

NEI\_2011\_radm

1.0

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# Chapter 1

## Modules Index

### 1.1 Modules List

Here is a list of all modules with brief descriptions:

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## Chapter 2

# File Index

### 2.1 File List

Here is a list of all files with brief descriptions:

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## Chapter 3

# Module Documentation

### 3.1 var\_nei Module Reference

Emissions Inventorie Variables.

#### Functions/Subroutines

- subroutine [check](#) (status)  
*Verifies no error in netcdf function call.*
- subroutine [lee\\_nml](#) (IX, JX, KX)  
*Reads dimensions from namelist file.*

#### Variables

- integer [zlev](#)  
*Emission Layer.*
- integer [hh](#)  
*Start hour in binary emissions file.*
- integer [nradm](#)  
*Number of chemical species in netcdf emissions file.*
- integer, parameter [nh](#) =24  
*Number of hours in a day.*
- integer, parameter [radm](#) =32  
*Number of chemical species in RADM mechanism.*
- integer, parameter [ndims](#) =6  
*Number dimensions to be stored in netcdf output file.*
- real, dimension(:, :, :, :), allocatable [emiss3d](#)  
*emissions by nx, ny, level, nh, radm*
- real, dimension(:, :, :), allocatable [xlat](#)  
*Latitude coordinates by nx, ny, nh from wrfinput file.*
- real, dimension(:, :, :), allocatable [xlon](#)  
*Longitude coordinates by nx, ny, nh from wrfinput file.*
- integer [grid\\_id](#)  
*Domain ID from wrfinput file and used in output file.*

- integer [julyr](#)  
*julian year global attribute from wrfinput file and used in output file.*
- integer [julday](#)  
*julian day global attribute from wrfinput file and used in output file.*
- integer [mapproj](#)  
*Map projection ID global attribute from wrfinput file and used in output file.*
- integer [iswater](#)  
*Water ID global attribute from wrfinput file and used in output file.*
- integer [islake](#)  
*Lake ID global attribute from wrfinput file and used in output file.*
- integer [isice](#)  
*Ice ID global attribute from wrfinput file and used in output file.*
- integer [isurban](#)  
*Urban ID global attribute from wrfinput file and used in output file.*
- integer [isoilwater](#)  
*Water-soil ID global attribute from wrfinput file and used in output file.*
- real [cenlat](#)  
*Projection central latitude.*
- real [cenlon](#)  
*Projection central longitude.*
- real [dx](#)  
*Grid size (m) in W-E direction.*
- real [dy](#)  
*Grid size (m) in S-N direction.*
- real [trulat1](#)  
*Standard parallel 1.*
- real [trulat2](#)  
*Standard parallel 2.*
- real [moadcenlat](#)  
*Mother of all domains center latitude.*
- real [stdlon](#)  
*Standard longitude.*
- real [pollat](#)  
*Pole latitude.*
- real [pollon](#)  
*Pole longitude.*
- real [gmt](#)  
*Time zone.*
- real [num\\_land\\_cat](#)  
*Land cover categories number.*
- character(len=10) [cday](#)  
*Day of the week.*
- character(len=9), dimension(:), allocatable [ename1](#)  
*Emissions name in binary file.*
- character(len=10), dimension(:), allocatable [ename](#)  
*Emissions name in output netcdf file.*
- character(len=19) [mminlu](#)  
*Source of land use data.*
- character(len=19) [cmap\\_proj\\_char](#)  
*Projection description.*
- character(len=38) [title](#)

*Title from wrfinput file.*

- character(len=19), dimension(ndims) **sdim** = (/ "Time ", "DateStrLen ", "west\_east ", "south\_north ", "bottom\_top ", "emissions\_zdim\_stag" /)

