

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



ANC23FA031

ONBOARD VIDEO RECORDER

Specialist's Factual Report

October 10, 2023

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A. ACCIDENT

Location: Nuevo, California
Date: March 24, 2023
Time: 12:17 Pacific Daylight Time (PDT)
Helicopter: Bell 407, private operator, N14Z

B. ONBOARD VIDEO RECORDER SPECIALIST

Specialist: Kyle Garner
Sr. Aerospace Engineer - Recorder Specialist
National Transportation Safety Board (NTSB)

C. DETAILS OF THE INVESTIGATION

A group was not convened.

The NTSB Vehicle Recorder Division received the following devices:

Device Manufacturer/Model: GoPro HERO10 Black
Device Serial Number: C3461324774098
microSD card: 256GB SanDisk Extreme

Device Manufacturer/Model: GoPro HERO9 Black
Recorder Serial Number: C3441325178475
microSD card: 64GB SanDisk Extreme

1.0 Device Description

The GoPro HERO9 and HERO10 are compact digital cameras designed for capturing video and photos in extreme environments. The HERO9 camera can record up to 5K video at 30 frames per second and the HERO10 can record up to 5.3K video at 60 frames per second. The cameras can also record lower-quality resolution video at higher frame rates.

The cameras feature built-in GPS and Wi-Fi capabilities. Data are saved to an internal microSD card.

2.0 Device Condition

The GoPro HERO9 Black arrived in good condition with no visible exterior damage, as shown in Figure 1. A 64GB microSD card was found intact and seated securely in the memory card slot.



Figure 1. Condition of the front (left) and rear (right) of GoPro HERO9 Black, as received.

The GoPro HERO10 Black arrived with minimal exterior damage, as shown in Figure 2. A 256GB microSD card was found intact and seated securely in the memory card slot.



Figure 2. Condition of the front (upper left), rear (upper right), and side (lower center) of GoPro HERO10 Black, as received.

2.1 Device Recording Description

Both microSD cards were successfully imaged and searched forensically for traces of corrupted and unplayable video files. The microSD card from the HERO9

contained only one video in MP4 format. The microSD card from the HERO10 contained 14 videos, in LRV¹ and MP4 format.

3.0 Video File Information

The video file forensically recovered from the HERO9 camera was reviewed and determined to be from the accident date, however, the video ended before the helicopter departed French Valley Airport (F70), in Murrieta, California. Thus, the video recovered from the HERO9 will not be discussed in this report.

All the videos contained on the HERO10's microSD card were reviewed, and two videos² containing the accident flight departure, cruise, and impact were identified and concatenated.

Metadata in the file indicated the accident flight video was recorded at a resolution of 3840x2160 pixels and a frame rate of 29.97 frames per second. An audio track was also recorded from the camera's internal microphone. The camera was mounted on the helicopter's exterior on the right landing skid and was forward-facing, as shown in Figure 3.



Figure 3. Field-of-view of the forward-facing camera when the helicopter was on the ground at F70.

¹ LRV = low-resolution video format = a video file format used by GoPro for video previews.

² The filenames of the two videos discussed in this report - GX010013.MP4 and GX020013.MP4.

4.0 Video Timing

The video files contained embedded accelerometer and GPS data, including a GPS-synchronized timestamp in coordinated universal time (UTC). The timestamp in UTC was converted to local time, PDT, by subtracting 7 hours. All time referenced in the video summary is PDT. The offset to local time, PDT, is shown below:

$$\text{Video local time, PDT} = \text{video elapsed time} + 12:01:49.624$$

D. VIDEO SUMMARY

The accident flight recording began at approximately 12:02 PDT with the helicopter on the ground at F70. The weather conditions at the time appeared to be partly cloudy with no restrictions on visibility.

At 12:03:15, one of the pilots was visible performing a preflight visual inspection of the front of the helicopter.

At 12:05:32, sounds consistent with engine start were noted. The shadow of the main rotor spooling up was visible shortly thereafter.

At 12:08:23, the helicopter began to lift off from the landing pad at F70. After lifting off, the helicopter began to travel over the airport's apron toward the south.

