>

    <regression name="rts">
      <run days="8"   npes="96"   runTimePerJob="01:00:00"/>
      <run days="8"   npes="144"  runTimePerJob="00:45:00"/>
      <run days="4 4" npes="288"  runTimePerJob="00:45:00"/>
      <run days="8"   npes="432"  runTimePerJob="00:40:00"/>
      <run days="8"   npes="576"  runTimePerJob="00:40:00"/>
      <run days="8"   npes="864"  runTimePerJob="00:40:00"/>
      <run days="8"   npes="1152" runTimePerJob="00:40:00"/>
      <run days="8"   npes="1728" runTimePerJob="00:40:00"/>
    </regression>

    <regression name="timing">
      <run months="1" npes="96"   runTimePerJob="02:00:00"/>
      <run months="1" npes="144"  runTimePerJob="02:00:00"/>
      <run months="1" npes="288"  runTimePerJob="01:30:00"/>
      <run months="1" npes="432"  runTimePerJob="01:00:00"/>
      <run months="1" npes="576"  runTimePerJob="01:00:00"/>
      <run months="1" npes="864"  runTimePerJob="01:00:00"/>
      <run months="1" npes="1152" runTimePerJob="01:00:00"/>
      <run months="1" npes="1728" runTimePerJob="01:00:00"/>
    </regression>

  </runtime>

</experiment>


<!-- 15 sample experiments with 11-year production runs -->

<experiment name="ssam01_control" inherit="c48L48_am3p10">
</experiment>


<experiment name="ssam02_tropchem_lght" inherit="ssam01_control">
  <input>
    <namelist name="tropchem_driver_nml">
      relaxed_dt = 864000.,
```

```
      ub_pres = 1.,
      relaxed_dt_lbc = 86400.,
      lb_pres = 800.e2,
      file_sulfate = 'sulfate.nc',
      file_conc = 'tracerIC.19800101.v2.nc',
      file_emis_1 = 'emissions.',
      file_emis_2 = '.1x1.1859_2020.nc',
      file_emis3d_1 = 'emissions3D.',
      file_emis3d_2 = '.1x1.1859_2020.nc',
      file_ub = 'ub_vals.mozart.nc',
      file_dry = 'depvel.nc',
      inv_list = '',
      file_aircraft = 'emissions.aircraft.1x1.1859_2020.nc',
      lght_no_prd_factor = 0.8,
      strat_chem_age_factor = 1.25,
      strat_chem_dclydt_factor = 1.,
      do_tropchem = .true.,
      use_tdep_jvals = .true.,
      file_jval_lut = 'jvals.v6fix.twilight.solarmax',
      file_jval_lut_min = 'jvals.v6fix.twilight.solarmin',
      o3_column_top = 0.002,
      repartition_water_tracers = .true.,
      allow_negative_cosz = .true.,
      allow_psc_settling_type1 = .true.,
      force_cly_conservation = .true.,
      set_min_h2o_strat = .true.,
      ch4_filename = 'ch4_gblannualdata',
      ch4_scale_factor = 1.e-9,
      verbose = 1
      retain_cm3_bugs =.false.
      check_convergence = .true.
    </namelist>
  </input>
</experiment>


<experiment name="ssam03_aerosolrad" inherit="ssam01_control">
  <input>
    <namelist file="$(SSAM_INPUT_ROOT)/c48L48_am3p10_sulf.nml"/>
    <namelist name="land_model_nml">
      layout   = $land_layout
      io_layout = $land_io_layout
      tau_snow_T_adj = 604800.,
    </namelist>
  </input>
</experiment>


<experiment name="ssam04_donner_deep_PES" inherit="ssam01_control">
  <input>
    <namelist name="donner_deep_nml">
      parcel_launch_level = 2
      model_levels_in_sfcbl = 0
      donner_deep_freq = 1800
      write_reduced_restart_file = .true.
      allow_mesoscale_circulation = .true.
      do_donner_cape    = .false.
      do_donner_plume   = .false.
```