*Dimension description array.*

- character(len=19), dimension(radm) **cname** = (/ "Sulfur Dioxide ", "Nitrogen oxide ", "Aldehydes ", "HCHO ", "Acetic Acid ", "Ammonia ", "Butanes ", "Pentanes ", "Alkane ", "Ethane ", "Carbon Monoxide ", "Alkanes ", "Terminal Alkenes ", "Alkenes ", "Toluene ", "Xylene ", "Acetone ", "Cresol ", "Isoprene ", "Methane ", "PM25I ", "PM25J ", "SulfatesI ", "SulfatesJ ", "Nitrates ", "NitratesJ ", "OrganicI ", "OrganicJ ", "Elemental Carb I", "Elemental Carb J", "PM\_10 ", "Nitrogen Dioxide" /)

*Chemical mechanism variable emissions description.*

- character(len=19) **current\_date**

*Date in wrfiput file.*

- character(len=19) **mecha**

*mechanism name*

### 3.1.1 Detailed Description

Emissions Inventorie Variables.

Author

Jose Agustin Garcia Reynoso

Date

25/04/2018

Version

1.0

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### 3.1.2 Function/Subroutine Documentation

#### 3.1.2.1 check()

```
subroutine var_nei::check (
    integer, intent(in) status )
```

Verifies no error in netcdf function call.

**Parameters**

<i>status</i>	NetCDF functions return a non-zero status codes on error.
---------------	---

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Definition at line 144 of file module\_var\_nei.F90.

**3.1.2.2 lee\_nml()**

```
subroutine var_nei::lee_nml (  
    integer, intent(out) IX,  
    integer, intent(out) JX,  
    integer, intent(out) KX )
```

Reads dimensions from namelist file.

Obtains from domain.nml file dimension of domain dimensions.

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Jose Agustin Garcia Reynoso

**Date**

01/22/2021

**Version**

1.0

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**Parameters**

<i>IX</i>	number of cell grid in W-E direction
<i>JX</i>	number of cell grid in S-N direction
<i>KX</i>	number of cell grid in vertical direction

Definition at line 168 of file module\_var\_nei.F90.

### 3.1.3 Variable Documentation

#### 3.1.3.1 cday

```
character(len=10) var_nei::cday
```

Day of the week.

Definition at line 70 of file module\_var\_nei.F90.

#### 3.1.3.2 cenlat

```
real var_nei::cenlat
```

Projection central latitude.

Definition at line 46 of file module\_var\_nei.F90.

#### 3.1.3.3 cenlon

```
real var_nei::cenlon
```

Projection central longitude.

Definition at line 48 of file module\_var\_nei.F90.

#### 3.1.3.4 cmap\_proj\_char

```
character(len=19) var_nei::cmap_proj_char
```

Projection description.

Definition at line 78 of file module\_var\_nei.F90.

### 3.1.3.5 cname

```
character(len= 19), dimension(radm) var_nei::cname =(/'Sulfur Dioxide ', 'Nitrogen oxide ', 'Aldehydes ', 'HCHO ', 'Acetic Acid ', 'Ammonia ', 'Butanes ', 'Pentanes ', 'Alkane ', 'Ethane ', 'Carbon Monoxide ', 'Alkanes ', 'Terminal Alkenes', 'Alkenes ', 'Toluene ', 'Xylene ', 'Acetone ', 'Cresol ', 'Isoprene ', 'Methane ', 'PM25I ', 'PM25J ', 'SulfatesI ', 'SulfatesJ ', 'Nitrates ', 'NitratesJ ', 'OrganicI ', 'OrganicJ ', 'Elemental Carb I', 'Elemental Carb J', 'PM_10 ', 'Nitrogen Dioxide'/)
```

Chemical mechanism variable emissions description.

Definition at line 86 of file module\_var\_nei.F90.

### 3.1.3.6 current\_date

```
character (len=19) var_nei::current_date
```

Date in wrfput file.

Definition at line 96 of file module\_var\_nei.F90.

### 3.1.3.7 dx

```
real var_nei::dx
```

Grid size (m) in W-E direction.

