Package 'igrf'

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Type Package

Title International Geomagnetic Reference Field

Version 2.0

Maintainer Koen Hufkens <koen.hufkens@gmail.com>

Description The 14th generation International Geomagnetic Reference Field (IGRF).
A standard spherical harmonic representation of the Earth's main field.

URL https://github.com/bluegreen-labs/igrf,

https://bluegreen-labs.github.io/igrf/

BugReports https://github.com/bluegreen-labs/igrf/issues

Depends R (>= 3.6)

License AGPL-3

ByteCompile true

RoxygenNote 7.3.1

NeedsCompilation yes

Suggests metR, sf, ggplot2, rnaturalearth, rnaturalearthdata,
rmarkdown, covr, testthat, knitr

VignetteBuilder knitr

Author Koen Hufkens [aut, cre] (ORCID:
<https://orcid.org/0000-0002-5070-8109>),
BlueGreen Labs [cph, fnd]

Repository CRAN

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igrf   *International Geomagnetic Reference Field*

Description

The 13th Generation International Geomagnetic Reference Field.

Usage

```
igrf(field = "main", year, type = "spheroid", altitude, latitude, longitude)
```

Arguments

field	main field (default = "main") or secular variation ("variation") data output
year	Decimal year between 1900 and 2030 A.D
type	"spheroid" (default) or "sphere" representation
altitude	in km above the earth surface for a spheroid type, or distance from the earth center (radial distance) for the sphere representation (in the later the value should exceed 3485km)
latitude	latitude in decimal degrees
longitude	longitude in decimal degrees

Details

The R model underpinning the base function is the original Fortran model published by Alken et al. 2021 and available on the project website <https://www.ngdc.noaa.gov/IAGA/vmod/igrf.html>.

Outputs have been verified to correspond with the original code with the exception that values in the R implementation are not rounded before output (as in the original model). For all intents and purposes the data can be considered equivalent.

For full model details I refer Alken et al. 2021, and the project website where both the original code and a brief model description can be found. The authors of both the R package and the original Fortran code take no responsibility regarding the use of these data within a professional context <https://www.ngdc.noaa.gov/IAGA/vmod/igrfhw.html>.

Value

a data frame with components X,Y,Z,F, D, H and I for the main geomagnetic field or the secular variations, i.e. instantaneous time rate of change of the geomagnetic main field. Keep in mind that the secular variations are generally only used for interpolation purposes and do not reflect the actual rate of change. For more guidance on the use of the secular variations and caveats we refer to the main project's website <https://www.ngdc.noaa.gov/IAGA/vmod/igrfhw.html>.

Examples

```
field <- igrf::igrf(
 field = "main",
 year = 2000,
 type = "spheroid",
 altitude = 2,
 latitude = 50,
 longitude = 10
)
```

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igrf_grid   *Generate an IGRF regular grid*

Description

Generates a global grid (map) of the 13th Generation International Geomagnetic Reference Field (IGRF) for a predefined spatial resolution (in decimal degrees).

Usage

```
igrf_grid(field = "main", year, type = "spheroid", altitude, resolution = 5)
```

Arguments

field	main field (default = "main") or secular variation ("variation") data output
year	year A.D. Must be greater than or equal to 1900.0 and less than or equal to 2030. Warning message is given for dates greater than 2025.
type	"spheroid" (default) or "sphere" representation
altitude	in km above the earth surface for a geodetic type, or distance from the earth center for the spherical representation.
resolution	spatial resolution of the output map in decimal degree (default = 5).

Value

a data frame with components X,Y,Z,F, D, H and I for the main geomagnetic field or the delta (dX etc) variants for the secular variation on a regular grid. Data is returned in a tidy format with required latitude and longitude columns for convenient plotting.

Examples

```
grid <- igrf::igrf_grid(
year = 2000,
field = "main",
type = "spheroid",
altitude = 2,
resolution = 5
)
```

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