

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

May 2, 2022

Personal Electronic Devices

Specialist's Factual Report
By W. Deven Chen

1. EVENT SUMMARY

Location: Comstock, Texas
Date: July 17, 2021
Aircraft: Luscombe 8F
Registration: N2054B
Operator: Private
NTSB Number: CEN21FA327

2. GROUP

A group was not convened.

3. DETAILS OF INVESTIGATION

On July 23, 2021, the National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following personal electronic devices (PEDs):

Device Manufacturer/Model:	Google Pixel 4 XL (pilot)
IMEI Number:	Unknown

Device Manufacturer/Model:	Garmin D2 Charlie Watch (pilot)
Serial Number:	5CJ002189

3.1. Device Description

PEDs are a category of devices comprised primarily of portable computing devices and mobile phones. Portable computing devices are typically capable of internet access, email, messaging services, and can run user-installed applications to perform specific tasks. Depending on the model, mobile phones can perform many of the same tasks as portable computing devices, plus have voice call and text messaging capabilities. PED user and system data is typically stored on non-volatile memory¹ and can be accessed through manufacturer-provided interfaces.

¹ Non-volatile memory is semiconductor memory that does not require external power for data retention.

3.2. Data Recovery

3.2.1. Google Pixel 4 XL

Upon arrival at the Vehicle Recorder Division, an exterior examination revealed that the device had sustained severe impact damage, as shown in Figure 1. The motherboard was removed from the device and found to be snapped in half during the impact, as shown in Figure 2. The device was sent to a commercial data recovery facility where a chip-level transplant was attempted. However, due to the severity of the damage, no data was recoverable.



Figure 1. Google Pixel 4 XL as received.

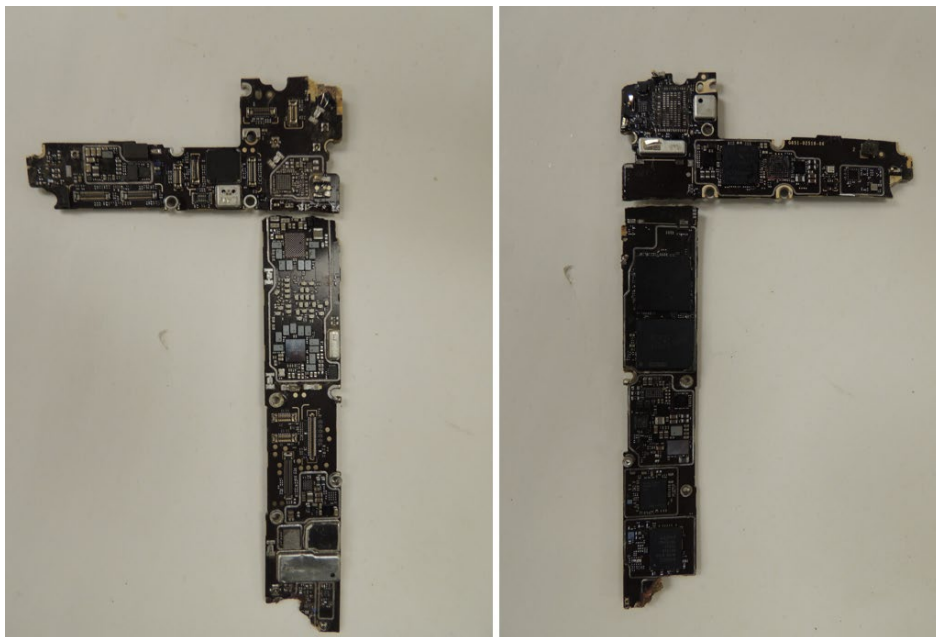


Figure 2. Google Pixel 4 XL as received.

3.2.2. Garmin D2 Charlie Watch

Upon arrival at the Vehicle Recorder Division, an exterior examination revealed that the device had sustained damage, as shown in Figure 3. The device was cleaned and connected to a PC with a Garmin charging/data cable. The device powered on and data were downloaded to the PC.



Figure 3. Front and Back of the Garmin D2 Charlie Watch as received.

3.3. Data Description

Data downloaded from the Garmin watch contained numerous folders. Under the Activity folder, there were 191 FIT² files ranging from September 9, 2018, to July 17, 2021. The last two FIT files (recorded on July 11 and July 17, 2021) were uploaded to Garmin Connect³ and converted into data in engineering units. The last recording session was determined to be related to the event. Both the event flight and the previous flight recorded on July 11, 2021, are included in this report.

3.4. Data Time Correlation

The Garmin watch synced its time with the satellites and recorded in UTC (Coordinated Universal Time). All times are converted to CDT (central daylight time) for the rest of this report. The difference between CDT and UTC is 5 hours. The last recording session ranged from 20:15:52 on July 17 to 14:42:02 on July 18, 2021, CDT, within which, the recording between 20:15:52 and 20:39:58 on July 17, 2021, was determined to be valid.

3.5. Parameters Provided

Table 1 shows the data parameters recorded by the Garmin watch. The recorded data included a parameter named "speed" whose values ranged from 0 to 56 knots, which was determined invalid. The Speed_cal shown in Table 1 was calculated ground speed

² FIT files - GIS data files contains location and time information logged on the GPS devices during a run, bike race, or other athletic event.

³ Garmin Connect - a web-based tool for tracking, analyzing, and sharing health and fitness activities recorded by Garmin devices.

based on the Haversine formula with recorded latitude, longitude, and time intervals. The recorded data also included "heart rate". Note that the Garmin Watch measured heart rates with an optical sensor and that the level of accuracy of the heart rate recording was unknown.