Definition at line 50 of file module\_var\_nei.F90.

### 3.1.3.8 dy

```
real var_nei::dy
```

Grid size (m) in S-N direction.

Definition at line 52 of file module\_var\_nei.F90.

### 3.1.3.9 emiss3d

```
real, dimension(:,:,:,,:), allocatable var_nei::emiss3d
```

emissions by nx,ny,level,nh,radm

Definition at line 22 of file module\_var\_nei.F90.

### 3.1.3.10 `ename`

```
character (len=10), dimension(:), allocatable var_nei::ename
```

Emissions name in output netcdf file.

Definition at line 74 of file module\_var\_nei.F90.

### 3.1.3.11 `ename1`

```
character (len= 9), dimension(:), allocatable var_nei::ename1
```

Emissions name in binary file.

Definition at line 72 of file module\_var\_nei.F90.

### 3.1.3.12 `gmt`

```
real var_nei::gmt
```

Time zone.

Definition at line 66 of file module\_var\_nei.F90.

### 3.1.3.13 `grid_id`

```
integer var_nei::grid_id
```

Domain ID from wrfinput file and used in output file.

Definition at line 28 of file module\_var\_nei.F90.

### 3.1.3.14 `hh`

```
integer var_nei::hh
```

Start hour in binary emissions file.

Definition at line 12 of file module\_var\_nei.F90.

#### 3.1.3.15 isice

```
integer var_nei::isice
```

Ice ID global attribute from wrfinput file and used in output file.

Definition at line 40 of file module\_var\_nei.F90.

#### 3.1.3.16 islake

```
integer var_nei::islake
```

Lake ID global attribute from wrfinput file and used in output file.

Definition at line 38 of file module\_var\_nei.F90.

#### 3.1.3.17 isoilwater

```
integer var_nei::isoilwater
```

Water-soil ID global attribute from wrfinput file and used in output file.

Definition at line 44 of file module\_var\_nei.F90.

#### 3.1.3.18 isurban

```
integer var_nei::isurban
```

Urban ID global attribute from wrfinput file and used in output file.

Definition at line 42 of file module\_var\_nei.F90.

#### 3.1.3.19 iswater

```
integer var_nei::iswater
```

Water ID global attribute from wrfinput file and used in output file.

Definition at line 36 of file module\_var\_nei.F90.



**3.1.3.20 julday**

```
integer var_nei::julday
```

julian day global attribute from wrfinput file and used in output file.

Definition at line 32 of file module\_var\_nei.F90.

**3.1.3.21 julyr**

```
integer var_nei::julyr
```

julian year global attribute from wrfinput file and used in output file.

Definition at line 30 of file module\_var\_nei.F90.

**3.1.3.22 mapproj**

```
integer var_nei::mapproj
```

Map projection ID global attribute from wrfinput file and used in output file.

Definition at line 34 of file module\_var\_nei.F90.

**3.1.3.23 mecha**

```
character (len=19) var_nei::mecha
```

mechanism name

Definition at line 98 of file module\_var\_nei.F90.

**3.1.3.24 mminlu**

```
character (len=19) var_nei::mminlu
```

Source of land use data.

Definition at line 76 of file module\_var\_nei.F90.

#### 3.1.3.25 moadcenlat

```
real var_nei::moadcenlat
```

Mother of all domains center latitude.

Definition at line 58 of file module\_var\_nei.F90.

#### 3.1.3.26 ndims

```
integer, parameter var_nei::ndims =6
```

Number dimensions to be stored in netcdf output file.

Definition at line 20 of file module\_var\_nei.F90.

#### 3.1.3.27 nh

```
integer, parameter var_nei::nh =24
```

Number of hours in a day.

Definition at line 16 of file module\_var\_nei.F90.

#### 3.1.3.28 nradm

```
integer var_nei::nradm
```

Number of chemical species in netcdf emissions file.

Definition at line 14 of file module\_var\_nei.F90.

