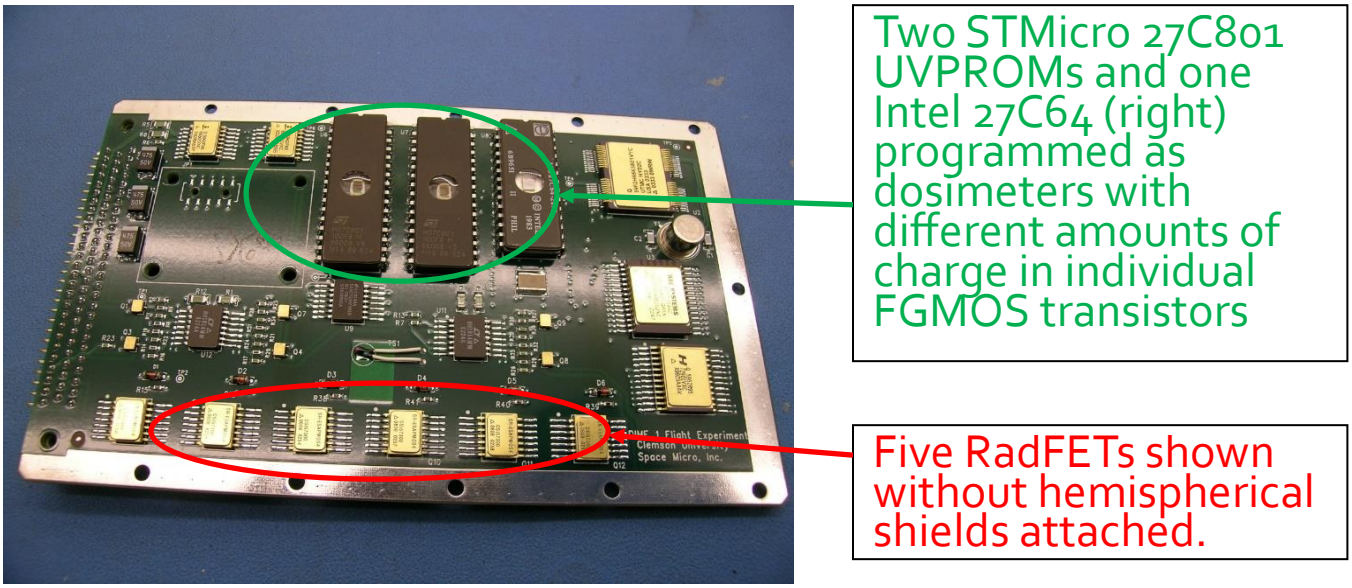
DIME-1 RADFETS

Mission name: dsx-set_dime1_Radfets_2019213T200035_v01.csv
Instrument: DIME-1
PI/Provider name: Dr Peter McNulty
Institute: Clemson University
Contact info: email: mpeter@g.clemson.edu
Data format: CSV
Data description (including how measurements were made): Read and record Radfet Vth
Time resolution/cadence: Readings taken every 15 minutes
Acknowledgement: Supported by NASA awards NNG04EE357C and 0978-204 2014361
Related publications: Most recent NSREC 2021 Conference
Data publishing time: October 2021
Paper DOI or DOI of dataset if available: N/A
Other relevant info:



DIME1 is shown with five operating RadFETS along the bottom of the board and three UVPROM dosimeters. The board has a mass of 0.2 kg and requires < 0.5 W to read the sensors. The RadFETS, circled, are referred to in the data files by number 2 through 6 starting on the left in the photo. The thickest Ta shield, 0.03", was mounted on 2 and the thinnest, 0.01", on 3. Al shields; thinnest, 0.125", was mounted on 4, next, 0.21875" on 5 and the thickest, 0.25" on 6. NASA daughter board not shown.

DIME1_ **Experimental details**

A constant current of 10 micro amps was passed through the RadFET to read the Threshold voltage Vth.

At all other times the RadFET was off.

It is below the recommended 12.7 micro amps for minimum temperature effects. The data is not corrected for temperature.

During the 1.75yrs there were many random shut down events and some longer planned power downs occurred. This causes disruptions in data collection and many files were corrupted on either the

uncontrolled shut down or start up. This appears as missing data or gaps longer than the 15minute scheduled reads.

A second event corrupting data was caused by the different clocks running data collection on the board and the system clock being out of synch. This results in a programmed time of 24 reads for the RADFETS being cut to 23 seconds or increased to 25 seconds. Not a big problem as long as the extraction of good data takes care of this factor. In other words simply setting an extraction to take place every 15 minutes and 24 seconds for each RadFET will result in the inclusion of bad data into your dataset.