Table 1. Data Parameters.

Parameter Name	Parameter Description
Lat (deg)	GPS position latitude (degrees)
Lon (deg)	GPS position longitude (degrees)
Ele (ft)	GPS Altitude (feet)
Speed_cal (kts)	Calculated Ground Speed (knots)
Heart_rate (bpm)	Heart Rate (beats per minute)

3.6. Overlays and Tabular Data

The following 10 figures contain data recorded by the Garmin watch of the event flight recorded on July 17, 2021, and the previous flight recorded on July 11, 2021. Figures 4 through 10 show Google Earth overlays and figures 11 through 13 show parameters plots.

Figure 4 is a Google Earth overlay of the entire event flight. The weather and lighting conditions in Google Earth are not necessarily the weather and lighting conditions present at the time of the recording.

Figure 5 is a Google Earth overlay showing the beginning of the event flight. It shows the aircraft took off at the Del Rio International Airport at around 20:15 CDT.

Figures 6 through 8 are Google Earth overlays showing the final portion of the event flight. The reported wreckage location is shown with a red pin.

Figure 9 is a Google Earth overlay showing the entire previous flight recorded on July 11, 2021. It shows this flight was taken place in the vicinity of the event flight location. The reported wreckage location is shown with a red pin.

Figure 10 is a Google Earth overlay showing the beginning and final portions of the previous flight. This flight took off and landed at Del Rio International Airport.

Figure 11 is a plot of the data parameters for the entire event flight. The time interval displayed is 20:15:00 to 20:40:00 CDT. There were no heart rate data recorded between 20:39:48 to 20:39:58.

Figure 12 is a plot of the data parameters for the last 5 minutes of the event flight.

Figure 13 is a plot of the data parameters for the entire previous flight recorded on July 11, 2021. The time interval displayed is 11:40:00 to 13:40:00 CDT.

The corresponding tabular data for the event flight recorded on July 17, 2021, are provided in CSV format as Attachment 1 to this report. The tabular data for the previous flight recorded on July 11 are provided in CSV format as Attachment 2 to this report. The attachments may contain additional parameters, and not every additional parameter in the attachments have been validated by the specialist.



Figure 4. Google Earth overlay showing the entire event flight.