#### 3.1.3.29 num\_land\_cat

```
real var_nei::num_land_cat
```

Land cover categories number.

Definition at line 68 of file module\_var\_nei.F90.

### 3.1.3.30 pollat

```
real var_nei::pollat
```

Pole latitude.

Definition at line 62 of file module\_var\_nei.F90.

### 3.1.3.31 pollon

```
real var_nei::pollon
```

Pole longitude.

Definition at line 64 of file module\_var\_nei.F90.

### 3.1.3.32 radm

```
integer, parameter var_nei::radm =32
```

Number of chemical species in RADM mechanism.

Definition at line 18 of file module\_var\_nei.F90.

### 3.1.3.33 sdim

```
character (len=19), dimension(ndims) var_nei::sdim =(/"Time ", "DateStrLen ", "west_east ", "south↵  
_north ", "bottom_top ", "emissions_zdim_stag"/)
```

Dimension description array.

Definition at line 82 of file module\_var\_nei.F90.

### 3.1.3.34 stdlon

```
real var_nei::stdlon
```

Standard longitude.

Definition at line 60 of file module\_var\_nei.F90.

### 3.1.3.35 title

```
character(len=38) var_nei::title
```

Title from wrfinput file.

Definition at line 80 of file module\_var\_nei.F90.

### 3.1.3.36 trulat1

```
real var_nei::trulat1
```

Standard parallel 1.

Definition at line 54 of file module\_var\_nei.F90.

### 3.1.3.37 trulat2

```
real var_nei::trulat2
```

Standard parallel 2.

Definition at line 56 of file module\_var\_nei.F90.

### 3.1.3.38 xlat

```
real, dimension(:,:,:), allocatable var_nei::xlat
```

Latitude coordinates by nx,ny,nh from wrfinput file.

Definition at line 24 of file module\_var\_nei.F90.

### 3.1.3.39 xlon

```
real, dimension(:,:,:), allocatable var_nei::xlon
```

Longitude coordinates by nx,ny,nh from wrfinput file.

Definition at line 26 of file module\_var\_nei.F90.

### 3.1.3.40 zlev

```
integer var_nei::zlev
```

Emission Layer.

Definition at line 10 of file module\_var\_nei.F90.

## Chapter 4

# File Documentation

### 4.1 /Users/agustin/proyectos/NEI\_2011\_radm/source/convierte.F90 File Reference

#### Functions/Subroutines

- program [nei\\_2011](#)

*Reads binary files from NEI 2011 and converts into netcdf.*

#### 4.1.1 Function/Subroutine Documentation

##### 4.1.1.1 nei\_2011()

```
program nei_2011
```

Reads binary files from NEI 2011 and converts into netcdf.

using wrfinput to set dates, attributes and dimensions for RADM2 mechanism this is made in two steps: 1) Set hh=0 to indicate that binary file starting at 00Z will be read reads wrfinput file obtaining time, attributes and dimensions. stores 00z emissions data in netcdf format 2) Set hh=12 to read 12Z binary file uses previous wrfinput information and stores 12z emissions data in netcdf format

#### Author

Jose Agustin Garcia Reynoso

#### Date

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#### Version

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Definition at line 17 of file convierte.F90.

## 4.2 /Users/agustin/proyectos/NEI\_2011\_radm/source/guarda.F90 File Reference

### Functions/Subroutines

- subroutine [guarda\\_emisiones](#)  
*Stores emissions in radm categories in netcdf format.*
- subroutine [crea\\_attr](#) (ncid, ifl, dimids, svar, cname, cunits, id\_var)  
*Creates attributes for each variable in the netcdf file.*

### 4.2.1 Function/Subroutine Documentation

#### 4.2.1.1 crea\_attr()

```
subroutine guarda_emisiones::crea_attr (
    integer, intent(in) ncid,
    integer, intent(in) ifl,
    integer, dimension(:), intent(in) dimids,
    character(len=*), intent(in) svar,
    character(len=*), intent(in) cname,
    character(len=*), intent(in) cunits,
    integer, intent(out) id_var )
```

Creates attributes for each variable in the netcdf file.

