NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, D.C. 20594

October 7, 2021

Ballooning Electronic Instrument

Specialist's Factual Report
By Sean Payne

1. EVENT SUMMARY

Location:	Rio Rancho, NM
Date:	January 23, 2021
Aircraft:	Lindstrand 77A Balloon
Registration:	N477LB
Operator:	Private
NTSB Number:	WPR21LA158

2. DETAILS OF INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following global positioning system (GPS) device:

Device Manufacturer/Model:	**DigiTool DBI3**
Serial Number:	**12195**

2.1. Device Description

The DigiTool DBI3 is an electronic instrument created for hot air ballooning. Features include altimeter, variometer, and temperature indicating displays, as well as a flight timer, audio alarms, and an integral GPS showing ground track and speed. The DBI3 also has an on-board flash memory capable of storing up to 10,000 hours of recoverable flight data. The DBI3 is powered by an integral LiPo battery lasting up to 12 hours per charge.

2.2. Data Recovery

The device was undamaged and is shown in figure 1. The device was connected to a PC running a software program suggested by the manufacturer of the device to extract data. The device behaved normally, and data from the accident day, and other days were successfully extracted from the device.

Figure 1. Photo of undamaged DigiTool DBI3.

2.3. Data Description

The data extracted included track log data for approximately 73 sessions. Each session did not necessarily correlate to a complete balloon flight. There were three log files associated with the accident day. They are as follows:

- 2021_01_23_14_13_04.log – A short log file showing no change in altitude
- 2021_01_23_14_13_20.log – A short log file showing no change in altitude
- 2021_01_23_14_56_22.log – Determined to be the accident flight.

2.4. Parameters Provided

Table 1 describes data parameters provided by the ballooning device. Date, Time, Latitude, Longitude, Barometric Pressure and Altitude are recorded by the device. Parameters such as Groundspeed and Track are derived from the recorded parameters.

Table 1. Electronic Ballooning Instrument (DBI3) Data Parameters.

Parameter Name	Parameter Description
BAR	Barometric Pressure (millibars)
Date	Date for recorded data point (MM/DD/YYYY)
Time	Time (UTC) for recorded data point (HH:MM:SS)
BATM	DBI3 Battery Voltage (volts)
BRDT	DBI3 Board Temperature (deg. C)
GPSS	GPS Status (1=valid, 0-invalid)
LAT	Recorded Latitude (degrees)
LON	Recorded Longitude (degrees)
ALT	Recorded Barometric Altitude (feet)
ROC	Rate of Climb (fpm)
SOG	Average derived groundspeed (knots)
TOPTS	Envelope Top Temperature Status (1=valid, 0-invalid)
TOPT	Envelope Top Temperature (deg. C)
COG	Average derived true course (degrees)

2.5. OVERLAYS AND TABULAR DATA

All times are given in UTC. The weather and lighting conditions in Google Earth are not necessarily the weather and lighting conditions present at the time of the recording.

The two other files determined to be created on the accident day, did not capture any change altitude data. In general, other recordings contained altitude data from the beginning of the recording. In other recordings, approximately 2 and half minutes had elapsed before the device recorded altitude data. The two other recorded files in the data set created on the accident day were most likely not associated with an actual balloon flight, but rather a power cycle of the device.

The following figures describe data from the file 2021_01_23_14_56_22.log which was determined to be the accident flight.

Figure 2 is a graphical overlay generated using Google Earth for the entire accident flight.

Figure 3 is a graphical overlay showing the area of departure of the balloon on the accident flight.

Figure 4 is a graphical overlay depicting an area of low flight around 15:38.

Figure 5 is a graphical overlay depicting an area of low flight between 15:50 and 15:52.

Figure 6 is a graphical overlay depicting the area of the accident flight's termination.

Figure 7 is a graphical overlay depicting the area of the accident flight's termination zoomed in to show the final portion of flight.

Figure 8 is a plot of available recorded data, including envelope temperature data, from the entire accident flight. The time interval shown is 14:55:00 to 16:05:00.

