

# Package ‘daRt’

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**Type** Package

**Title** Read DART Model Outputs

**Version** 0.5.0

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**Description** For reading outputs from the Discrete Anisotropic Radiative Transfer (DART) model, formatted in a ``long" dplyr-ready format suitable for efficient analysis.

**Github** <https://github.com/willmorrison1/daRt>

**License** GPL-3

**Encoding** UTF-8

**RoxygenNote** 6.1.1

## R topics documented:

accessors	2
as.data.frame,SimulationData-method	2
deleteFiles	3
Directions-class	3
getData	3
getFiles	4
Images-class	4
imagesToDirectionsDF	4
plotDirections	5
RB3D-class	5
rb3DtoNc	6
removeRelief	6
sequenceParameters	7
SimulationData-class	7
SimulationFiles-class	7
simulationFilter	8
SimulationFilter-class	8
versionInfo	9

<b>Index</b>	<b>10</b>
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accessors

*Access object information*

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**Description**

Generic functions to access information from the objects with classes defined in this package

**Usage**

```
product(x)
simname(x)
files(x)
bands(x)
iters(x)
variables(x)
variablesRB3D(x)
typeNums(x)
imageType(x)
imageNos(x)
```

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as.data.frame, SimulationData-method  
*as.data.frame*

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**Description**

as.data.frame

**Usage**

```
## S4 method for signature 'SimulationData'
as.data.frame(x, as.tibble = TRUE)
```

**Arguments**

x                      SimulationData.

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deleteFiles	<i>deleteFiles</i>
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### Description

DART input files can be very large. This function deletes those large files that are not required for post-processing of data in this package.

### Usage

```
deleteFiles(x = "SimulationFiles", trianglesInput = "logical",
  maketOutput = "logical")
```

### Arguments

x	<a href="#">SimulationFiles-class</a> type object.
trianglesInput	remove "triangles" input files? (bool)
maketOutput	remove "maket.txt" output file? (bool)

### Details

Delete potentially large input files

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Directions-class	<i>Directions data class</i>
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### Description

Directions data class that extends [SimulationData-class](#) class.

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getData	<i>Main function: get DART data</i>
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### Description

Main function to get data from DART simulation outputs in a friendly 'long' data format that is part of an object that extends a [SimulationData-class](#) type object

### Usage

```
getData(x, sF, ...)
```

### Arguments

x	simulation directory or directories (character) or <a href="#">SimulationFiles-class</a> object
sF	<a href="#">SimulationFilter-class</a> if x = character

---

getFiles	<i>Get DART output filenames</i>
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### Description

Get DART output filenames

### Usage

```
getFiles(x = "character", sF = "SimulationFilter")
```

### Arguments

x	simulation directory or directories (character)
sF	<a href="#">SimulationFilter-class</a> object
...	Optional arguments of: nCores: number of cores to use when loading data.

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Images-class	<i>Images data class</i>
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### Description

Image data class extends [SimulationData-class](#) class.

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imagesToDirectionsDF	<i>imagesToDirectionsDF</i>
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### Description

Convert an [Images-class](#) object to a Directions-class object

### Usage

```
imagesToDirectionsDF(x, fun)
```

### Arguments

x	<a href="#">Images-class</a> object
fun	Function to apply across each image.

### Details

Aggregate images to single values

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plotDirections	<i>plotDirections</i>
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**Description**

Plot directions data as polar plot.

**Usage**

```
plotDirections(azimuth, zenith, value, azimuthOffsetVal = 0,
  outerRadius = max(zenith) + max(zenith) * 0.01, zenithLabPch = 20,
  zenithLabCol = "darkgrey", zenithLabCex = 1, brks = seq(min(value),
  max(value), length.out = 10), cols = c("dark grey",
  colorRampPalette(c("purple", "blue3", "yellow", "red"))(length(brks) -
  3), "firebrick4"), ...)
```

**Arguments**

azimuth	Numeric. Azimuth angle with DART conventions
zenith	Numeric. Zenith angle with DART conventions
value	Numeric. Values associated with the given azimuth and zenith angles
azimuthOffsetVal	Numeric. Scene offset (degrees) as shown in the DART GUI.
outerRadius	Numeric. Maximum radius (degrees) of polar plot
zenithLabPch	Numeric. Pch for zenith label.
zenithLabCol	Character. Colour for zenith label.
zenithLabCex	Numeric. Cex for zenith label.
brks	Numeric. Breaks for colour palette e.g. seq(0, 1, by = 0.1). Optional.
cols	Character. Colours for given breaks. Optional.
...	Additional options passed to points() when drawing directions points.

**Examples**

```
#Inputs are DART oriented directions (as seen in the DART files and \link{Directions-class})
plotDirections(azimuth = rep(225, 10),
  zenith = seq(0, 90, length.out = 10),
  value = 1:10)
#Output plot uses 'upward' directions from ground, where e.g.:
  0deg (270deg) azimuth faces north (west)
  0deg (90deg) zenith faces upward (horizon)
```

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RB3D-class	<i>RB3D class</i>
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**Description**

RB3D (Radiative Budget 3D) class that extends [SimulationData-class](#) class.