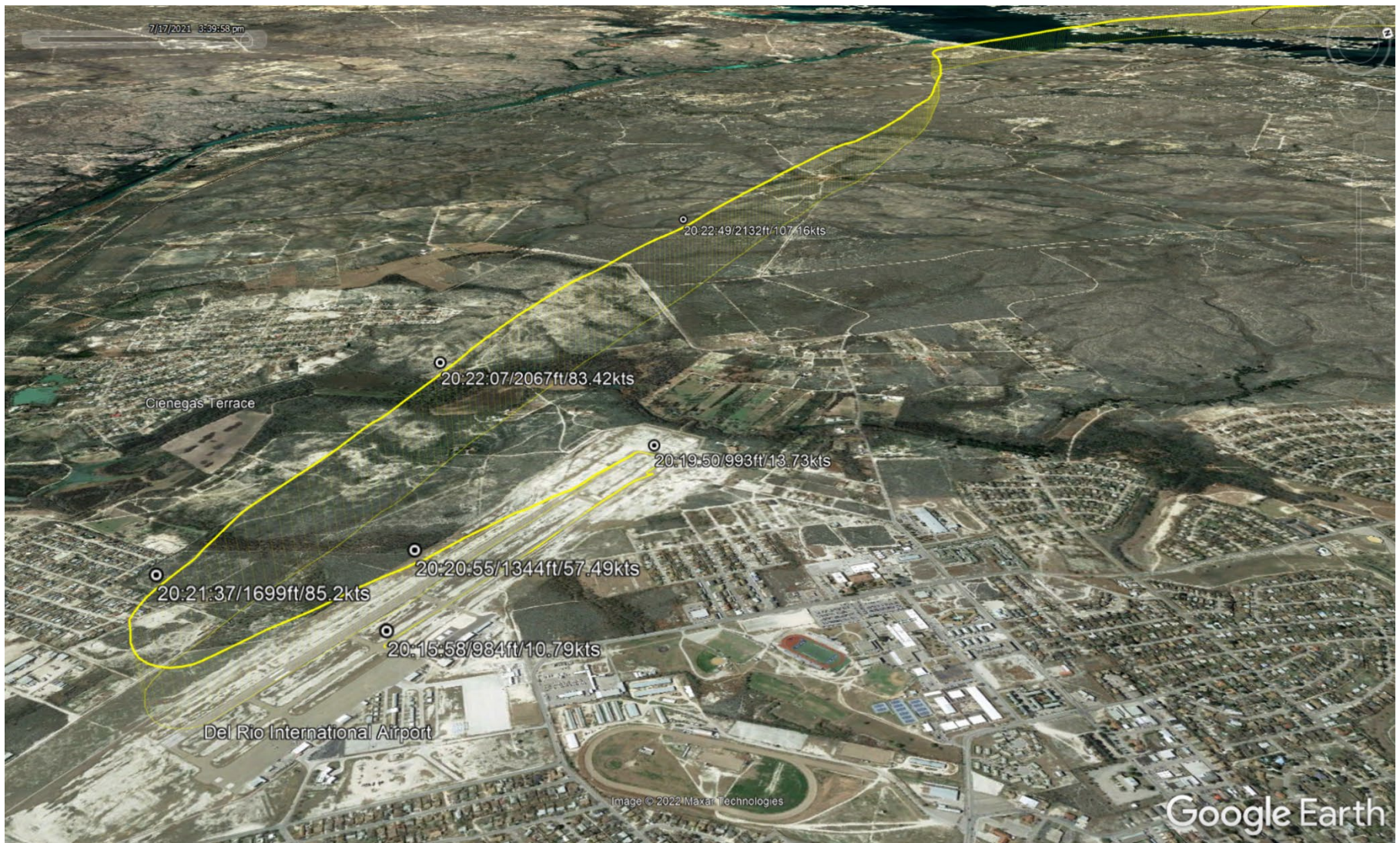


Figure 5. Google Earth overlay showing the takeoff portion of the event flight.

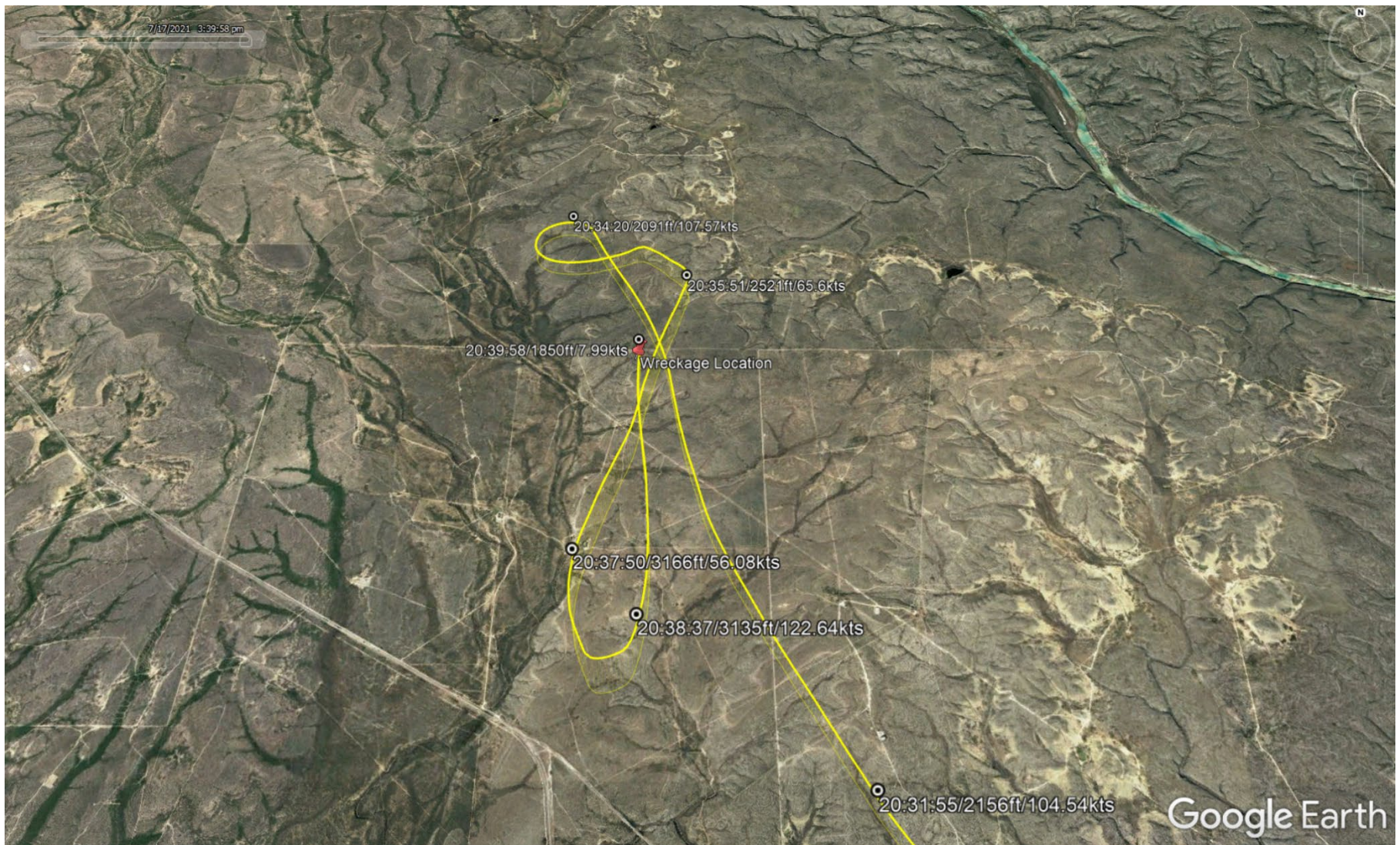


Figure 6. Google Earth overlay showing the final portion of the event flight.