Figure 9 is a plot of available recorded data, including envelope temperature data, from the accident flight, zoomed in on the end of flight. The time interval shown is 15:56:55 to 16:05:00.

Tabular data used to generate figures 2 through 9 are included as Attachment 1. This attachment is provided in electronic comma-delimited (.CSV) format.

Figure 2. A depiction of the GPS tracks for the entire set of data relevant to the accident. The figure is oriented north up.

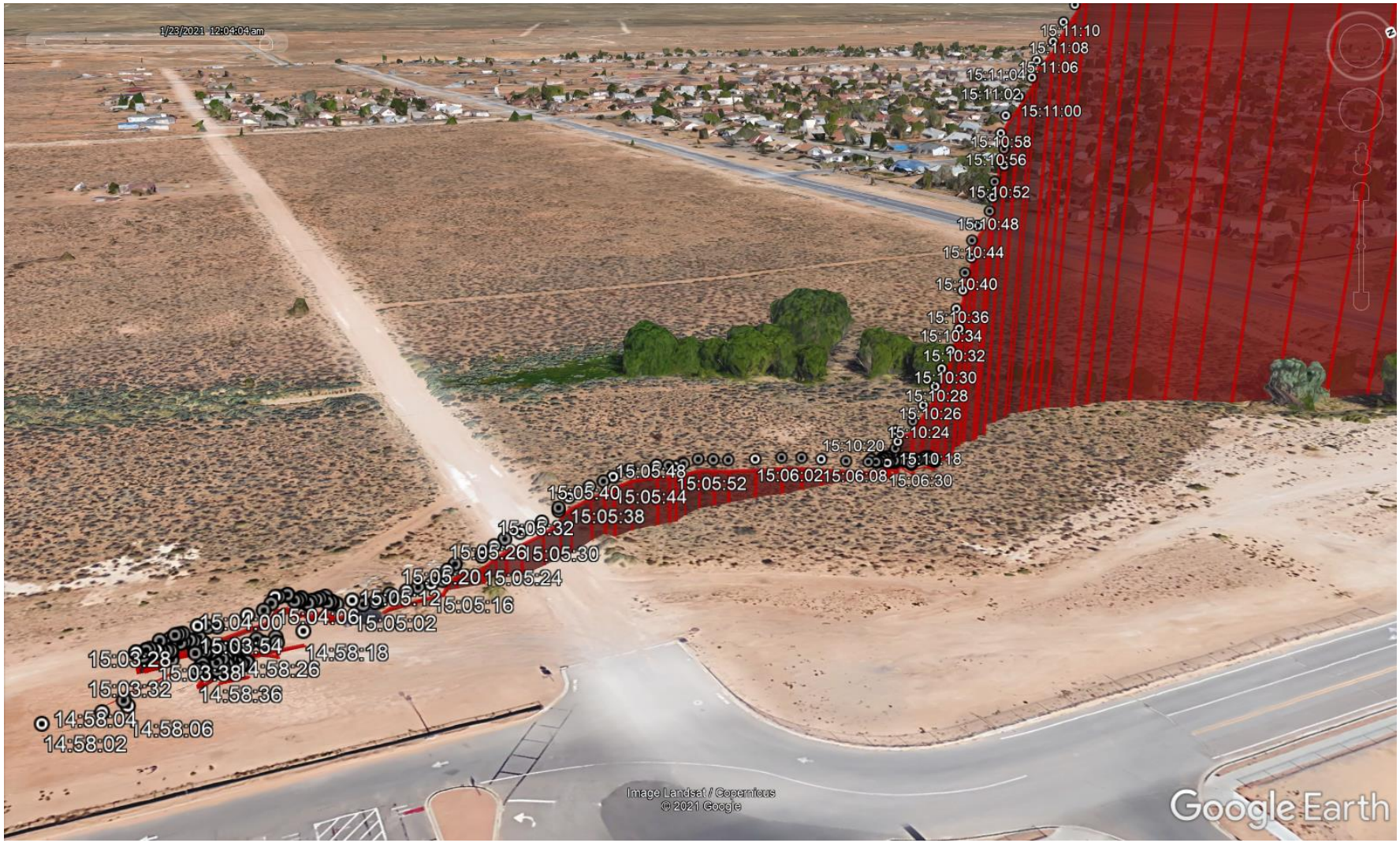

Figure 3. A depiction of the GPS tracks for the start of the accident recording. Note the clusters of points around 15:03 and 15:06.