At 12:09:01, the helicopter performed a 180-degree right turn and started to travel to the north. For about 4 minutes and 30 seconds, the helicopter continued to travel in a north-northwesterly heading at an altitude between 500 to 600 feet above ground level (AGL).

At 12:13:35, the helicopter approached a hill, as shown in Figure 4. Shortly thereafter, the helicopter started to pitch up to avoid the hill.



Figure 4. Video frame at 12:13:35.

At 12:14:00, embedded GPS data indicated the helicopter traversed the crest of the hill at an altitude between 30 and 40 feet AGL, as shown in Figure 5. After traversing the hill, the helicopter continued to travel in a north-northwesterly heading.



Figure 5. Video frame at 12:14:00.

At 12:16:40, the helicopter was about 17 miles north-northwest of F70. The helicopter started a left bank to align with the crest of a different hill.

At 12:17:09, embedded GPS data indicated the helicopter traversed the crest at an altitude of about 30 feet AGL, as shown in Figure 6. At 12:17:13, the helicopter started a right bank and four seconds later, at 12:17:17, the helicopter clipped a rock formation on the hill. Fragments of the helicopter shedding were visible on the recording as shown in Figure 7.

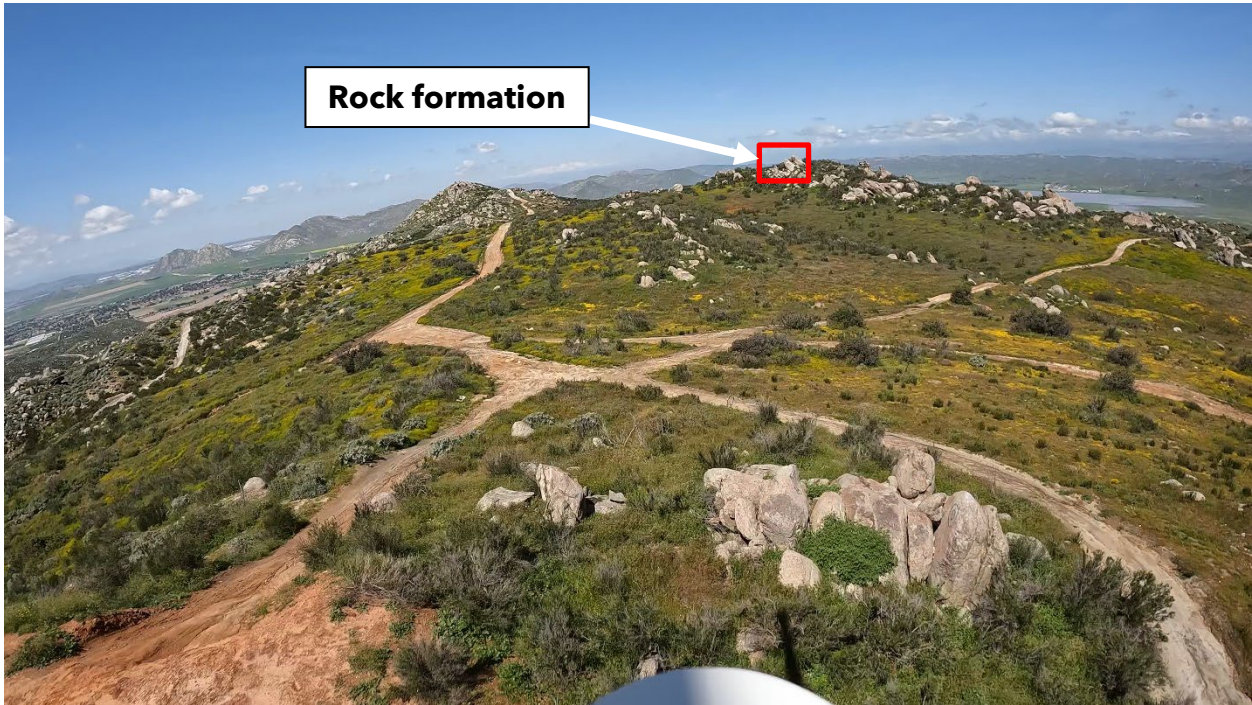


Figure 6. Video frame at 12:17:09. A rock formation the helicopter clipped at 12:17:17 is shown in the red box.