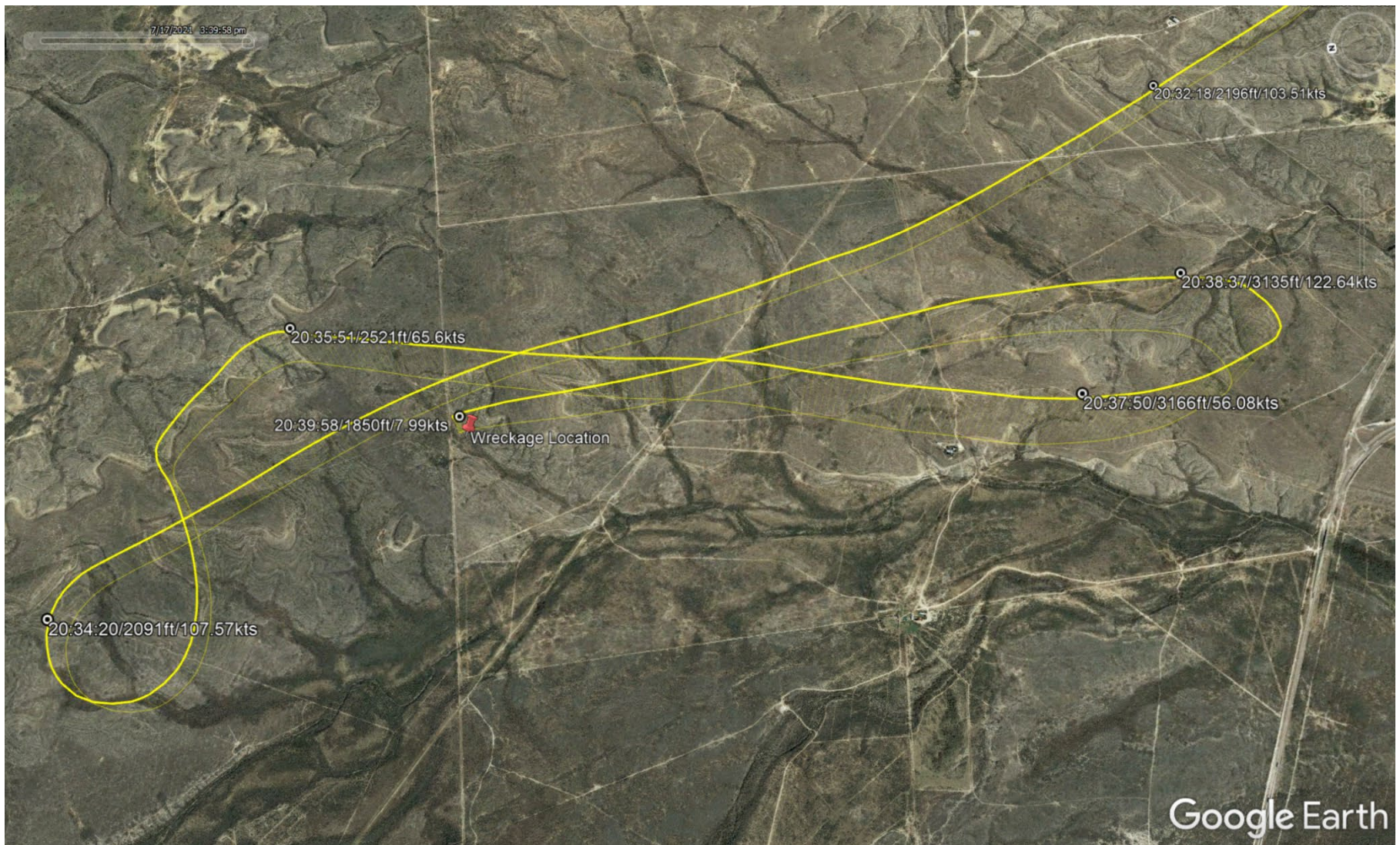


Figure 7. Google Earth overlay showing the final portion of the event flight at a different view angle.