```
    do_donner_closure = .false.
    do_donner_lscloud = .true.
    do_dcape          = .true.
    do_lands          = .false.
    do_freezing_for_cape = .true.
    do_freezing_for_closure = .true.
    gama              = 0.0
    tau               = 28800.
    tke0              = 0.5
    cape0             = 1000.
    lochoice          = 10
    do_capetau_land   = .false.
    use_llift_criteria= .true.
    do_ice            = .true.
    atopevap  = 0.1
    auto_rate = 1.e-3
    auto_th   = 0.5e-3
    frac      = 1.65
    ttend_max = 0.005
    EVAP_IN_DOWNDRAFTS  = 0.00
    EVAP_IN_ENVIRON     = 0.00
    ENTRAINED_INTO_MESO = 1.00
    ANVIL_PRECIP_EFFICIENCY = 0.55
    MESO_DOWN_EVAP_FRACTION = 0.4
    MESO_UP_EVAP_FRACTION   = 0.05
    wmin_ratio      = 0.05,
    arat =  1.0, 0.26, 0.35, 0.32, 0.3, 0.54, 0.66
    erat =  1.0, 1.30, 1.80, 2.50, 3.3, 4.50, 10.0
    frc_internal_enthalpy_conserv = .true.
    limit_pztm_to_tropo = .true.
  </namelist>
 </input>
</experiment>


<experiment name="ssam05_donner_deep_capeThreshhold" inherit="ssam01_control">
 <input>
  <namelist name="donner_deep_nml">
    parcel_launch_level = 2
    model_levels_in_sfcbl = 0
    donner_deep_freq = 1800
    write_reduced_restart_file = .true.
    allow_mesoscale_circulation = .true.
    do_donner_cape    = .false.
    do_donner_plume   = .false.
    do_donner_closure = .false.
    do_donner_lscloud = .true.
    do_dcape          = .false.
    do_lands          = .false.
    do_freezing_for_cape = .true.
    do_freezing_for_closure = .true.
    gama              = 0.0
    tau               = 28800.
    tke0              = 0.5
    cape0             = 3000.
    lochoice          = 10
    do_capetau_land   = .false.
    use_llift_criteria= .false.
```

```
      do_ice           = .true.
      atopevap  = 0.1
      auto_rate = 1.e-3
      auto_th   = 0.5e-3
      frac      = 1.65
      ttend_max = 0.005
      EVAP_IN_DOWNDRAFTS  = 0.00
      EVAP_IN_ENVIRON     = 0.00
      ENTRAINED_INTO_MESO = 1.00
      ANVIL_PRECIP_EFFICIENCY = 0.55
      MESO_DOWN_EVAP_FRACTION = 0.4
      MESO_UP_EVAP_FRACTION   = 0.05
      wmin_ratio      = 0.05,
      arat =  1.0, 0.26, 0.35, 0.32, 0.3, 0.54, 0.66
      erat =  1.0, 1.30, 1.80, 2.50, 3.3, 4.50, 10.0
      frc_internal_enthalpy_conserv = .true.
      limit_pztm_to_tropo = .true.
    </namelist>
  </input>
</experiment>


<experiment name="ssam06_entrain_beta_rad" inherit="ssam01_control">
  <input>
    <namelist name="entrain_nml">
      convect_shutoff = .true.,
      apply_entrain = .true.,
      parcel_buoy   = 0.25,
      parcel_option = 2,
      beta_rad      = 0.23,
      Ashear        = 25.0,
      radperturb    = 0.10,
      critjump      = 0.10,
      num_pts_ij    = 0,
      i_entprt_gl   = 112, 96, 89,105, 81, 97,
      j_entprt_gl   =  71, 61, 56, 64, 53, 46
    </namelist>
  </input>
</experiment>


<experiment name="ssam07_strat_cloud_vfact" inherit="ssam01_control">
  <input>
    <namelist name="strat_cloud_nml">
      use_online_aerosol = .true.,
      U00 = 0.80,
      U00_profile = .true.,
      rthresh = 8.2,
      Dmin = 1.0e-07,
      n_land = 300.e6,
      diff_thresh = 0.1,
      mc_thresh = 0.001,
      eros_scale = 1.3e-6,
      eros_choice = .true.,
      eros_scale_c = 7.e-5,
      eros_scale_t = 7.e-5,
      super_choice = .true.,
      tracer_advec = .true.
```

```
      vfact = 1.0
      cfact = 1.0
      do_liq_num = .true.
      use_kk_auto = .false.
      var_limit = 0.7
      num_mass_ratio1 = 1.0
      num_mass_ratio2 = 0.
      use_sub_seasalt = .false.
    </namelist>
  </input>
</experiment>