Figure 7. Video frame at 12:17:17. Fragments of the helicopter are seen at the top of the frame.

At 12:17:18, the helicopter impacted the ground and came to rest shortly thereafter.

The remainder of the video was uneventful. The video ended at 12:25:30.

E. GOOGLE EARTH OVERLAY

Figure 8 through Figure 11 are Google Earth overlays of the recorded GPS data from the accident flight video file. Note that the weather and lighting conditions in Google Earth are not necessarily the weather and lighting conditions present at the time of the accident.

The corresponding tabular data used to create figures 7 to 10 are provided in a comma-separated value (CSV) format as Attachment 1 to this report.

Submitted by:

Kyle Garner
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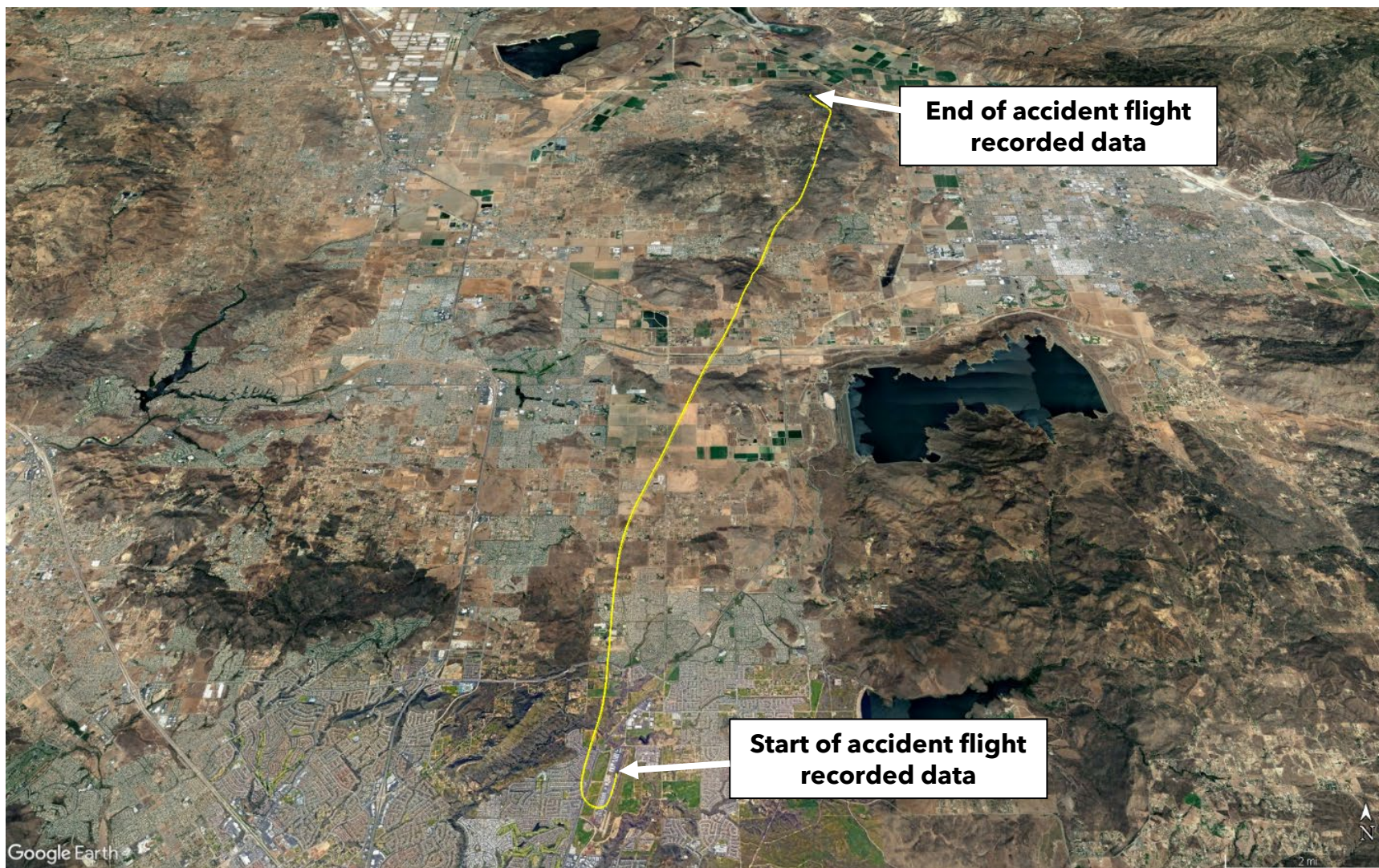


Figure 8. Start and end of accident flight recorded data.

