Title: Data set: Radio Frequency Senser (RFS) example waveforms, altitudes, and density plot

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Abstract: This data set contains three types of RFS data. 1) The first are time domain waveforms of three lightning events, in both the RFS high band (116 – 142 MHz) and the RFS low band (10-60 MHz), sampled at 155 MHz. The waveforms are right-hand circularly polarized waveforms. 2) The second type of data is altitudes and locations of trans-ionospheric pulse pairs (TIPPs) over time. The locations were determined by time coincidence with geolocated World Wide Lightning Location Network strokes. 3) The third type is RFS events per square kilometer per year in latitude and longitude. The RFS event were located by time correlation to Earth Networks Global Lightning Network lightning strokes.

Data set 1:
Consists of six ASCII files – 3 high band & 3 low band example RFS right-hand circularly polarized waveforms. Each ascii file contains a header with the RFS event time in UTC, the label of "RFS high band (77.5 – 155 MHz)" or "low band (0 – 77.5 MHz)", and sample rate (155 MHz). Data following the header are time samples of electric field in uV/m sampled at 155 MHz.
Filenames are:
RFS_waveform_HighBand_20230607_010803.txt
RFS_waveform_HighBand_20230607_015553.txt
RFS_waveform_HighBand_20230607_034055.txt
RFS_waveform_LowBand_20230607_010803.txt
RFS_waveform_LowBand_20230607_015553.txt
RFS_waveform_LowBand_20230607_034055.txt

Data set 2:
Filename = 'RFS_TIPPs_20230607_0100-0500_UTC.txt'
1 ASCII comma separated value (CSV) file. Columns are:

1. UTC date yyyy/mm/dd
2. UTC seconds of day
3. WWLLN-determined latitude (degrees, wwlln_latitude in header)
4. WWLLN-determined longitude (degrees, wwlln_longitude in header)
5. TIPP-estimated height (km, height in header)

Data set 3:
Filename = 'RFS_map.csv'
1 CSV file of a 2-dimensional data set.

1. Row 1, Longitude (degrees, in 0.25-degree steps)
2. Column 1, Latitude (degrees, in 0.5-degree steps)
3. 2-D grid in latitude and longitude: events per square kilometer per year

Notes: Since the RFS coverage range goes across longitude = -180/180 degrees, longitudes go from 147.75 to 180, then start at -180 to -12.75. Latitude range goes from -58.5 to 68.5, as there were no detected RFS events outside these latitudes.

The three examples given in data set 1 are those shown in LA-UR-23-32419, Figure 2. The TIPP data in data set 1 is shown in LA-UR-23-32419, Figure 4, and comprises data from 07 June 2023 between 01:00-05:00 UTC. Data set 3 contains RFS event rates per sq. km per year for data from 1 March 2022 – 1 March 2023, with the caveats described in LA-UR-23-32419.