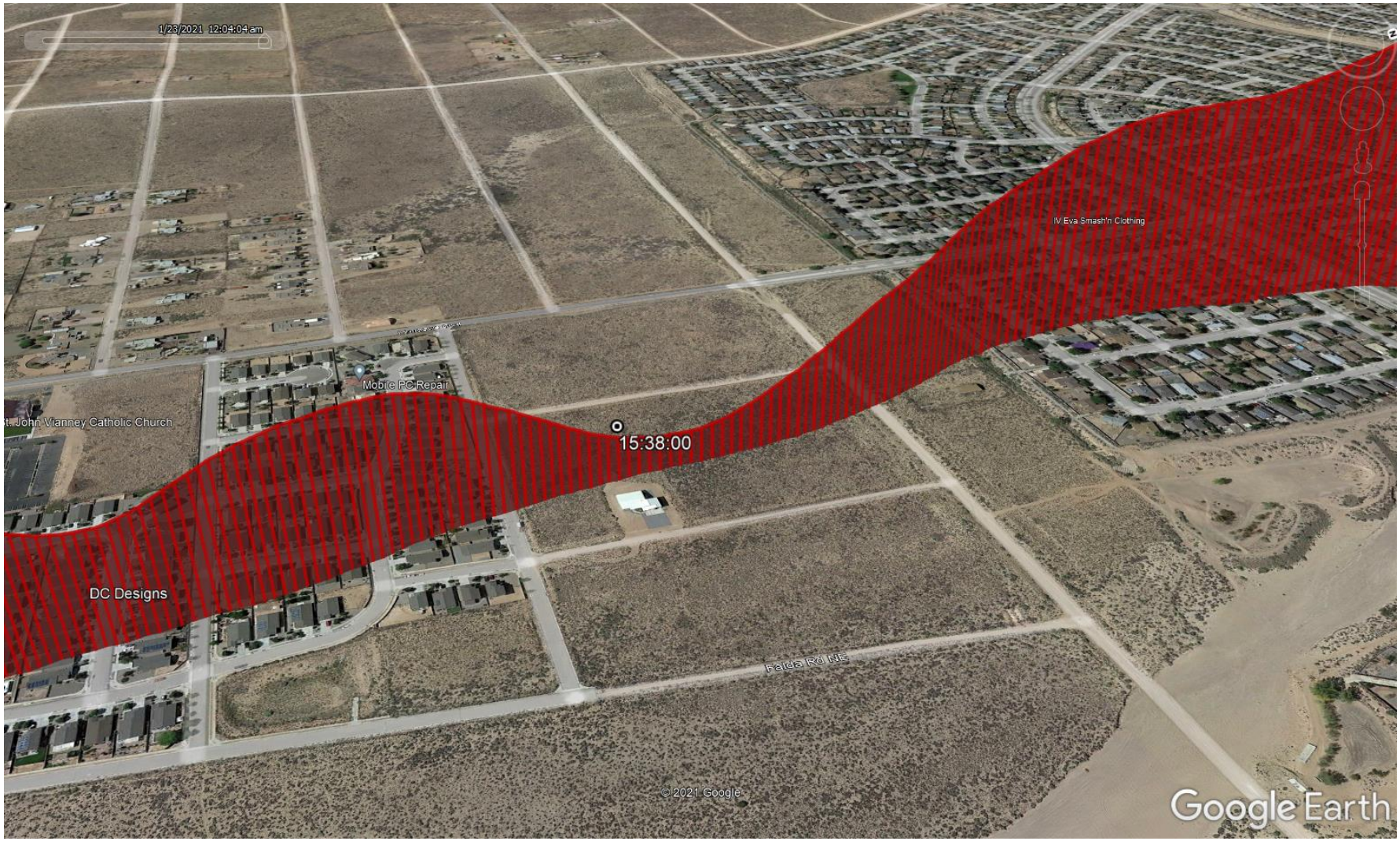

Figure 4. A depiction of the GPS tracks for an area of low altitude flight around 15:38.