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rb3DtoNc

*rb3DtoNc*


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### Description

DART radiative budget .bin files can be very large. This function replaces all .bin files with .nc files, which can be compressed and are faster to read.

### Usage

```
rb3DtoNc(x = "SimulationFiles", ...)
```

### Arguments

x [SimulationFiles-class](#) type object.  
 ncCompressionFactor  
 Compression factor (0 - 9) for writing ncdf files (see ncdf4 package)

### Details

Convert radiative budget .bin to .nc

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removeRelief

*removeRelief*


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### Description

Remove underlying orography from a [RB3D-class](#) dataset using a digital elevation model (DEM) of class RasterLayer that is georeferenced to [RB3D-class](#).

### Usage

```
removeRelief(x = "RB3D", DEM = "RasterLayer")
```

### Arguments

x [RB3D-class](#) type object.  
 DSM RasterLayer type object with height above ground level (m) and - preferably - a finer horizontal resolution than that of the radiative budget cells in x. The center of the DSM must be georeferenced to the center of the radiative budget data in x. The DSM can have a larger extent than x.

### Details

Remove underlying orography

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sequenceParameters	<i>sequenceParameters</i>
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**Description**

return a data frame. A row describes the parameters (parametre\*) for a simulation (simName).

**Usage**

```
sequenceParameters(x)
```

**Arguments**

[SimulationFiles-class](#)  
or [SimulationData-class](#) class object

**Details**

Get data frame of all sequence parameters

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SimulationData-class	<i>Generic SimulationData class</i>
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**Description**

Generic SimulationData class that extends to data classes for specific DART products

**Slots**

data data.frame.

**See Also**

[Images-class](#) [Directions-class](#) [RB3D-class](#)

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SimulationFiles-class	<i>SimulationFiles class</i>
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**Description**

An S4 class to represent the files within a simulation or simulations. Created using the [getFiles](#) method. Specific files within the class are modified by the object with class [SimulationFilter-class](#)

**Usage**

```
simdir(x)
```

**Slots**

simulationFilter contains [SimulationFilter-class](#) object  
 files a data.frame, with each row describing the file  
 sequenceInfoList a list, with each list element showing the variable permutation(s) within this specific simulation sequence.

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simulationFilter	Create <a href="#">SimulationFilter</a> class
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**Description**

Function for creating the [SimulationFilter](#) class

**Usage**

```
simulationFilter(product = "character", ...)
```

**Arguments**

product            One of "directions", "rb3D", "images".  
 ...

**See Also**

[SimulationFilter-class](#)

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SimulationFilter-class	<i>SimulationFilter class.</i>
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**Description**

SimulationFilter class.

**Usage**

```
product(x) <- value  

iters(x) <- value  

bands(x) <- value  

variablesRB3D(x) <- value  

variables(x) <- value  

typeNums(x) <- value  

imageType(x) <- value  

imageNos(x) <- value
```



Slots

- bands character.
- variables character.
- iters character.
- variablesRB3D character.
- typeNums character.
- imageType character.
- imageNos numeric.
- product character.

See Also

[simulationFilter](#)

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versionInfo	<i>ResourceUse</i>
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Description

Return a data frame with information on the resource use for a [SimulationFiles-class](#) type object

Usage

versionInfo(x)

Arguments

x                    [SimulationFiles-class](#) type object

Details

Return resource use

# Index

accessors, [2](#)  
as.data.frame, SimulationData-method, [2](#)  
  
bands (accessors), [2](#)  
bands<- (SimulationFilter-class), [8](#)  
  
deleteFiles, [3](#)  
Directions-class, [3](#), [7](#)  
  
files (accessors), [2](#)  
  
getData, [3](#)  
getFiles, [4](#), [7](#)  
  
imageNos (accessors), [2](#)  
imageNos<- (SimulationFilter-class), [8](#)  
Images-class, [4](#), [4](#), [7](#)  
imagesToDirectionsDF, [4](#)  
imageType (accessors), [2](#)  
imageType<- (SimulationFilter-class), [8](#)  
iters (accessors), [2](#)  
iters<- (SimulationFilter-class), [8](#)  
  
plotDirections, [5](#)  
product (accessors), [2](#)  
product<- (SimulationFilter-class), [8](#)  
  
RB3D-class, [5](#), [6](#), [7](#)  
rb3DtoNc, [6](#)  
removeRelief, [6](#)  
  
sequenceParameters, [7](#)  
simdir (SimulationFiles-class), [7](#)  
simname (accessors), [2](#)  
SimulationData-class, [3](#)–[5](#), [7](#), [7](#)  
SimulationFiles-class, [3](#), [6](#), [7](#), [7](#), [9](#)  
SimulationFilter, [8](#)  
simulationFilter, [8](#), [9](#)  
SimulationFilter-class, [3](#), [4](#), [7](#), [8](#), [8](#)  
  
typeNums (accessors), [2](#)  
typeNums<- (SimulationFilter-class), [8](#)  
  
variables (accessors), [2](#)  
variables<- (SimulationFilter-class), [8](#)  
  
variablesRB3D (accessors), [2](#)  
variablesRB3D<-  
    (SimulationFilter-class), [8](#)  
versionInfo, [9](#)