#### Author

Jose Agustin Garcia Reynoso

#### Date

07/13/2020

#### Version

2.2

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#### Parameters

<i>ncid</i>	netcdf file ID
<i>ifl</i>	type of variable 0 for ratio, 1 for emissions 2 for number
<i>dimids</i>	ID dimensons array
<i>svar</i>	short variable name
<i>cname</i>	description variable name
<i>cunits</i>	units of the variable
<i>id_var</i>	variable ID

Definition at line 208 of file guarda.F90.

#### 4.2.1.2 guarda\_emisiones()

```
subroutine guarda_emisiones
```

Stores emissions in radm categories in netcdf format.

##### Author

Jose Agustin Garcia Reynoso

##### Date

26/04/2018

##### Version

1.0

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Definition at line 21 of file guarda.F90.

## 4.3 /Users/agustin/proyectos/NEI\_2011\_radm/source/lee\_NEI.F90 File Reference

### Functions/Subroutines

- subroutine [lee\\_nei](#)  
*Reads binary emissions file with radm categories.*

#### 4.3.1 Function/Subroutine Documentation

#### 4.3.1.1 lee\_nei()

```
subroutine lee_nei
```

Reads binary emissions file with radm categories.

uses a global variable hh to read 00z or 12z.

##### Author

Jose Agustin Garcia Reynoso

##### Date

25/04/2018

##### Version

1.0

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Definition at line 14 of file lee\_NEI.F90.

## 4.4 /Users/agustin/proyectos/NEI\_2011\_radm/source/lee\_wrfinput.F90 File Reference

### Functions/Subroutines

- subroutine [lee\\_wrfinput](#)

#### 4.4.1 Function/Subroutine Documentation

##### 4.4.1.1 lee\_wrfinput()

```
subroutine lee_wrfinput
```

Definition at line 11 of file lee\_wrfinput.F90.



## 4.5 /Users/agustin/proyectos/NEI\_2011\_radm/source/module\_var\_nei.F90 File Reference

### Modules

- module `var_nei`  
*Emissions Inventorie Variables.*

### Functions/Subroutines

- subroutine `var_nei::check` (status)  
*Verifies no error in netcdf function call.*
- subroutine `var_nei::lee_nml` (IX, JX, KX)  
*Reads dimensions from namelist file.*

### Variables

- integer `var_nei::zlev`  
*Emission Layer.*
- integer `var_nei::hh`  
*Start hour in binary emissions file.*
- integer `var_nei::nradm`  
*Number of chemical species in netcdf emissions file.*
- integer, parameter `var_nei::nh` =24  
*Number of hours in a day.*
- integer, parameter `var_nei::radm` =32  
*Number of chemical species in RADM mechanism.*
- integer, parameter `var_nei::ndims` =6  
*Number dimensions to be stored in netcdf output file.*
- real, dimension(,;,;,;,;), allocatable `var_nei::emiss3d`  
*emissions by nx,ny,level,nh,radm*
- real, dimension(,;,;), allocatable `var_nei::xlat`  
*Latitude coordinates by nx,ny,nh from wrfinput file.*
- real, dimension(,;,;), allocatable `var_nei::xlon`  
*Longitude coordinates by nx,ny,nh from wrfinput file.*
- integer `var_nei::grid_id`  
*Domain ID from wrfinput file and used in output file.*
- integer `var_nei::julyr`  
*julian year global attribure from wrfinput file and used in output file.*
- integer `var_nei::julday`  
*julian day global attribure from wrfinput file and used in output file.*
- integer `var_nei::mapproj`  
*Map projection ID global attribure from wrfinput file and used in output file.*
- integer `var_nei::iswater`  
*Water ID global attribure from wrfinput file and used in output file.*
- integer `var_nei::islake`  
*Lake ID global attribure from wrfinput file and used in output file.*
- integer `var_nei::isice`  
*Ice ID global attribure from wrfinput file and used in output file.*