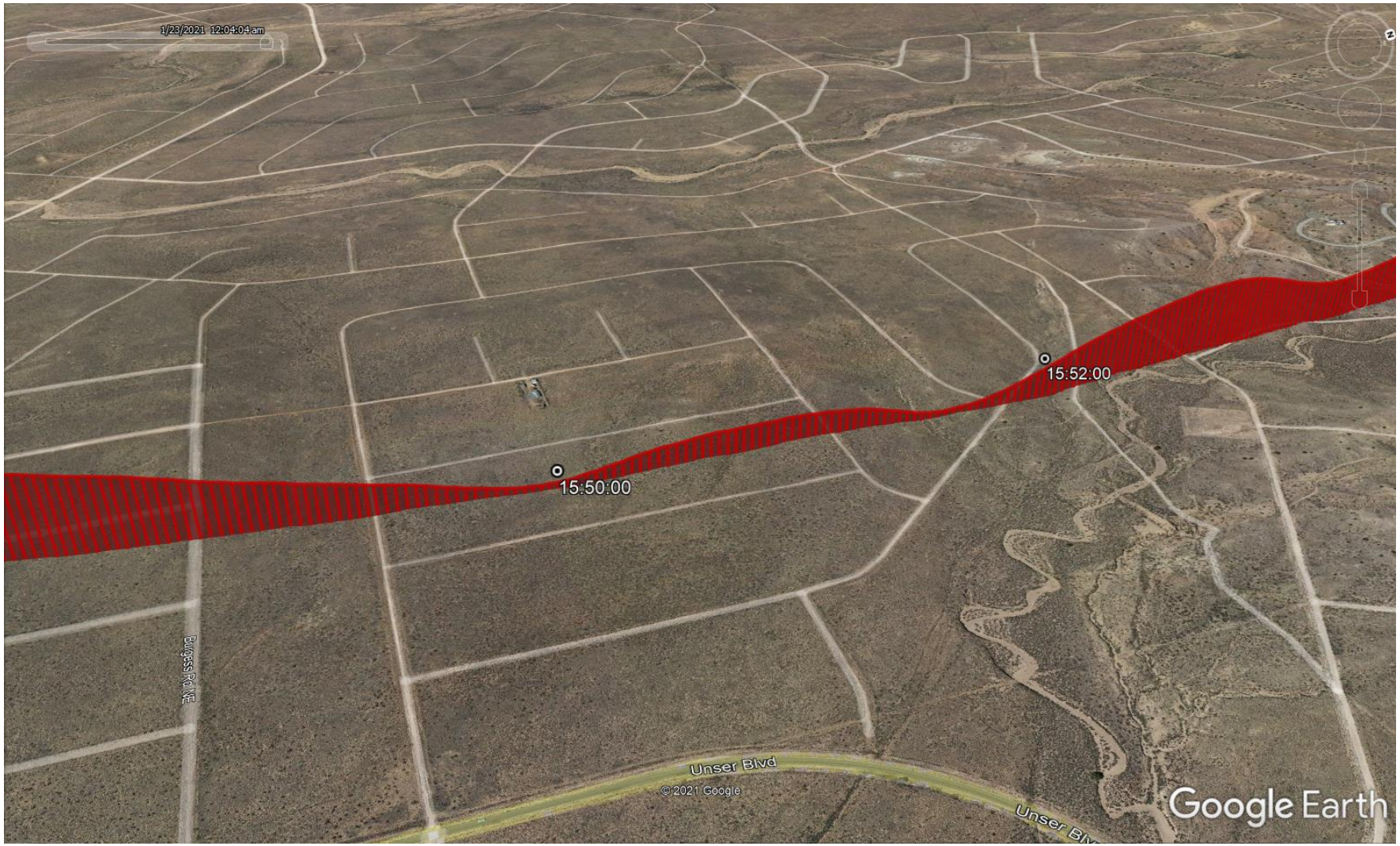

Figure 5. A depiction of the GPS tracks for an area of low altitude flight between 15:50 and 15:52.