<experiment name="ssam08_uw_conv_rkm_sh" inherit="ssam01_control">
  <input>
    <namelist name="uw_conv_nml">
      use_online_aerosol = .true.,
      iclosure        = 0,
      rkm_sh          = 10.0,
      cldhgt_max      = 50.e3,
      do_uwcmt        = .false.,
      apply_tendency  = .true.,
      wmin_ratio      = 0.05,
      do_lands        = .false.
      gama            = 0.0,
      tke0            = 0.5
      pblht0          = 500.
      lofactor0       = 0.5
      lochoice        = 10
      do_rescale      = .true.
      use_sub_seasalt = .false.
      wrel_min=1.
    </namelist>
  </input>
</experiment>


<experiment name="ssam09_uw_plume_auto_th0" inherit="ssam01_control">
  <input>
    <namelist name="uw_plume_nml">
      rmaxfrac = 0.15
      auto_th0 = 1.5e-3,
      tcrit    = -50.0,
      wmin     = 0.5,
      deltaqc0 = 0.5e-3
      do_pdfpcp= .false.
      do_pmadjt= .true.
      do_emmax = .true.
      do_pnqv  = .true.
    </namelist>
  </input>
</experiment>


<experiment name="ssam10_vegn_data_Vmax1" inherit="ssam01_control">
  <input>
    <namelist name="vegn_data_nml">
      dat_snow_crit = 0.0167, 0.0167, 0.0333, 0.2, 0.1
```

```
      vegn_to_use = 'uniform'
      K1=10,
      K2=0.1,
      fsc_liv=0.9,
      fsc_wood=0.45,
      c1(4) = 0.3
      c2(4) = 0.3
      Vmax = 1.5E-5, 2.0E-5, 2.0E-5, 2.0E-5, 1.5E-5,
      m_cond = 4., 9., 9., 7., 7.,
      alpha_phot = 0.05, 0.06, 0.06, 0.06, 0.06,
      gamma_resp = 0.03, 0.02, 0.02, 0.02, 0.02,
      fact_crit_phen(0:4) = 0., 0., 0., 0., 0.
      fact_crit_fire(0:4) = 0., 0., 0., 0., 0.
      cnst_crit_phen(0:4) = 0.30, 0.4, 0.30, 0.30, 0.30
      cnst_crit_fire(0:4) = 0.25, 0.4, 0.30, 0.15, 0.15
      wet_leaf_dreg(0:4)  = .3, .3, .3, .3, .3
      dfr = 3e-2,3e-2,7e-3,7e-3,7e-3,
      ksi =  0, 0, 0, 0, 0,
      leaf_refl(0:4,1) = 0.11, 0.11, 0.10, 0.10, 0.10
      leaf_refl(0:4,2) = 0.58, 0.58, 0.45, 0.45, 0.50,
      dat_root_zeta(0:4) =   0.35212, 0.17039, 0.28909, 0.25813, 0.17039
      critical_root_density = 0.0,
      tau_drip_s     = 259200.0
      cmc_lai(0:4) = 0.02, 0.02, 0.02, 0.02, 0.02
      csc_lai(0:4) = 0.2, 0.2, 0.2, 0.2, 0.2
      t_transp_min = 268.
      srl(0:1) = 112.0e3, 150.0e3
      root_perm = 14*5e-7
      alpha(1,3) = 4
      leaf_age_tau(2) = 150
      smoke_fraction = 0.9, 0.9, 0.6, 0.6, 0.6
    </namelist>
  </input>
</experiment>


<experiment name="ssam11_radiative_gases_co2" inherit="ssam01_control">
  <input>
    <namelist name="radiative_gases_nml">
      verbose = 3
      gas_printout_freq = 240
      time_varying_co2 = .false.,
      co2_variation_type = 'linear',
      co2_dataset_entry = 1860,1,1,0,0,0
      co2_specification_type = 'time_series',
      co2_floor = 100.0E-06,
      co2_ceiling = 1600.0E-06,
      co2_data_source = 'input'
      time_varying_ch4 = .true.,
      ch4_variation_type = 'linear'
      ch4_dataset_entry = $baseDate
      ch4_specification_type = 'time_series'
      ch4_data_source = 'input'
      time_varying_n2o = .true.,
      n2o_variation_type = 'linear'
      n2o_dataset_entry = $baseDate
      n2o_specification_type = 'time_series'
      n2o_data_source = 'input'
```