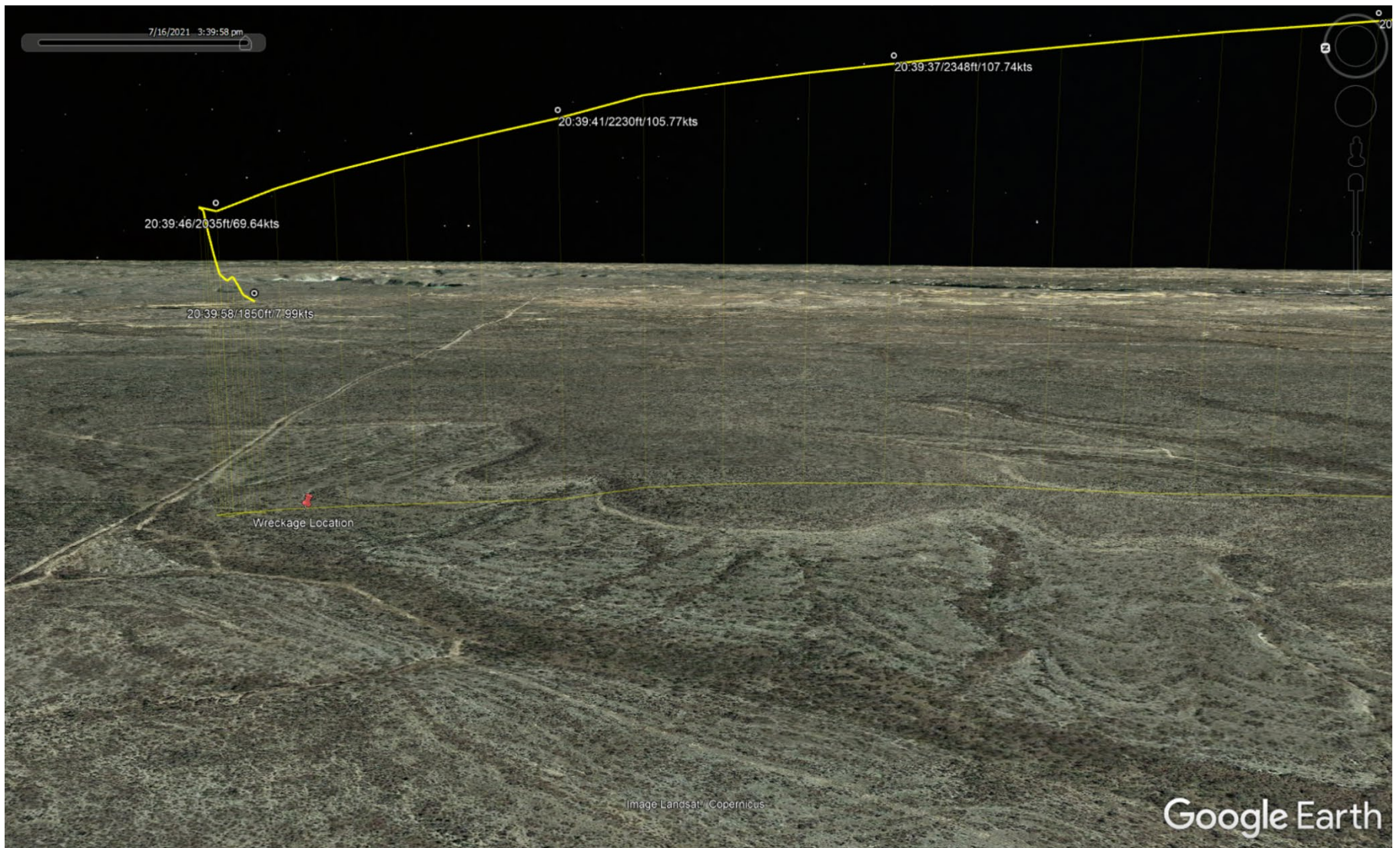


Figure 8. Google Earth overlay showing the end of the event flight.

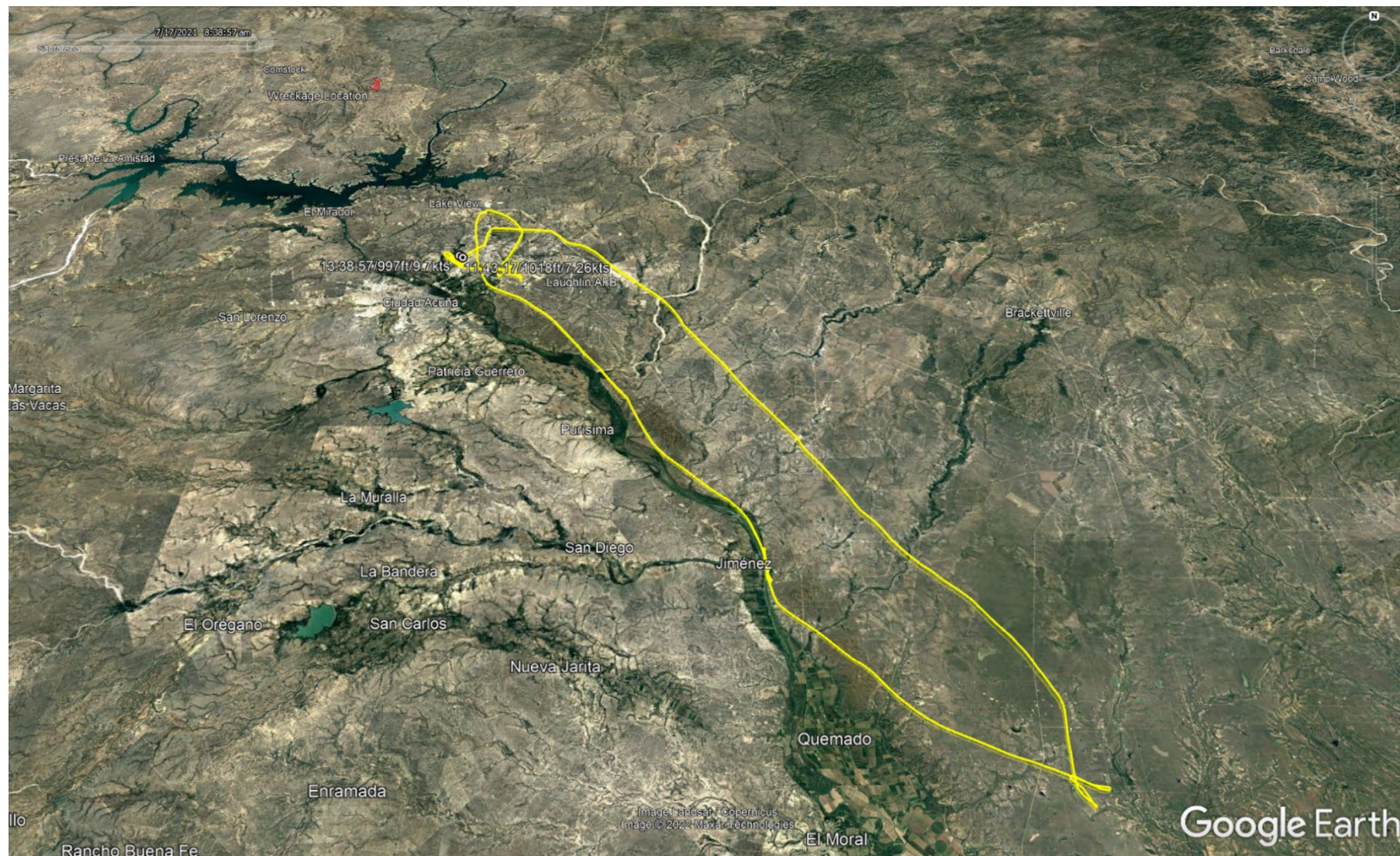


Figure 9. Google Earth overlay showing the entire previous flight recorded on July 11, 2021. The reported wreckage location from the event flight is shown with a red pin.