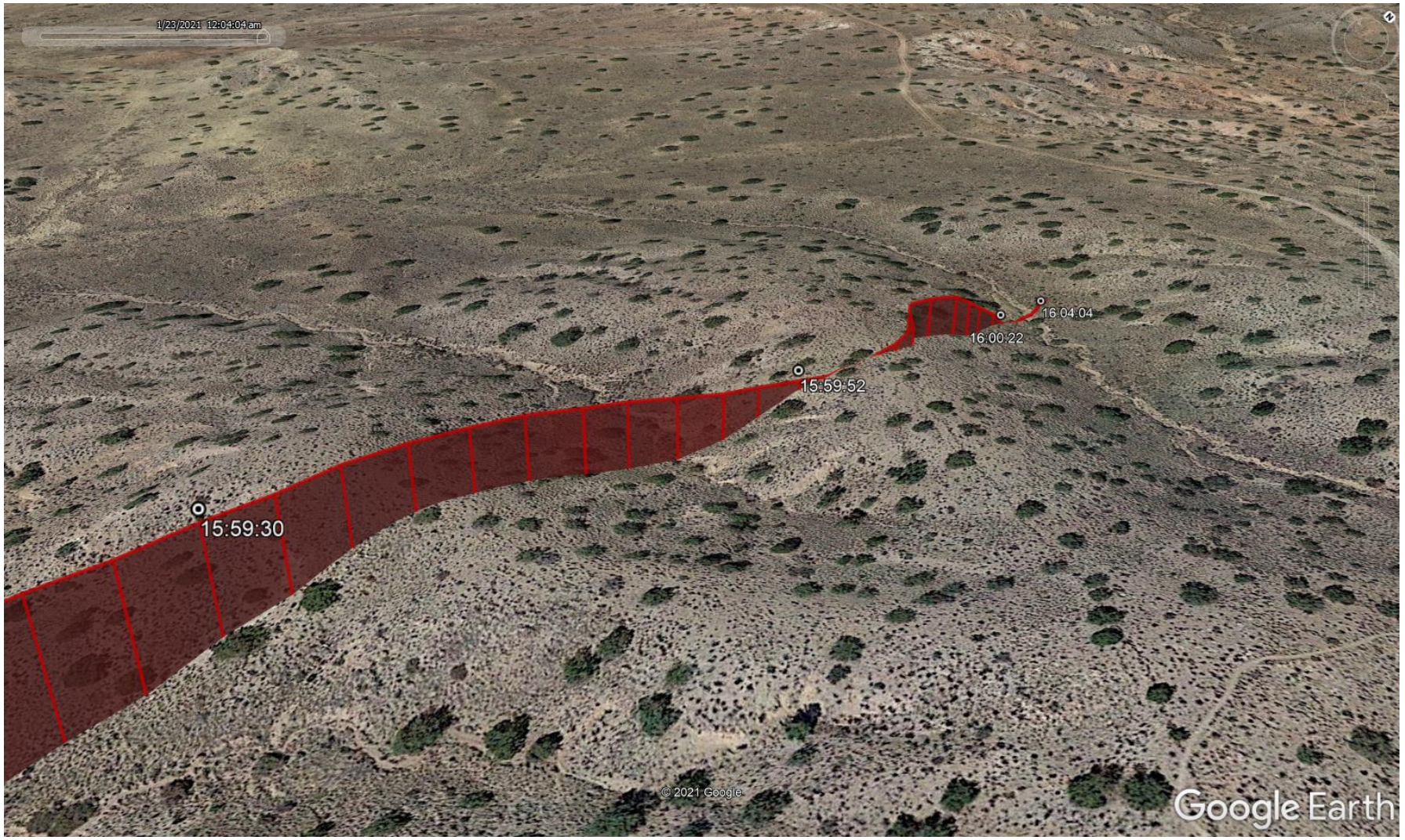

Figure 6. A depiction of the GPS tracks for the final portion of the accident recording.