```
      time_varying_f11 = .true.,
      f11_variation_type = 'linear'
      f11_dataset_entry = $baseDate
      f11_specification_type = 'time_series'
      f11_data_source = 'input'
      time_varying_f12 = .true.,
      f12_variation_type = 'linear'
      f12_dataset_entry = $baseDate
      f12_specification_type = 'time_series'
      f12_data_source = 'input'
      time_varying_f113 = .true.,
      f113_variation_type = 'linear'
      f113_dataset_entry = $baseDate
      f113_specification_type = 'time_series'
      f113_data_source = 'input'
      time_varying_f22 = .true.,
      f22_variation_type = 'linear'
      f22_dataset_entry = $baseDate
      f22_specification_type = 'time_series'
      f22_data_source = 'input' /
    </namelist>
  </input>
</experiment>


<experiment name="ssam12_dust_emis" inherit="ssam01_control">
  <input>
    <namelist name="dust_nml">
      dust_source_name = 'source',
      dust_source_filename = 'dust_source_Iceland_1x1.nc'
      uthresh = 1.
      coef_emis = 5.0e-9
    </namelist>
  </input>
</experiment>


<experiment name="ssam13_so2_emission" inherit="ssam01_control">
  <input>
    <dataFile label="input" target="INPUT/" chksum="" size="" timestamp="">
      <dataSource platform="$(platform)">$(FMS_ARCHIVE_ROOT)/cm3/ipcc_ar5/input/common/hadisst.186912-
201108.tar</dataSource>
    </dataFile>
    <dataFile label="input" target="INPUT/" chksum="" size="" timestamp="">
      <dataSource platform="$(platform)">$
(FMS_ARCHIVE_ROOT)/cm3/ipcc_ar5/input/common/sea_esf_dec2011.cpio</dataSource>
    </dataFile>
    <dataFile label="input" target="INPUT/" chksum="" size="" timestamp="">
      <dataSource platform="$(platform)">$
(FMS_ARCHIVE_ROOT)/cm3/ipcc_ar5/input/common/navy_topography.data.nc</dataSource>
    </dataFile>
    <dataFile label="input" target="INPUT/" chksum="" size="" timestamp="">
      <dataSource platform="$(platform)">$
(FMS_ARCHIVE_ROOT)/cm3/ipcc_ar5/input/common/mom4.dec2009.cpio</dataSource>
    </dataFile>
    <dataFile label="input" target="INPUT/" chksum="" size="" timestamp="">
      <dataSource platform="$(platform)">$
(FMS_ARCHIVE_ROOT)/cm3/ipcc_ar5/input/common/land_LM3.dec2009.cpio</dataSource>
```

```
      </dataFile>
      <dataFile label="input" target="INPUT/" chksum="" size="" timestamp="">
        <dataSource platform="$(platform)">$
(FMS_ARCHIVE_ROOT)/cm3/ipcc_ar5/input/historical/landuse.nc</dataSource>
      </dataFile>
      <dataFile label="input" target="INPUT/" chksum="" size="" timestamp="">
        <dataSource platform="$(platform)">$
(FMS_ARCHIVE_ROOT)/cm3/ipcc_ar5/input/common/aerosol_inputs.dec2009.cpio</dataSource>
      </dataFile>
      <dataFile label="input" target="INPUT/" chksum="" size="" timestamp="">
        <dataSource platform="$(platform)">$
(FMS_ARCHIVE_ROOT)/cm3/ipcc_ar5/input/RCP/cmip5_rcp45.cpio</dataSource>
      </dataFile>
      <dataFile label="input" target="INPUT/" chksum="" size="" timestamp="">
       <dataSource platform="$(platform)">$
(FMS_ARCHIVE_ROOT)/cm3/ipcc_ar5/input/common/tropchem_oct2011.cpio</dataSource>
      </dataFile>
      <dataFile label="input" target="INPUT/" chksum="" size="" timestamp="">
        <dataSource platform="$(platform)">$
(FMS_ARCHIVE_ROOT)/cm3/ipcc_ar5/input/common/megan2.1_input.cpio</dataSource>
      </dataFile>
      <dataFile label="input" target="INPUT/" chksum="" size="" timestamp="">
        <dataSource platform="$(platform)">$
(FMS_ARCHIVE_ROOT)/cm3/ipcc_ar5/input/historical/emissions.1x1.1859_2020.tar</dataSource>
        <dataSource platform="$(platform)">/lustre/ltfs/scratch/Ni-
Zhang.Golaz/ssam2012/input/emissions/2xso2/emissions.so2.1x1.1859_2020.nc</dataSource>
      </dataFile>
    </input>
  </experiment>


