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| WORLD METEOROLOGICAL ORGANIZATION  COMMISSION FOR BASIC SYSTEMS  -----------------------------  SECOND MEETING OF  INTER-PROGRAMME EXPERT TEAM ON CODES MAINTENANCE  OFFENBACH, GERMANY, 28 MAY - 1 JUNE 2018 |  | IPET-CM-II / Doc. 2.2(7)  18.05.2018  -------------------------  ITEM 2.2  ENGLISH ONLY |

MANUAL ON CODES: TABLE-DRIVEN CODE FORMS

FM 92 GRIB

Representing gnomonic grids

*Submitted by Jeff Ator (USA)*

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**Summary and Purpose of Document**

This document proposes a new GDT in GRIB2 for representing gnomonic grids.

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**ACTION PROPOSED**

The team is requested to address the questions contained within the document and accept the modified proposal for validation.

**DISCUSSION AND PROPOSAL**

In the coming months, NCEP will begin implementing a new FV3 (finite-volume cubed sphere) dynamic core within most of its numerical models, as part of a move towards a unified modelling framework. The cubed sphere consists of 6 planes, each tangential to the sphere, with the sphere projected from its center point onto each plane resulting in a gnomonic projection.

We were unable to locate any existing Grid Definition Template (GDT) within GRIB2 for representing a gnomonic projection, which was surprising given that such a capability was apparently available within GRIB1 (see Code Table 6 “Data representation type”, code figure 2). Gnomonic projections are also referenced within the code table for BUFR descriptor 0-29-001 “Projection type”, as code figure 0. Yet there appears to be no reference to gnomonic grids anywhere within the existing GRIB2 regulations.

Presuming that we are correct that there is no existing way to represent gnomonic grids in GRIB2(?), we propose the following new GDT and respectfully ask for volunteers who would be willing to assist in validation:

***Code table 3.1 – Grid definition template number***

Code figure Meaning

60 Gnomonic

***Grid definition template 3.60 – Gnomonic***

Octet No. Contents

15 Shape of the Earth (see Code table 3.2)

16 Scale factor of radius of spherical Earth

17–20 Scaled value of radius of spherical Earth

21 Scale factor of major axis of oblate spheroid Earth

22–25 Scaled value of major axis of oblate spheroid Earth

26 Scale factor of minor axis of oblate spheroid Earth

27–30 Scaled value of minor axis of oblate spheroid Earth

31–34 Nx – number of points along the x-axis

35–38 Ny – number of points along the y-axis

39–42 La1 – latitude of first grid point

43–46 Lo1 – longitude of first grid point

47 Resolution and component flags (see Flag table 3.3)

48–51 LatC – latitude of the projection center

52–55 LonC – longitude of the projection center

56–59 Dx – x-direction grid length (see Note 1)

60–63 Dy – y-direction grid length (see Note 1)

64 Projection centre flag (see Flag table 3.5)

65 Scanning mode (see Flag table 3.4)

Notes:

(1) Grid lengths are in units of 10-3 m.

Within the particular context of the FV3 cubed sphere, it would also be helpful for post-processing purposes to indicate, for each of the 6 projected grids, how they are to be stitched back together to form the original cube surrounding the sphere. Perhaps this could be done by the addition of two new octets to the above template, where the first octet would indicate the total number N of related grids (or, in a sense, “tiles”?) The value N would be set equal to 6 in the case of FV3 but could vary for other potential uses of gnomonic grids, and the second octet would indicate the grid (or “tile”?) number (ranging from 1 to N) being represented within each successive repetition of the template. Assuming it is agreed that this would be a useful and proper feature for inclusion within the proposed GDT, we would certainly welcome other suggestions from experts on alternative ways to accomplish this.