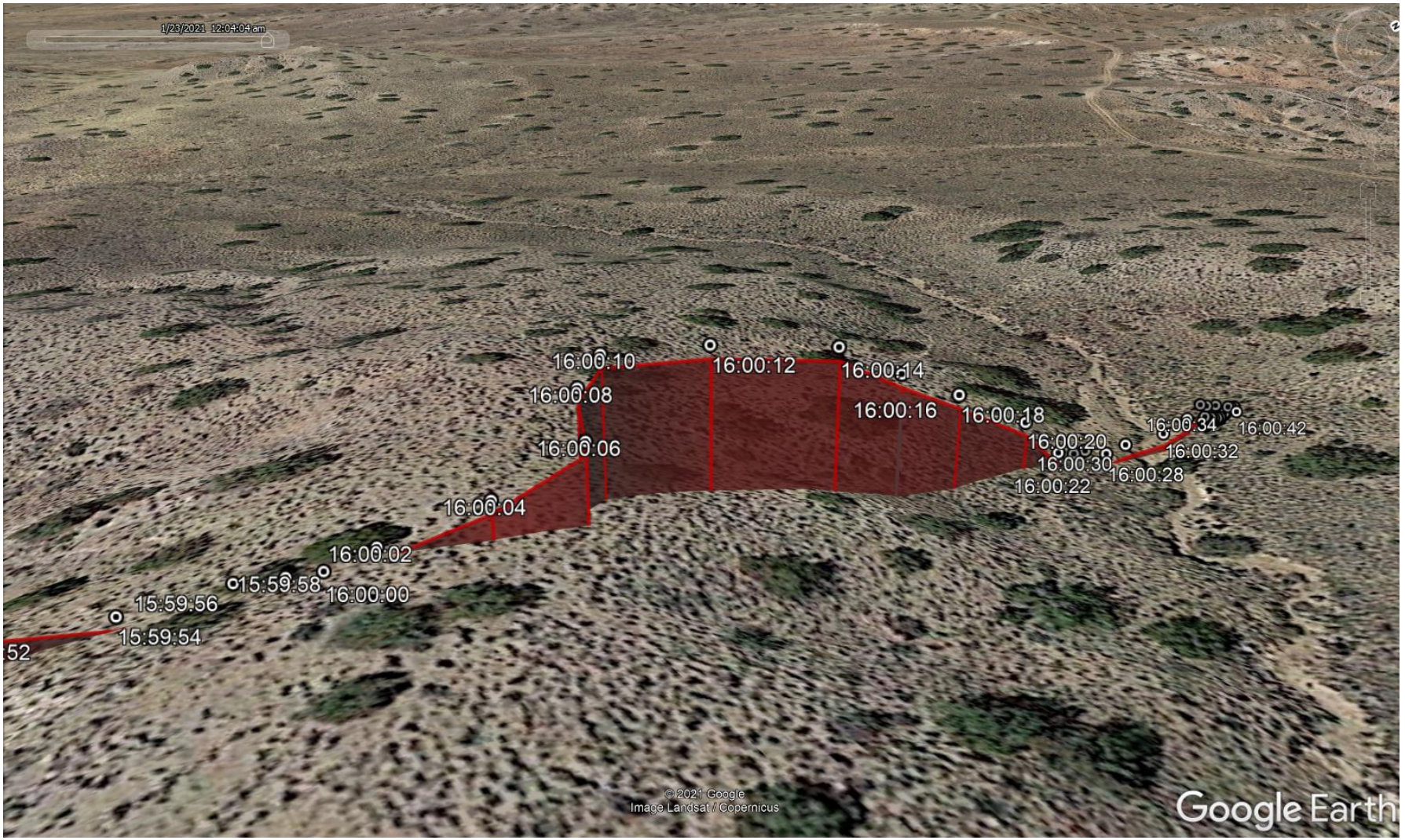

Figure 7. A depiction of the GPS tracks for the final portion of the recording zoomed in to show the termination of flight.