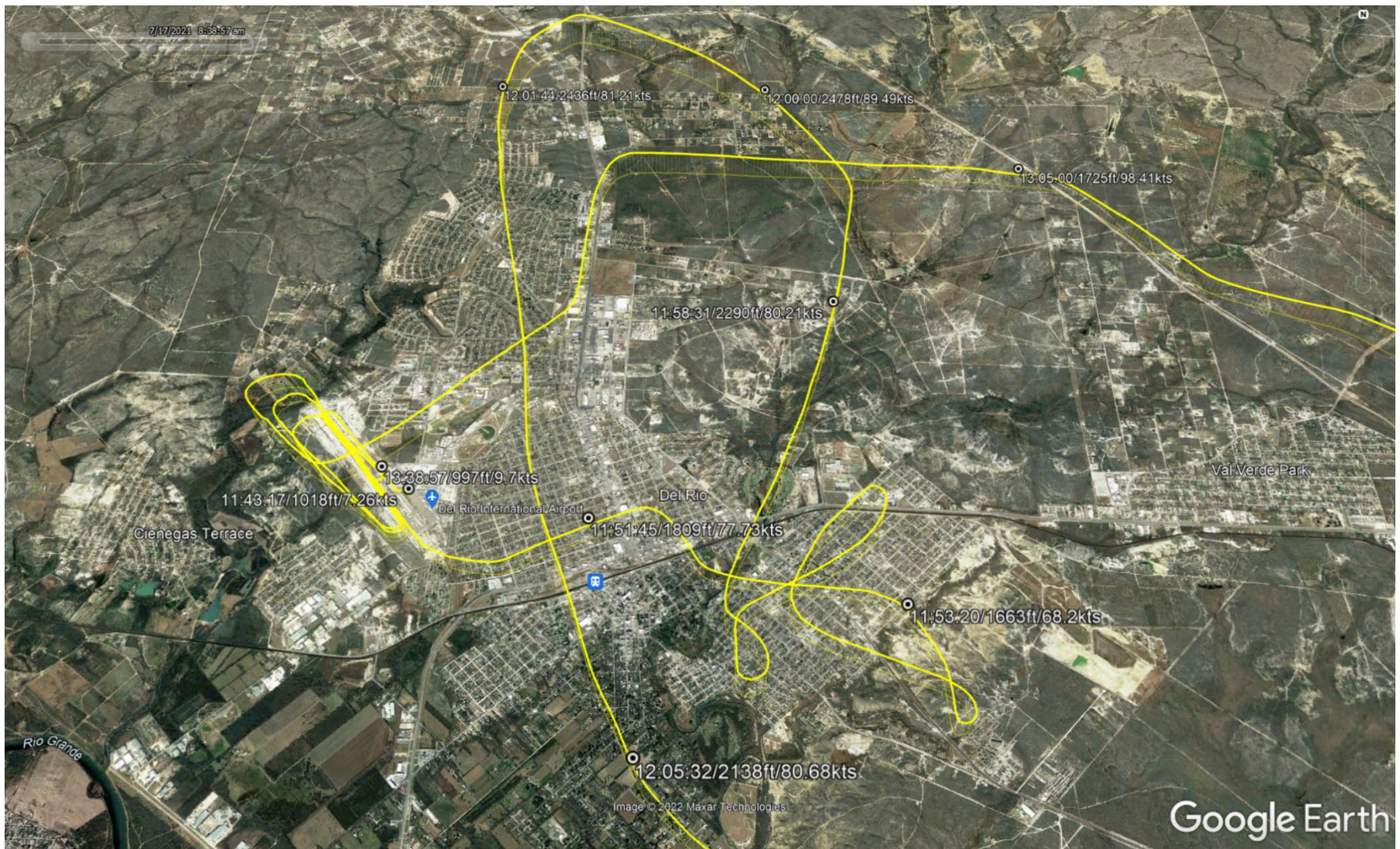


Figure 10. Google Earth overlay showing the beginning and final portions of the previous flight recorded on July 11, 2021.

