

7. File format descriptions

7.1. rtim_Format_File_LonLatGrid

This section describes version 1.0 of this format.

7.1.1. Purpose of format

Hold values defined on a 2D longitude-latitude grid. (Intended to be used for ionospheric TEC maps and related data, but may also be used for other purposes.)

7.1.2. General format rules

- Files in this format are ASCII text files.
- Markers are predefined labels that mark the start or end of a certain type of block. On the Marker lines, there is nothing prior to or after the Marker.
- All data maps in the file are defined on the same grid, which is specified in the header.
- All number fields are fixed width fields.
- All number fields must contain a number. If there is no data, fill the number field with '9's.
- There is one space character between each number.
- Epoch blocks must be sorted chronologically. (In rising order.)

7.1.3. Data types used in this format description

- 'integer': An integer number.
- 'float': A floating point number.

(The decimal point is '!')

(Scientific notation may be used, using the character 'E' or 'e'. Examples: "2.314E-4" "0.123e+03" "1.0003e5".)

- 'string': A continuous sequence of characters (no whitespaces).

7.1.4. NB

- There may be any number of empty lines between blocks.
- The number and types of variables may vary from epoch to epoch.

(For example, one epoch may have the variables "GIVE" and "VTEC" while the next epoch only has "VTEC".)

7.1.5. File structure

FORMAT VERSION NUMBER section

HEADER section

Comments block (zero or more)

Grid definition block (one)

DATA section

Comments block (zero or more)

Epoch block (zero or more)

Variable block (one or more)

Within each section, the blocks may come in any order. (Except that the Epoch blocks must come in chronological order.)

7.1.6. Section descriptions

FORMAT VERSION NUMBER:

Consists of one line, containing the format version number.

(Major version, followed by a dot, followed by minor version)

(Each number has a column width of 3)

(Examples: " 1.0 ", " 1.101", " 11.12 ")

HEADER:

Consists of exactly one grid definition block and zero or more comments blocks.

The following table lists all valid Markers for the Header section.

Marker	Description
<StartOfComments> <EndOfComments>	Marks the start and end of a comments block. (A block containing human-readable text.) May have any length and contain anything. We recommend giving a short description of the program and data used to calculate the values stored in the file. There may be several of these blocks.
<StartOfDefineGrid> <EndOfDefineGrid>	Marks the grid definition block. The block contains 2 lines with 3 numbers each: minimumLongitude[float] maximumLongitude[float] longitudeStep[float] minimumLatitude[float] maximumLatitude[float] latitudeStep[float] Each number has a column width of 6.
<EndOfHeader>	Marks the end of the header section.

DATA:

Consists of zero or more epoch blocks and zero or more comments blocks. Within each epoch block is one or more variable blocks.

The following table lists all valid Markers for the Data section.

Marker	Description
<StartOfComments>	Marks the start and end of a comments block. (A block containing human-readable text.)
<EndOfComments>	May have any length and contain anything. There may be several of these blocks.
<StartOfEpoch>	Marks the start and end of an epoch block.
<EndOfEpoch>	The first line of the epoch block contains the date and time: Line 1: year[integer] month[integer] day[integer] hour[integer] minute[integer] second[float] (year has a field width of 4) (month, day, hour and minute have a field width of 2) (second has a field width of 6) (Examples: "2011 03 15 00 30 0.0" "2005 3 4 0 30 10.001") After the first line, there is one or more variable blocks.

<p><StartOfVariable></p> <p><EndOfVariable></p>	<p>Marks the start and end of a variable block.</p> <p>These Markers are only valid within an epoch block.</p> <p>The first line contains the variable name as a 'string'.</p> <p>The second line contains the physical unit of the data as a 'string'.</p> <p>This is followed by the grid data ('float's) in matrix form.</p> <p style="padding-left: 40px;">The upper left corner is at (minimumLongitude, minimumLatitude).</p> <p style="padding-left: 40px;">Longitude increases with column number (increasing to the right).</p> <p style="padding-left: 40px;">Latitude increases with row number (increasing downwards).</p> <p style="padding-left: 40px;">The field width of each number is 10.</p>
<p><EndOfFile></p>	<p>When this is encountered, stop reading the file.</p>

7.1.7. Example

A small example of the format:

```
1.0
<StartOfDefineGrid>
  0      4      1
  55     64     1
<EndOfDefineGrid>
<EndOfHeader>

<StartOfEpoch>
2011  3 10  0  1      0
<StartOfVariable>
VTEC
TECU
  7.374      7.382      7.731      7.752      7.789
  7.485      7.716      7.769      7.795      7.588
  7.449      7.627      7.716      7.615      7.676
  7.216      7.052      7.134      7.324      7.514
  6.594      6.423      6.199      6.072      5.969
  6.134      5.593      5.019      4.545      4.331
  5.873      4.99      4.051      3.103      2.557
  5.473      4.74      4.103      3.61      3.386
  5.554      5.033      4.484      4.167      3.963
  5.964      5.533      5.126      4.698      4.533
<EndOfVariable>
<StartOfVariable>
GIVE
TECU
  11.29      11.37      11.49      11.65      11.74
  11.17      11.22      11.23      11.24      11.14
   11      11.02      10.99      10.83      10.83
  10.88      10.73      10.7      10.65      10.53
  10.77      10.8      10.81      10.78      10.71
  10.7      10.73      10.76      10.74      10.7
  10.51      10.57      10.56      10.52      10.51
  10.78      10.69      10.66      10.7      10.73
  10.95      10.81      10.67      10.66      10.7
  11.05      10.89      10.7      10.51      10.57
<EndOfVariable>
<EndOfEpoch>

<EndOfFile>
```