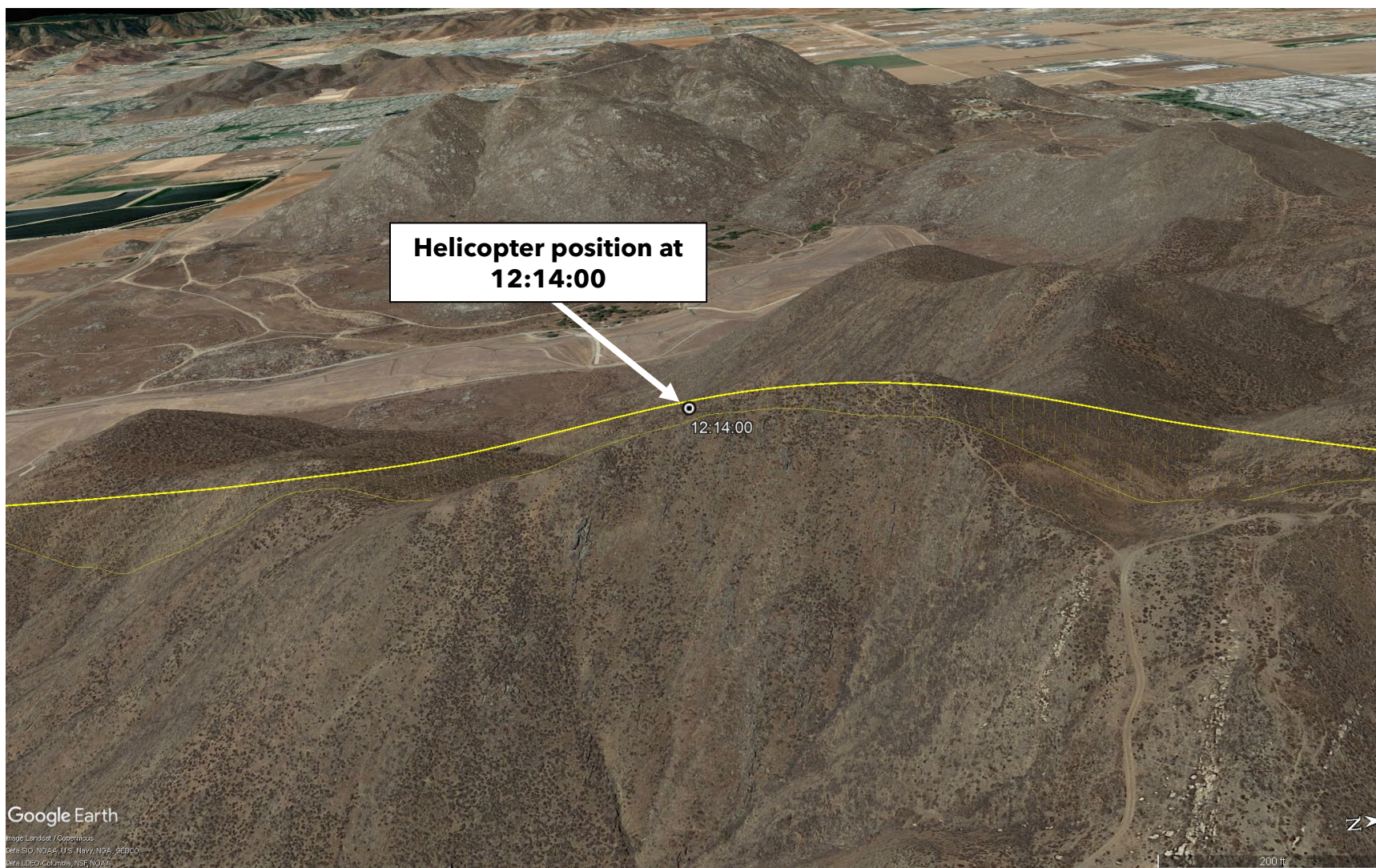


Figure 9. Helicopter position at 12:14:00 - side profile view. See Figure 5 for forward-facing camera view at this time.