  <experiment name="ssam14_donner_deep_capeRelaxation" inherit="ssam01_control">
    <input>
      <namelist name="donner_deep_nml">
        parcel_launch_level = 2
        model_levels_in_sfcbl = 0
        donner_deep_freq = 1800
        write_reduced_restart_file = .true.
        allow_mesoscale_circulation = .true.
        do_donner_cape    = .false.
        do_donner_plume   = .false.
        do_donner_closure = .false.
        do_donner_lscloud = .true.
        do_dcape          = .false.
        do_lands          = .false.
        do_freezing_for_cape = .true.
        do_freezing_for_closure = .true.
        gama              = 0.0
        tau               = 3600.
        tke0              = 0.5
        cape0             = 1000.
        lochoice          = 10
        do_capetau_land   = .false.
        use_llift_criteria= .false.
        do_ice            = .true.
        atopevap  = 0.1
        auto_rate = 1.e-3
        auto_th   = 0.5e-3
```

```
      frac      = 1.65
      ttend_max = 0.005
      EVAP_IN_DOWNDRAFTS  = 0.00
      EVAP_IN_ENVIRON     = 0.00
      ENTRAINED_INTO_MESO = 1.00
      ANVIL_PRECIP_EFFICIENCY = 0.55
      MESO_DOWN_EVAP_FRACTION = 0.4
      MESO_UP_EVAP_FRACTION   = 0.05
      wmin_ratio      = 0.05,
      arat =  1.0, 0.26, 0.35, 0.32, 0.3, 0.54, 0.66
      erat =  1.0, 1.30, 1.80, 2.50, 3.3, 4.50, 10.0
      frc_internal_enthalpy_conserv = .true.
      limit_pztm_to_tropo = .true.
    </namelist>
  </input>
</experiment>


<experiment name="ssam15_donner_deep_MP" inherit="ssam01_control">
  <input>
    <namelist name="donner_deep_nml">
      parcel_launch_level = 2
      model_levels_in_sfcbl = 0
      donner_deep_freq = 1800
      write_reduced_restart_file = .true.
      allow_mesoscale_circulation = .true.
      do_donner_cape    = .false.
      do_donner_plume   = .false.
      do_donner_closure = .false.
      do_donner_lscloud = .true.
      do_dcape          = .false.
      do_lands          = .false.
      do_freezing_for_cape = .true.
      do_freezing_for_closure = .true.
      gama              = 0.0
      tau               = 28800.
      tke0              = 0.5
      cape0             = 1000.
      lochoice          = 10
      do_capetau_land   = .false.
      use_llift_criteria= .false.
      do_ice            = .true.
      atopevap  = 0.1
      auto_rate = 1.e-3
      auto_th   = 0.5e-3
      frac      = 1.65
      ttend_max = 0.005
      EVAP_IN_DOWNDRAFTS  = 0.00
      EVAP_IN_ENVIRON     = 0.00
      ENTRAINED_INTO_MESO = 1.00
      ANVIL_PRECIP_EFFICIENCY = 0.51
      MESO_DOWN_EVAP_FRACTION = 0.48
      MESO_UP_EVAP_FRACTION   = 0.01
      wmin_ratio      = 0.05,
      arat =  1.0, 0.26, 0.35, 0.32, 0.3, 0.54, 0.66
      erat =  1.0, 1.30, 1.80, 2.50, 3.3, 4.50, 10.0
      frc_internal_enthalpy_conserv = .true.
      limit_pztm_to_tropo = .true.
```

```
    </namelist>
   </input>
  </experiment>


<!-- Few more experiments with 3-year production runs for your own exercise -->

  <experiment name="c48L48_am3p10_myControl" inherit="c48L48_am3p10">
<!-- For those could not complie the code, try to use an existing executable file as below -->
<!--
   <executable file="/lustre/ltfs/scratch/Ni-Zhang.Golaz/ssam2012/siena_201204/c48L48_am3p10/ncrc2.intel-prod-
openmp/exec/fms_c48L48_am3p10.x"/>
-->
   <runtime>

     <production simTime="3" units="years" npes="576" runTime="16:00:00">
       <segment simTime="12" units="months" runTime="05:20:00"/>
     </production>