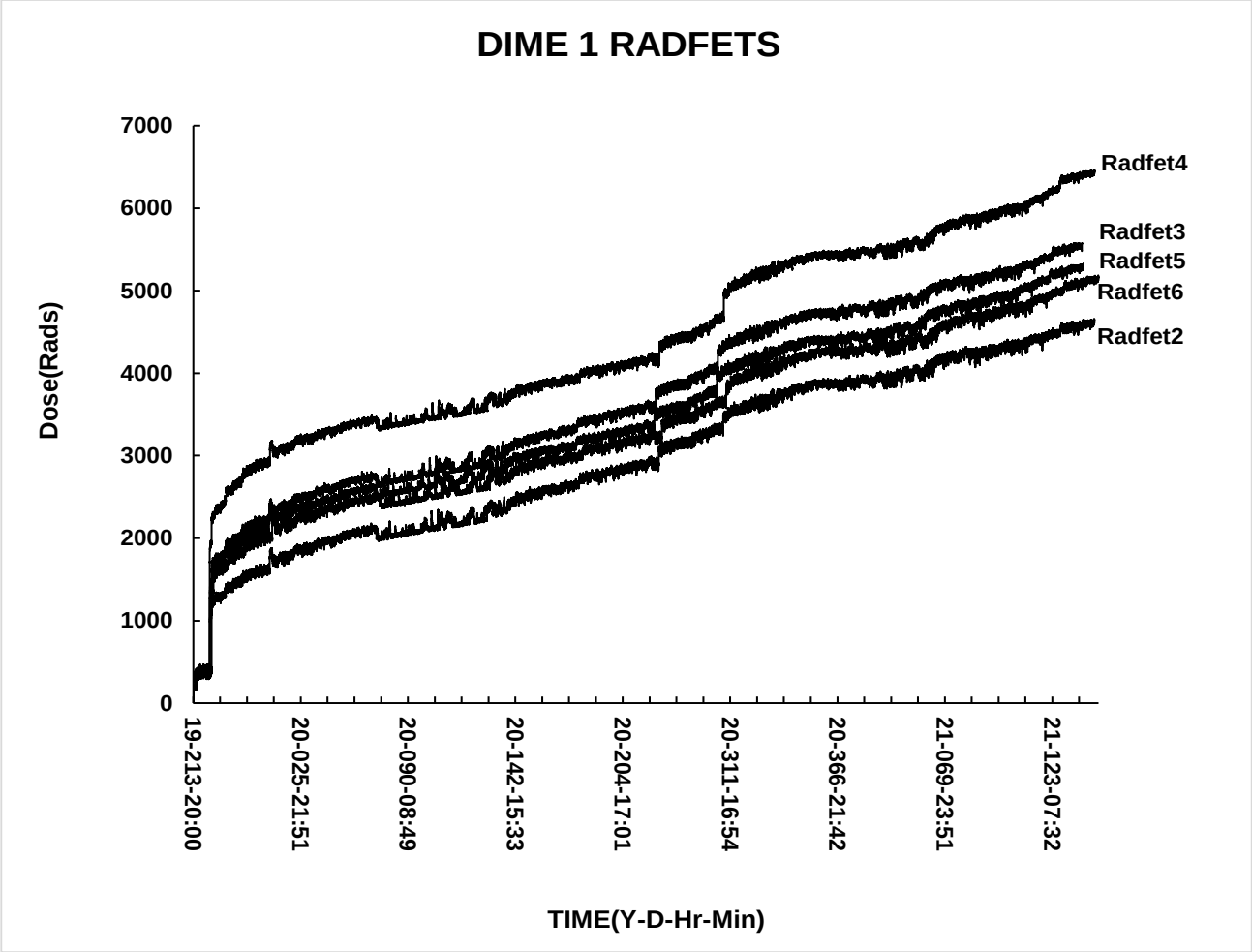


Figure 1 shows all radfets vs time

The next page shows the raw data and explains the different types of problems experienced and the pitfalls associated with extracting average values for the RADFETS over each 15 minute read cycle. Each radfet takes 23-25 seconds to read followed by a 3-5 second break when the next radfet is read. A full read of RadFET's 2,3,4,5 and 6 lasts approximately 1.5minutes.