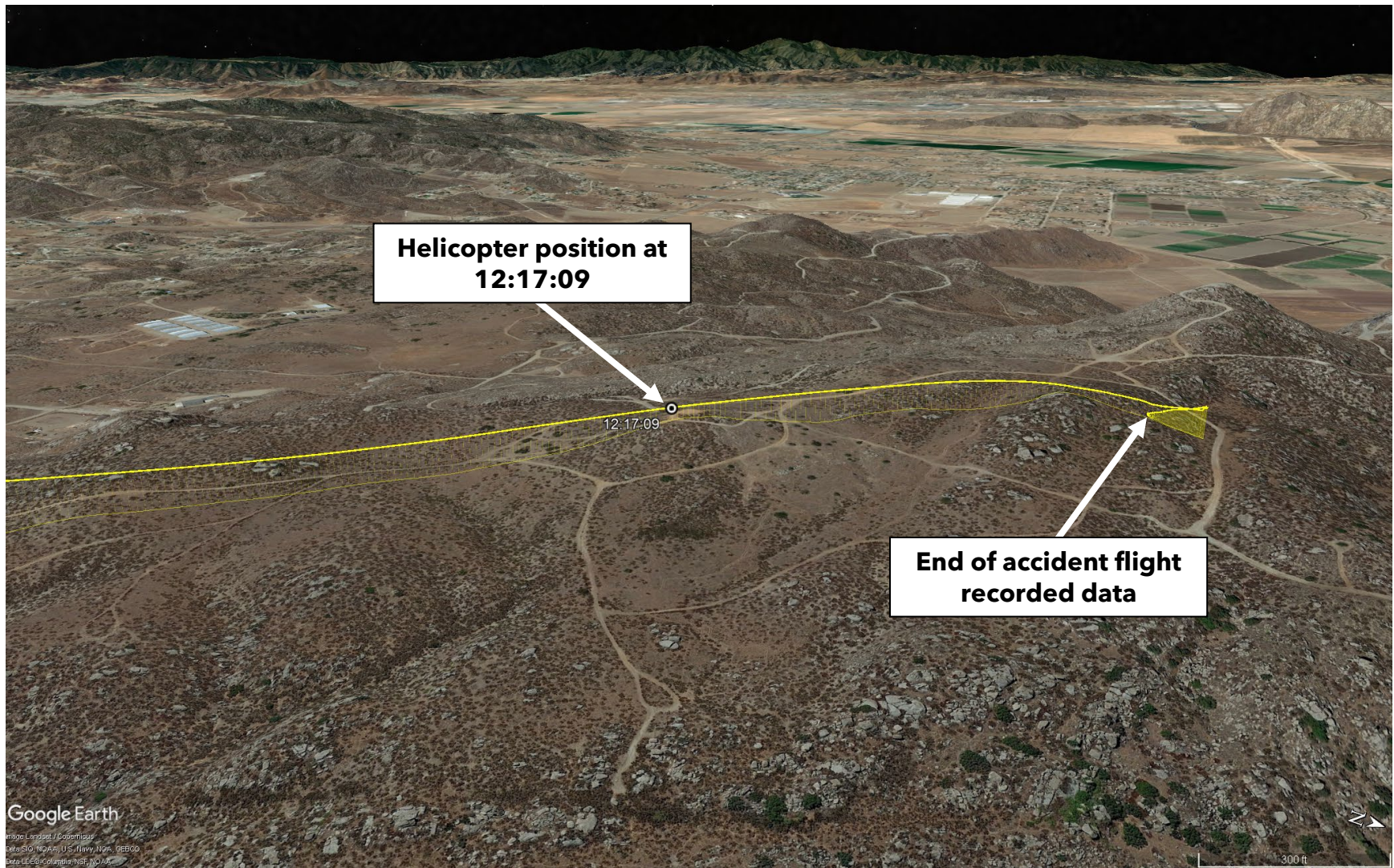


Figure 10. Helicopter position at 12:17:09 - side profile view. See Figure 6 for forward-facing camera view at this time.