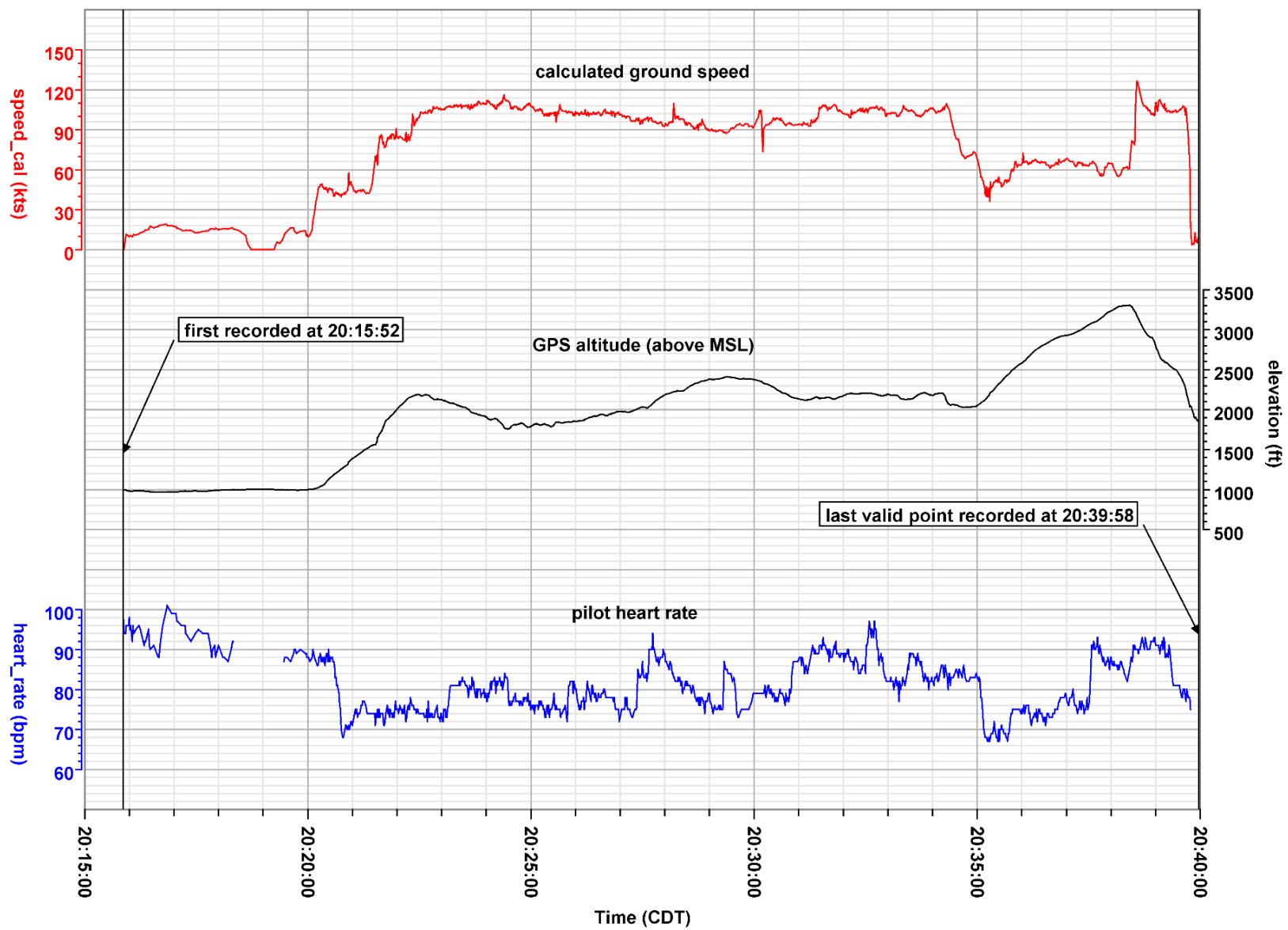


Figure 11. Plot of data parameters for the entire event flight recorded on July 17, 2021.