NO SPACES IN RAW DATA

time (yr-d-hr-min)	Vth (V)	temp (deg C)	dose_linear (rads)	dose_lin Ave (rads)	
2019-213-20:02:03.948	2.768	3.965	13		
2019-213-20:02:06.950	2.768	3.929	13	**?**	
2019-213-20:02:08.951	2.768	3.965	13		**INSUFFICIENT DATA**
2019-213-20:02:22.959	2.768	4.002	13	13	
2019-213-20:16:32.430	2.774	6.21	33		
2019-213-20:16:33.431	2.774	6.21	33		
2019-213-20:16:34.431	2.774	6.21	33		
2019-213-20:16:35.432	2.774	6.251	33		
2019-213-20:16:36.432	2.774	6.21	33		
2019-213-20:16:37.433	2.774	6.21	33		
2019-213-20:16:39.434	2.774	6.21	33		
2019-213-20:16:40.435	2.774	6.251	33		
2019-213-20:16:41.435	2.774	6.21	33	**33**	**Take AVERAGE of**
2019-213-20:16:42.436	2.774	6.251	33		Middle 10 reads
2019-213-20:16:43.436	2.774	6.251	33		
2019-213-20:16:46.438	2.774	6.251	33		
2019-213-20:16:47.438	2.774	6.251	33		
2019-213-20:16:48.439	2.774	6.293	33		
2019-213-20:16:49.440	2.774	6.251	33		
2019-213-20:16:50.440	2.774	6.251	33		
2019-213-20:16:51.441	2.774	6.251	33		
2019-213-20:16:52.441	2.774	6.251	33		
2019-213-20:16:54.442	2.774	6.293	33		
2019-213-20:31:30.929	2.778	8.446	47		
2019-213-20:31:31.929	2.778	8.4	47		
2019-213-20:31:32.930	2.778	8.446	47		
2019-213-20:31:33.931	2.784	8.4	67		
2019-213-20:31:35.932	2.784	8.446	67	**60.3**	May want to **discard**
2019-213-20:31:36.932	2.784	8.446	67		As INSUFFICIENT data
2019-213-20:31:40.934	2.784	8.446	67		
2019-213-20:31:43.936	2.784	8.446	67		
2019-213-20:31:52.941	2.784	8.446	67		
2019-213-20:46:29.428	2.788	10.415	80		
2019-213-20:46:30.428	2.788	10.363	80		
2019-213-20:46:31.429	2.788	10.415	80		
2019-213-20:46:32.429	2.788	10.415	80		
2019-213-20:46:33.430	2.788	10.467	80		
2019-213-20:46:34.430	2.788	10.415	80		
2019-213-20:46:36.432	2.788	10.415	80		
2019-213-20:46:37.432	2.788	10.415	80	**80**	**Take Average of**
2019-213-20:46:39.433	2.788	10.467	80		Middle 10 reads
2019-213-20:46:40.434	2.788	10.415	80		
2019-213-20:46:42.435	2.788	10.467	80		
2019-213-20:46:44.436	2.788	10.415	80		
2019-213-20:46:45.437	2.788	10.467	80		
2019-213-20:46:46.437	2.788	10.467	80		
2019-213-20:46:47.438	2.788	10.467	80		
2019-213-20:46:48.438	2.792	10.467	93		
2019-213-21:01:27.927	2.792	12.272	93		
2019-213-21:01:28.927	2.792	12.272	93		
2019-213-21:01:29.928	2.792	12.214	93		
2019-213-21:01:31.929	2.792	12.272	93		
2019-213-21:01:32.929	2.792	12.329	93		
2019-213-21:01:33.930	2.792	12.272	93		
2019-213-21:01:34.930	2.792	12.329	93		
2019-213-21:01:35.931	2.792	12.272	93		**2019-213-21-01:52.937**
2019-213-21:01:37.932	2.792	12.272	93		Is false reading as device
2019-213-21:01:38.933	2.792	12.329	93		**Switches OFF**
2019-213-21:01:39.933	2.792	12.272	93		Take AVERAGE of middle
2019-213-21:01:40.934	2.792	12.272	93	**93**	10 readings
2019-213-21:01:41.935	2.792	12.272	93		
2019-213-21:01:42.935	2.792	12.329	93		Similarly on **START UP,**
2019-213-21:01:43.935	2.792	12.272	93		the first reading can be
2019-213-21:01:44.936	2.792	12.272	93		lower.
2019-213-21:01:45.936	2.792	12.329	93		
2019-213-21:01:46.937	2.792	12.214	93		
2019-213-21:01:47.938	2.792	12.329	93		
2019-213-21:01:48.939	2.792	12.329	93		
2019-213-21:01:49.939	2.792	12.329	93		
2019-213-21-01:50.937	2.792	12.329	93		
2019-213-21-01:51.939	2.792	12.296	93		
2019-213-21-01:52.937	2.790	12.278	87		

2019-213-21:16:26.425	2.792	13.457	93
2019-213-21:16:27.426	2.798	13.519	113

It is necessary to parse the data into the 15minute blocks of reads. Many reads may be missing and many individual reads of a Radfet will not contain the full 24-25 values as can be seen in the above page of typical early data. The 2021 data is generally better and agrees more closely with the description.

The DIME experiment telemetered data is stored at the Nasa Space Physics Data facility (SPDF)

REFERENCES:

1. P.J. McNulty, K.F. Poole, and J.O. Poole, DIME-2 Flying as Part of NASA's SET-1 Project on the DSX Satellite. Paper H-1 at NSREC 2021.

2. K.F. Poole, P.J. McNulty, and J.O. Poole, DIME-1 Experiment Flying as Part of NASA's SET-1 Project on the Poster PH-1 at NSREC 2021.