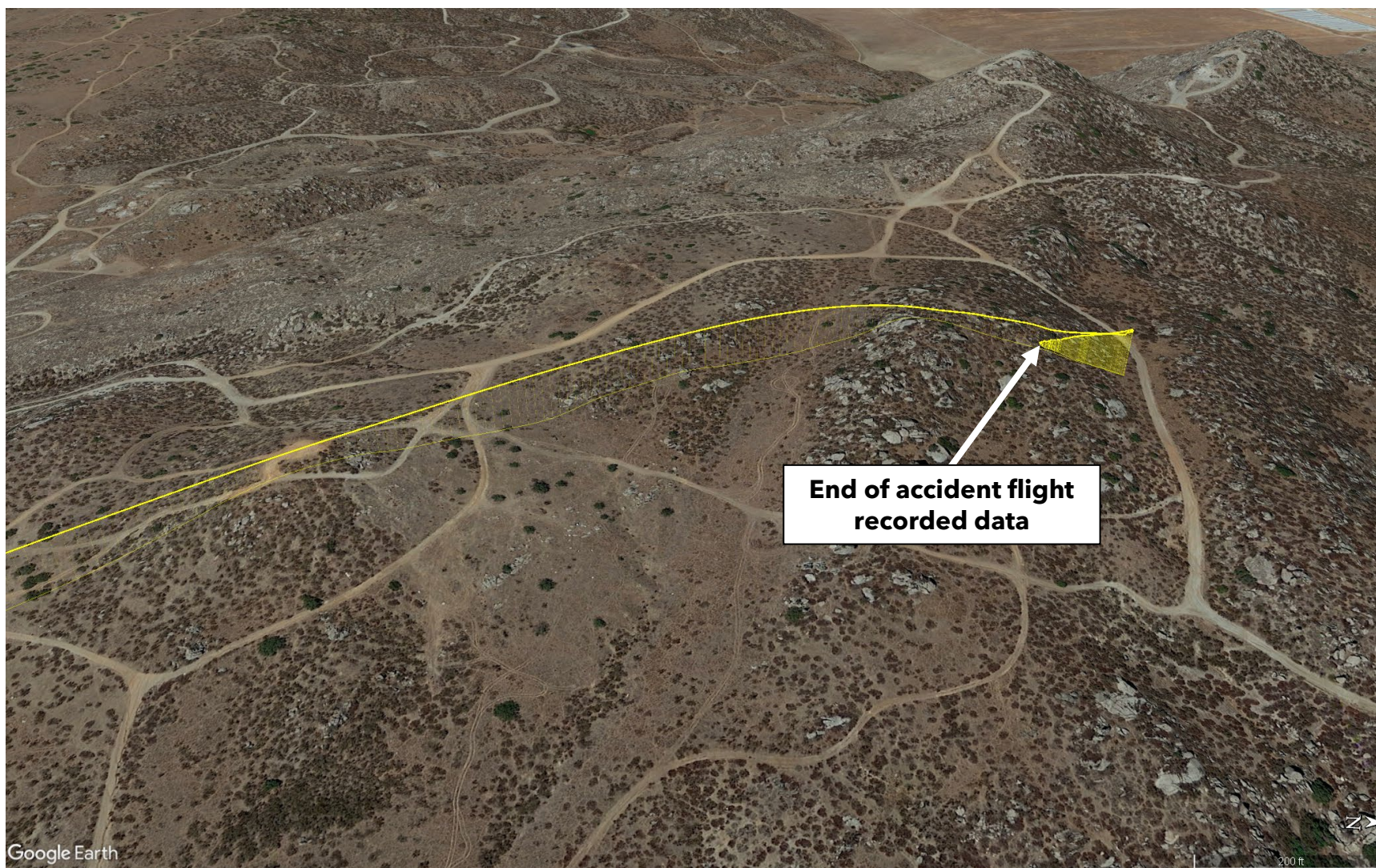


Figure 11. End of accident flight recorded data - side profile view.