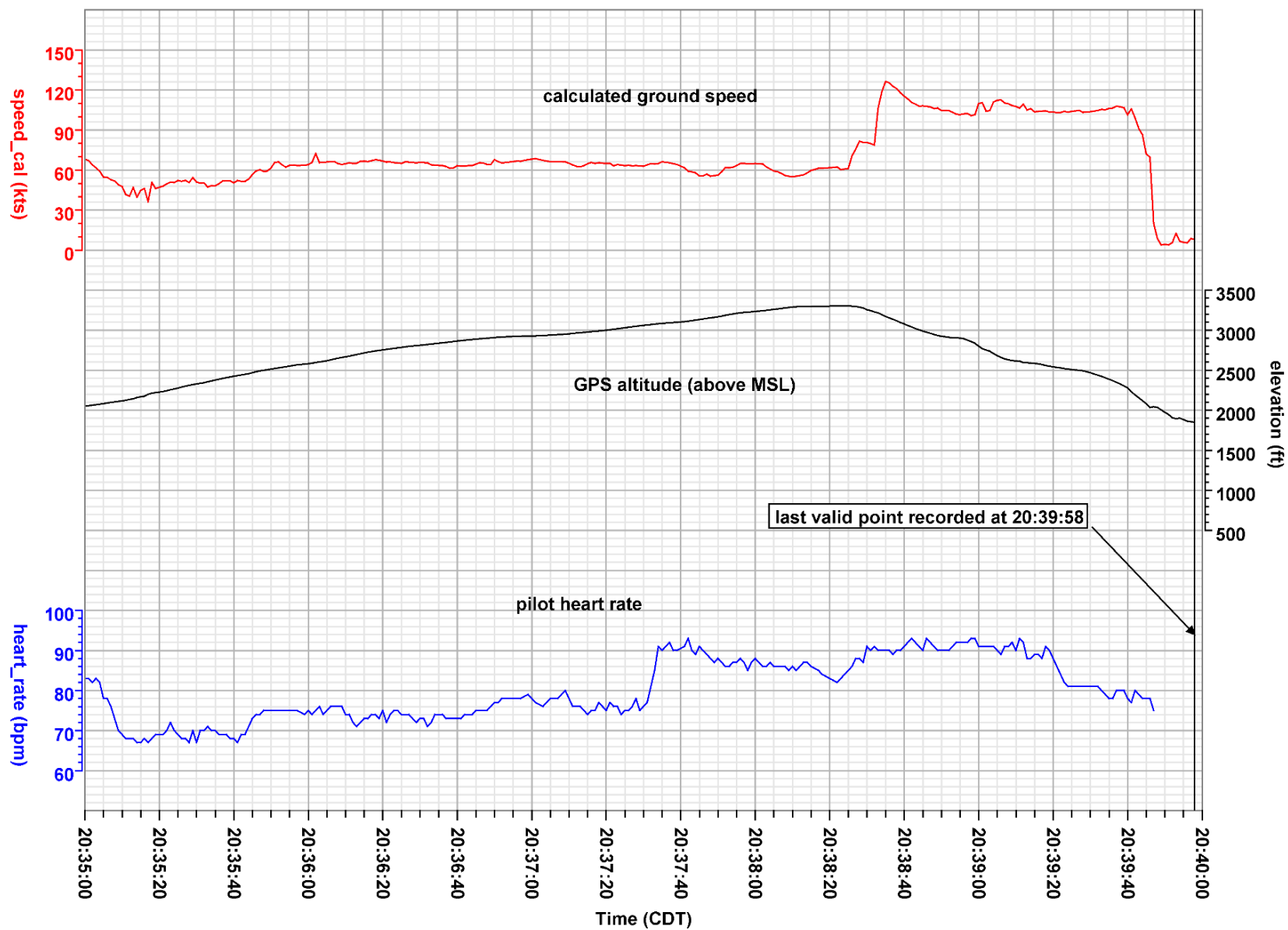


Figure 12. Plot of data parameters for the last 5 minutes of the event flight recorded on July 17, 2021.

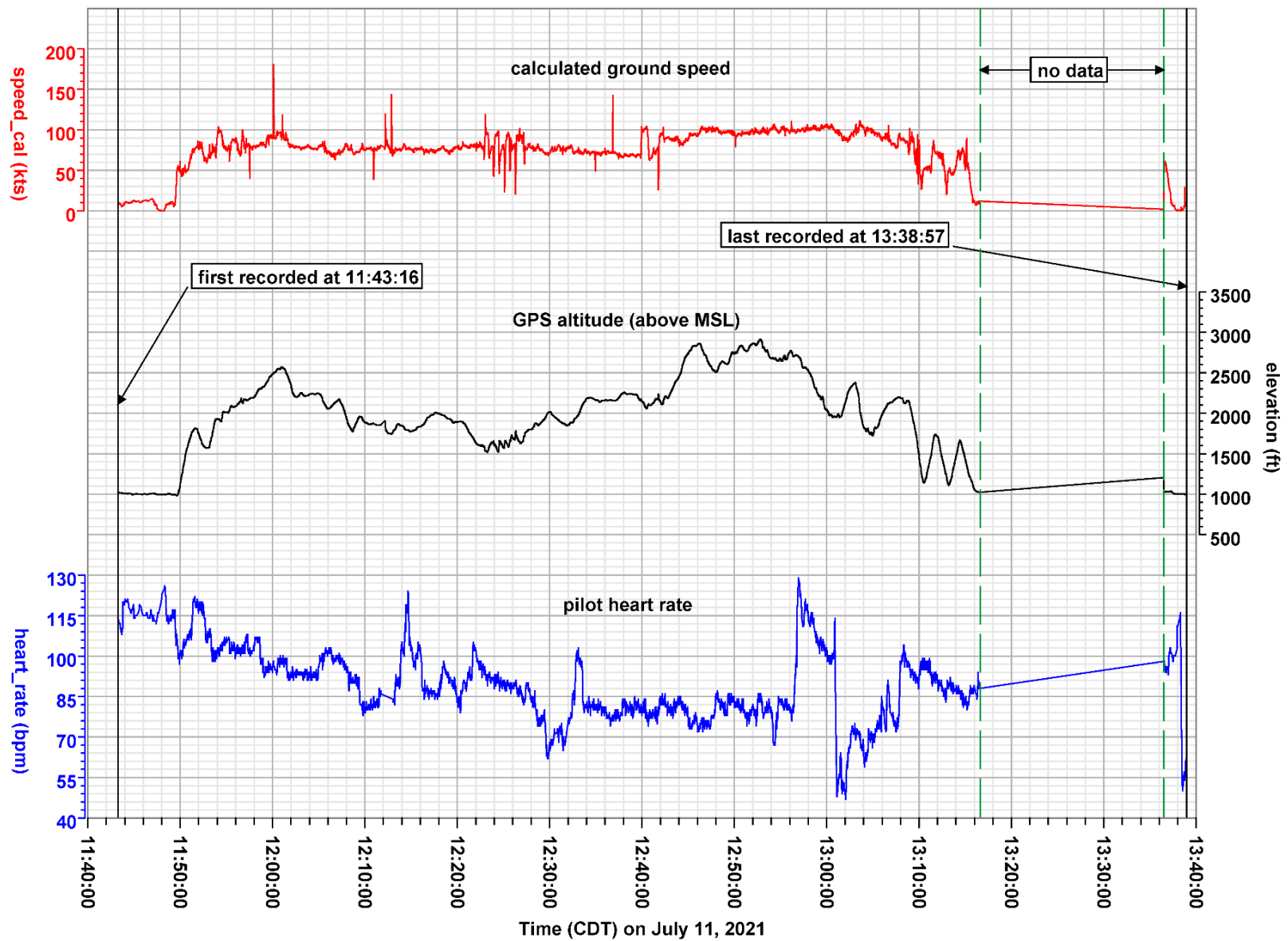


Figure 13. Plot of data parameters for the entire previous flight recorded on July 11, 2021.