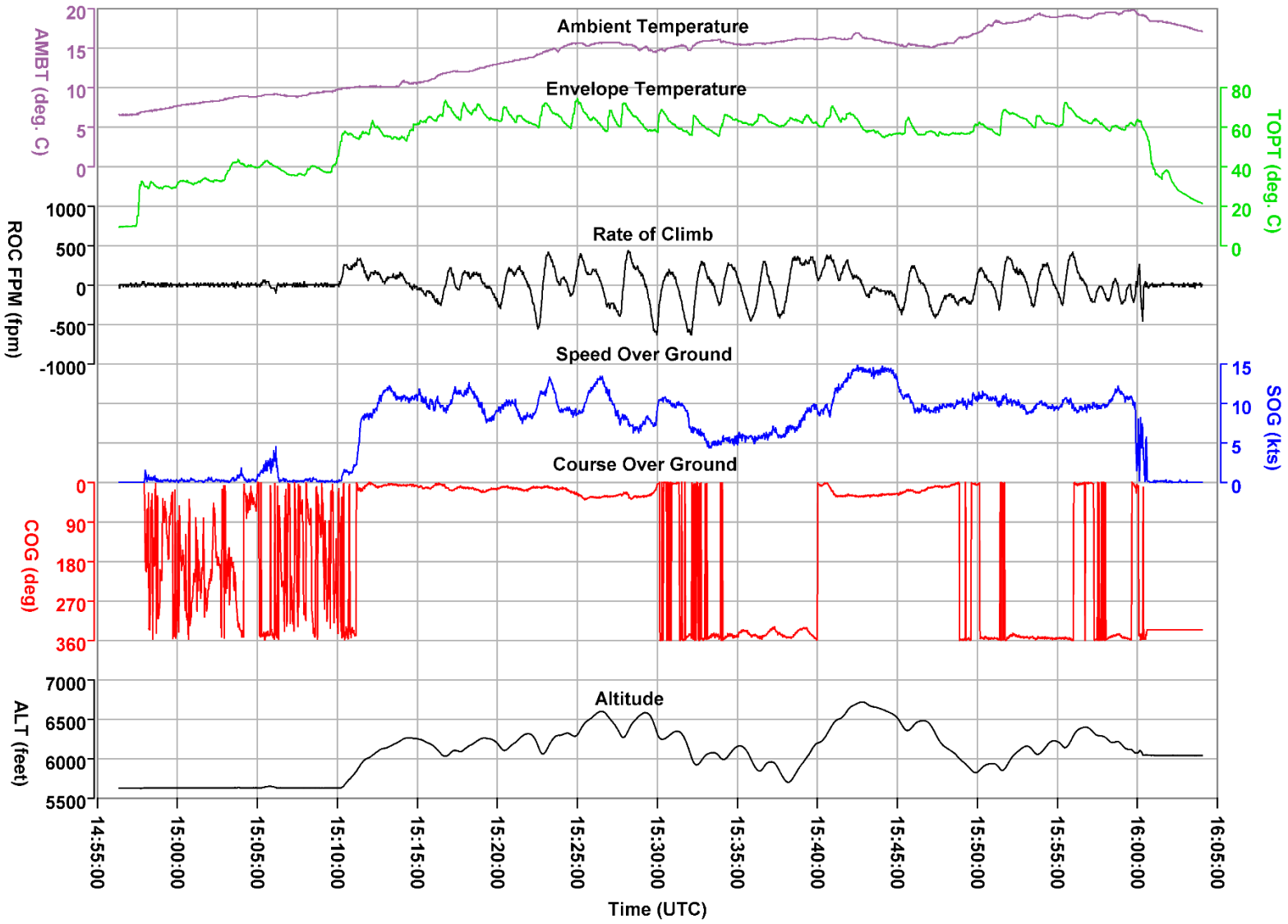

Figure 8. A plot of recorded parameters for the entire flight.