   </runtime>

  </experiment>


  <experiment name="c48L48_am3p10_sealw99_continuum" inherit="c48L48_am3p10_myControl">
   <input>
     <namelist name="sealw99_nml">
       do_thick = .false.,
       do_nlte = .false.,
       do_lwcldemiss = .true.,

       continuum_form = 'ckd2.4',
       linecatalog_form = 'hitran_2000',
       co2_tf_calc_intrvl = 3.0,
       use_current_co2_for_tf = .false.
       calc_co2_tfs_on_first_step = .true.,
       co2_tf_time_displacement = 0.0,

       ch4_tf_calc_intrvl = 3.0,
       calc_ch4_tfs_on_first_step = .false.,
       use_current_ch4_for_tf = .false.
       ch4_tf_time_displacement = 0.0,

       n2o_tf_calc_intrvl =  3.0,
       calc_n2o_tfs_on_first_step = .false.,
       use_current_n2o_for_tf = .false.
       n2o_tf_time_displacement = 0.0,

       verbose = 5
     </namelist>
   </input>
  </experiment>

  <experiment name="c48L48_am3p10_donner_deep_cellEntrainment" inherit="c48L48_am3p10_myControl">
   <input>
     <namelist name="donner_deep_nml">
       parcel_launch_level = 2
       model_levels_in_sfcbl = 0
```

```
    donner_deep_freq = 1800
    write_reduced_restart_file = .true.
    allow_mesoscale_circulation = .true.
    do_donner_cape    = .false.
    do_donner_plume   = .false.
    do_donner_closure = .false.
    do_donner_lscloud = .true.
    do_dcape          = .false.
    do_lands          = .false.
    do_freezing_for_cape = .true.
    do_freezing_for_closure = .true.
    gama              = 0.0
    tau               = 28800.
    tke0              = 0.5
    cape0             = 1000.
    lochoice          = 10
    do_capetau_land   = .false.
    use_llift_criteria= .false.
    do_ice            = .true.
    atopevap  = 0.1
    auto_rate = 1.e-3
    auto_th   = 0.5e-3
    frac      = 1.65
    ttend_max = 0.005
    EVAP_IN_DOWNDRAFTS  = 0.00
    EVAP_IN_ENVIRON     = 0.00
    ENTRAINED_INTO_MESO = 1.00
    ANVIL_PRECIP_EFFICIENCY = 0.55
    MESO_DOWN_EVAP_FRACTION = 0.4
    MESO_UP_EVAP_FRACTION   = 0.05
    wmin_ratio      = 0.05,
    arat =  1.0, 0.26, 0.35, 0.32, 0.3, 0.54, 0.66
    erat =  1.0, 0.65, 0.90, 1.25, 1.65, 2.25, 5.0
    frc_internal_enthalpy_conserv = .true.
    limit_pztm_to_tropo = .true.
   </namelist>
  </input>
</experiment>

<experiment name="c48L48_am3p10_donner_deep_massFluxes" inherit="c48L48_am3p10_myControl">
  <input>
   <namelist name="donner_deep_nml">
    parcel_launch_level = 2
    model_levels_in_sfcbl = 0
    donner_deep_freq = 1800
    write_reduced_restart_file = .true.
    allow_mesoscale_circulation = .true.
    do_donner_cape    = .false.
    do_donner_plume   = .false.
    do_donner_closure = .false.
    do_donner_lscloud = .true.
    do_dcape          = .false.
    do_lands          = .false.
    do_freezing_for_cape = .true.
    do_freezing_for_closure = .true.
    gama              = 0.0
    tau               = 28800.
    tke0              = 0.5
```

```
      cape0            = 1000.
      lochoice         = 10
      do_capetau_land   = .false.
      use_llift_criteria= .false.
      do_ice           = .true.
      atopevap  = 0.1
      auto_rate = 1.e-3
      auto_th   = 0.5e-3
      frac      = 1.65
      ttend_max = 0.005
      EVAP_IN_DOWNDRAFTS  = 0.00
      EVAP_IN_ENVIRON     = 0.00
      ENTRAINED_INTO_MESO = 1.00
      ANVIL_PRECIP_EFFICIENCY = 0.55
      MESO_DOWN_EVAP_FRACTION = 0.4
      MESO_UP_EVAP_FRACTION   = 0.05
      wmin_ratio      = 0.05,
      arat =  1.0, 0.78, 1.05, 0.96, 0.9, 1.62, 1.98
      erat =  1.0, 1.30, 1.80, 2.50, 3.3, 4.50, 10.0
      frc_internal_enthalpy_conserv = .true.
      limit_pztm_to_tropo = .true.
    </namelist>
    <diagTable file="/ncrc/home2/Ni-Zhang.Golaz/ssam2012/input/diagTable/c48L48_am3p10.diagTable_simMF"/>
  </input>
 </experiment>

</experimentSuite>
```