Joe Greene - NOAA Federal <joe.greene@noaa.gov>

HRD assessment of MMR
3 messages

Paul Reasor - NOAA Federal <paul.reasor@noaa.gov>   Mon, Jun 10, 2019 at 8:50 AM
To: Joe Greene - NOAA Federal <joe.greene@noaa.gov>
Cc: Nancy Griffin <nancy.griffin@noaa.gov>, Peter Dodge <peter.dodge@noaa.gov>, John Gamache
<John.Gamache@noaa.gov>, Frank Marks <frank.marks@noaa.gov>

Hi Joe,

I've been tasked with summarizing HRD's view on whether the MMR is presently acceptable for research and use by NHC. Our top line assessment is that, as things currently stand, we could not use the MMR for research or to meet future NHC requests for LF visualization. We hope that the concerns detailed below (specific questions bolded) can be addressed by Elta during their upcoming visit to AOC. We look forward to working with you all to make this a valuable instrument for all, just as the prior LF radar was. If you need further clarification, I've cc'd the HRDers working closely with the test data.

Regards,
Paul

Primary concerns and questions:

*** Documentation: We cannot use this radar system for research without adequate documentation. At this point, we are having to make educated guesses as to what is contained in the cfradial files. We do not believe the cfradial files we have received are fully compliant with the cfradial format.

- The document we have is from 2017. **Is there newer documentation?**

- There is no calibration information or radar specifications in the meta data. This is standard for any research radar and the maintenance of such a system in case it doesn't operate as designed. For example, how is dBZ computed? What are the radar frequency, pulse length for each range, antenna beam width, antenna gain, peak power, etc?

***Regarding dBZ: There is ambiguity regarding the dBZ units.

- According to the metadata on the HWX 2018 files, the reflectivity is "Byte" and the db resolution is 0.375. For the HWX 2019 it changed to "Float" but still shows the db resolution to be 0.375, causing the values to be low. When they changed from byte to float they may have forgotten to update the metadata. The values themselves seem correct.

*** MMR cfradial: Strange jumping behavior within a sweep

- To illustrate this problem we show an ncdump of MMR file HWX_2018_12_19_20_50_25.nc.
In addition, we have attached an example sweep image from a cfradial file.

The time array or vector is described in the metadata as follows:

double time(time) ;
  time:long_name = "time in seconds since volume start" ;
  time:standard_name = "time" ;
  time:units = "seconds since 2018-12-19T20:50:35Z" ;
  time:calendar = "gregorian" ;
  time:comment = "times are relative to the volume start_time" ;

Our assumption is that the time values of the array *should* increase during a sweep. While the values do get bigger overall, they jump around. The values in red show what we mean. **How does Elta explain this behavior of the time (and azimuth) variable?**

Example:
time = 0, 0.0343040004372597, 0.102848000824451, 0.0685760006308556, 0.13711993567467, 0.239904001355171, 0.171391993761063, 0.274176001548767, 0.205632001161575, 0.308447986841202, …

The azimuth array or vector is described as follows:

float azimuth(time) ;
  azimuth:standard_name = "ray_azimuth_angle" ;
  azimuth:long_name = "azimuth_angle_from_true_north" ;
  azimuth:units = "degrees" ;
  azimuth:axis = "radial_azimuth_coordinate" ;
  azimuth:_fillValue = -9999.f ;

The same jumping occurs in azimuths also. We believe this may be causing gaps on the sweeps (see attached image).

Example:
azimuth = -3.477173, -2.521362, -0.6591797, -1.560059, 0.2856445, 3.147583, 1.213989, 4.081421, 2.180786, 5.037231, 6.92688, 5.960083, 7.866211,....

*** MMR cfradial: **Why is the drift array zero?**

The drift array or vector is described as follows:
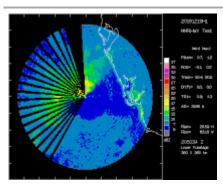
float drift(time) ;
  drift:long_name = "platform_drift_angle" ;
  drift:units = "degrees" ;
  drift:_fillValue = -9999.f ;

The values are all 0.0!

Example:
drift = 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,...

*** MMR cfradial: It would be useful to get the aircraft number and project id somewhere in the file.

*** MMR system: Some have wondered whether the MMR system itself is *able* to produce a full 360 degree sweep without angular gaps in its current configuration. **Can Elta prove that the MMR is capable of producing an LF sweep data file without angular gaps in coverage?** We cannot use this radar for research or transmission of images (derived from the cfradials) to NHC with such angular gaps.

lf181219H1_205034.gif
30K

Joe Greene - NOAA Federal <joe.greene@noaa.gov>   Mon, Jun 10, 2019 at 12:59 PM
To: Paul Reasor - NOAA Federal <paul.reasor@noaa.gov>

Paul,

Thank you very much for your input. We are all working toward the same goal. ELTA/Harris is very much on board with trying to help us make this a quality research instrument.

The CF Radial files you are looking at, from when were they taken? I ask because we did a software change to the radial data on the 17th of April. That is when ELTA/Harris implemented our requested changes. Any evaluation done before that date was on radials that were not meeting specification under 1.3.

Thank you.
Joe Greene
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Paul Reasor - NOAA Federal <paul.reasor@noaa.gov>　　　　　　　　　Mon, Jun 10, 2019 at 2:06 PM
To: Joe Greene - NOAA Federal <joe.greene@noaa.gov>

Hi Joe,

We had looked at files before and after 17 April, and the concerns described below using the pre-April-17 example remain (other than the byte to float change in the metadata that occurred post 17 April). Nancy Griffin showed me an ncdump from HWX 2019 24 May TORUS that showed the same issues. Compliant cfradial files ought to have 'time' monotonically increasing, which appears not to be the case. Hopefully ELTA can shed some light on this. Thanks for passing on our concerns to them. We're ready to provide any clarification they might need on any of the below. Just let us know.

Regards,
Paul

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