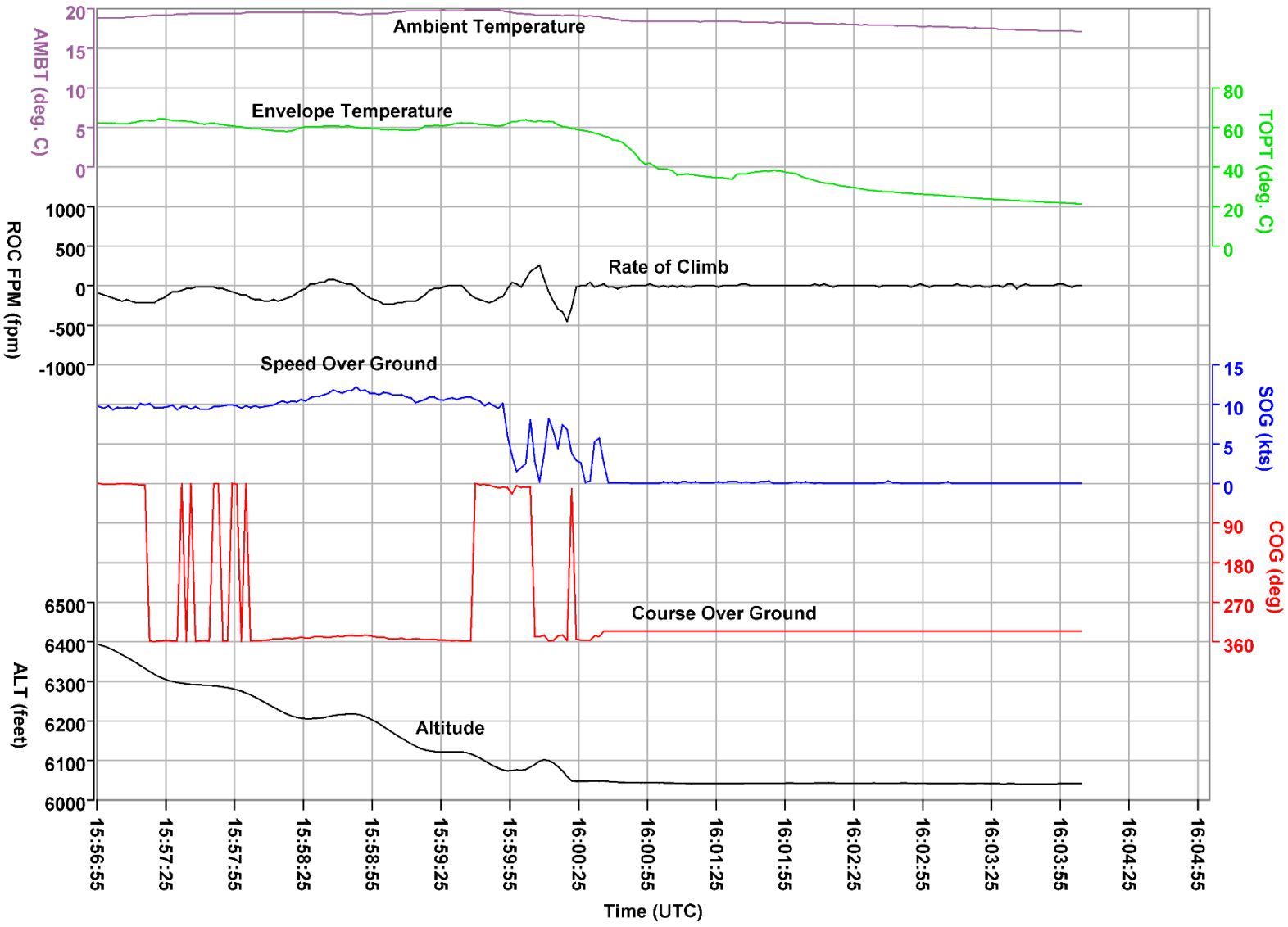

Figure 9. A plot of recorded parameters for the end of the accident flight.