- integer `var_nei::isurban`  
*Urban ID global attribute from wrfinput file and used in output file.*
- integer `var_nei::isoilwater`  
*Water-soil ID global attribute from wrfinput file and used in output file.*
- real `var_nei::cenlat`  
*Projection central latitude.*
- real `var_nei::cenlon`  
*Projection central longitude.*
- real `var_nei::dx`  
*Grid size (m) in W-E direction.*
- real `var_nei::dy`  
*Grid size (m) in S-N direction.*
- real `var_nei::trulat1`  
*Standard parallel 1.*
- real `var_nei::trulat2`  
*Standard parallel 2.*
- real `var_nei::moadcenlat`  
*Mother of all domains center latitude.*
- real `var_nei::stdlon`  
*Standard longitude.*
- real `var_nei::pollat`  
*Pole latitude.*
- real `var_nei::pollon`  
*Pole longitude.*
- real `var_nei::gmt`  
*Time zone.*
- real `var_nei::num_land_cat`  
*Land cover categories number.*
- character(len=10) `var_nei::cday`  
*Day of the week.*
- character(len=9), dimension(:), allocatable `var_nei::ename1`  
*Emissions name in binary file.*
- character(len=10), dimension(:), allocatable `var_nei::ename`  
*Emissions name in output netcdf file.*
- character(len=19) `var_nei::mminlu`  
*Source of land use data.*
- character(len=19) `var_nei::cmap_proj_char`  
*Projection description.*
- character(len=38) `var_nei::title`  
*Title from wrfinput file.*
- character(len=19), dimension(ndims) `var_nei::sdim` = (/ "Time ", "DateStrLen ", "west\_east ", "south\_north ", "bottom\_top ", "emissions\_zdim\_stag" /)  
*Dimension description array.*
- character(len=19), dimension(radm) `var_nei::cname` = (/ "Sulfur Dioxide ", "Nitrogen oxide ", "Aldehydes ", "HCHO ", "Acetic Acid ", "Ammonia ", "Butanes ", "Pentanes ", "Alkane ", "Ethane ", "Carbon Monoxide ", "Alkanes ", "Terminal Alkenes ", "Alkenes ", "Toluene ", "Xylene ", "Acetone ", "Cresol ", "Isoprene ", "Methane ", "PM25I ", "PM25J ", "SulfatesI ", "SulfatesJ ", "Nitrates ", "NitratesJ ", "OrganicI ", "OrganicJ ", "Elemental Carb I", "Elemental Carb J", "PM\_10 ", "Nitrogen Dioxide" /)  
*Chemical mechanism variable emissions description.*
- character(len=19) `var_nei::current_date`  
*Date in wrfiput file.*
- character(len=19) `var_nei::mecha`  
*mechanism name*

## 4.6 /Users/agustin/proyectos/NEI\_2011\_radm/source/testsuite/t\_check.F90 File Reference

### Functions/Subroutines

- program [test\\_check](#)

#### 4.6.1 Function/Subroutine Documentation

##### 4.6.1.1 test\_check()

```
program test_check
```

Definition at line 2 of file t\_check.F90.

## 4.7 /Users/agustin/proyectos/NEI\_2011\_radm/source/testsuite/test\_nml.F90 File Reference

### Functions/Subroutines

- program [nml\\_read](#)  
*Program to obtain the domain's dimensions.*

#### 4.7.1 Function/Subroutine Documentation

##### 4.7.1.1 nml\_read()

```
program nml_read
```

Program to obtain the domain's dimensions.

#### Author

Jose Agustin Garcia Reynoso

#### Date

01/22/2021

#### Version

1.0

#### Copyright

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Definition at line 7 of file test\_nml.F90.



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