

Package: wmm (via r-universe)

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Type Package

Title World Magnetic Model

Version 1.1.3

Maintainer Will Frierson <will.frierson@gmail.com>

Description Calculate magnetic field at a given location and time according to the World Magnetic Model (WMM). Both the main field and secular variation components are returned. This functionality is useful for physicists and geophysicists who need orthogonal components from WMM. Currently, this package supports annualized time inputs between 2000-01-01 to 2029-12-31. If desired, users can specify which WMM version to use, e.g., the original WMM2015 release or the recent out-of-cycle WMM2015 release. Methods used to implement WMM, including the Gauss coefficients for each release, are described in the following publications: NOAA NCEI Geomagnetic Modeling Team and British Geological Survey (2024) <[doi:10.25921/aqfd-sd83](https://doi.org/10.25921/aqfd-sd83)>, Chulliat et al (2020) <[doi:10.25923/ytk1-yx35](https://doi.org/10.25923/ytk1-yx35)>, Chulliat et al (2019) <[doi:10.25921/xhr3-0t19](https://doi.org/10.25921/xhr3-0t19)>, Chulliat et al (2015) <[doi:10.7289/V5TB14V7](https://doi.org/10.7289/V5TB14V7)>, Maus et al (2010) <https://www.ngdc.noaa.gov/geomag/WMM/data/WMMReports/WMM2010_Report.pdf>, McLean et al (2004) <https://www.ngdc.noaa.gov/geomag/WMM/data/WMMReports/TRWMM_2005.pdf>, and Macmillan et al (2000) <<https://www.ngdc.noaa.gov/geomag/WMM/data/WMMReports/wmm2000.pdf>>.

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Encoding UTF-8

Depends R (>= 4.3)

RoxygenNote 7.3.2

Suggests testthat (>= 3.2.3), data.table (>= 1.17.4), knitr (>= 1.50), rmarkdown (>= 2.29), covr (>= 3.6.4), devtools (>= 2.4.5)

URL <https://github.com/wfrierson/wmm>

BugReports <https://github.com/wfrierson/wmm/issues>
Language en-US
VignetteBuilder knitr
Repository <https://ropensci.r-universe.dev>
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GetMagneticFieldWMM	<i>Calculate Expected Magnetic Field from WMM</i>
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Description

Function that takes in geodetic GPS location and annualized time, and returns the expected magnetic field from WMM.

Usage

```
GetMagneticFieldWMM(lon, lat, height, time, wmmVersion = "derived")  
  
wmm(lon, lat, height, time, wmmVersion = "derived")
```

Arguments

lon	GPS longitude
lat	GPS latitude, geodetic
height	GPS height in meters above ellipsoid
time	Annualized date time. E.g., 2015-02-01 = (2015 + 32/365) = 2015.088; optionally an object (length 1) of class 'POSIXt' or 'Date'
wmmVersion	String representing WMM version to use. Must be consistent with time and one of the following: 'derived', 'WMM2000', 'WMM2005', 'WMM2010', 'WMM2015', 'WMM2015v2', 'WMM2020', 'WMM2025'. Default 'derived' value will infer the latest WMM version consistent with time.

Value

list of calculated main field and secular variation vector components in nT and nT/yr, resp. The magnetic element intensities (i.e., horizontal and total intensities, h & f) are in nT and the magnetic element angles (i.e., inclination and declination, i & d) are in degrees, with their secular variation in nT/yr and deg/yr, resp.: x, y, z, xDot, yDot, zDot, h, f, i, d, hDot, fDot, iDot, dDot

Examples

```
GetMagneticFieldWMM(
  lon = 240,
  lat = -80,
  height = 0,
  time = 2025,
  wmmVersion = 'WMM2025'
)
```

```
## Expected output
# x = 6117.5 nT
# y = 15751.9 nT
# z = -52022.5 nT
# xDot = 33.3 nT/yr
# yDot = -8.6 nT/yr
# zDot = 95.5 nT/yr
# h = 16898.1 nT
# f = 54698.2 nT
# i = -72 deg
# d = 68.78 deg
# hDot = 4.0 nT/yr
# fDot = -89.6 nT/yr
# iDot = 0.03 deg/yr
# dDot = -0.12 deg/yr
```

```
## Calculated output
#$x
#[1] 6117.548
```

```
#$y
#[1] 15751.91
```

```
#$z
#[1] -52022.52
```

```
#$xDot
#[1] 33.27253
```

```
#$yDot
#[1] -8.646338
```

```
#$zDot
#[1] 95.54722
```

```
#$h
```

```
#[1] 16898.13
```

```
#$f
```

```
#[1] 54698.17
```

```
#$i
```

```
#[1] -72.00499
```

```
#$d
```

```
#[1] 68.77539
```

```
#$hDot
```

```
#[1] 3.985647
```

```
#$fDot
```

```
#[1] -89.64208
```

```
#$iDot
```

```
#[1] 0.03489031
```

```
#$dDot
```

```
#[1] -0.1157767
```

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