Five Primary Geomagnetic Reference Model Categories

Summary

Details of the requirements in terms of power spectrum degree and update rate are given below for the five defined geomagnetic reference categories covered by ISCWSA generic set of tool-codes.

As a summary:

Category	Abbreviation	Example Geomagnetic Models
Low Resolution	LRGM	CGRF IGRF WMM
Standard Resolution	SRGM	BGGM prior to 2019 MVSD
High Resolution	HRGM	BGGM after 2019 HDGM HDGM-RT MVHD
In-Field Referencing	IFR1	
In-Field Referencing with Real-time Disturbance Field Correction	IFR2	

Abbreviations for Geomagnetic Models

BGGM	British Geological Survey Global Geomagnetic Model
CGRF	Canadian Geomagnetic Reference Field
HDGM	National Oceanic and Atmospheric Administration High Definition Geomagnetic Model
HDGM-RT	HDGM with Realtime Updates
IGRF	International Geomagnetic Reference Field
MVSD	MagVar Standard Definition Model
MVHD	MagVar High Definition Model
WMM	World Magnetic Model

- **Low Resolution (LRGM)**
    - Description: Main field only
    - Geomagnetic Power Spectrum degree 1 to at least 10
    - Wavelength coverage from 40,000 km down to 4000 km or smaller
    - Examples: IGRF, WMM, CGRF
    - Updated less frequently than yearly

- **Standard Resolution (SRGM)**
    - Description: Main Field plus large scale Crustal and Magnetospheric field
    - Geomagnetic Power Spectrum degree 1 through at least 133
    - Magnetospheric field degree 1
    - Wavelength coverage from 40,000 km down to 300 km or smaller
    - Examples: MVSD, Pre-BGGM2019
    - Updated yearly

- **High Resolution (HRGM)**
    - Description: Main field plus high resolution global crustal field and large-scale magnetospheric field
    - Geomagnetic Power Spectrum degree 1 to at least 720
    - Magnetospheric field degree 1 or real-time model of magnetosphere and ionosphere
    - Wavelength from 40,000 km down to 55 km or smaller
    - Examples: HDGM, MVHD, BGGM2019+, HDGM-RT
    - Updated Yearly

- **In-Field Referencing (IFR1)**
    - Description: Main field plus regional aeromagnetic, marine or ground survey
    - Wavelength 40,000 km down to 2 km or smaller
    - Corresponds to Geomagnetic Power Spectrum degree 1 to at least 20,000
    - Examples: IFR, IFR1, Ground shot plus secular variation correction
    - Updated yearly

- **In-Field Referencing with Real-time Disturbance Field Correction (IFR2)**
    - Description: IFR1 plus correction for realtime magnetospheric and ionospheric disturbance fields
    - Wavelength 40,000 km down to 2 km or smaller
    - Corresponds to Geomagnetic Power Spectrum degree 1 to at least 20,000
    - Geomagnetic observatory or realtime magnetic disturbance field monitoring station collecting absolute magnetic vector data within about 100 km distance of drill site (depending on geomagnetic latitude). Not applicable to "realtime" models using geomagnetic indices.
    - Examples: IFR2, IIFR
    - Local realtime measurements at 1 minute or shorter sampling rate