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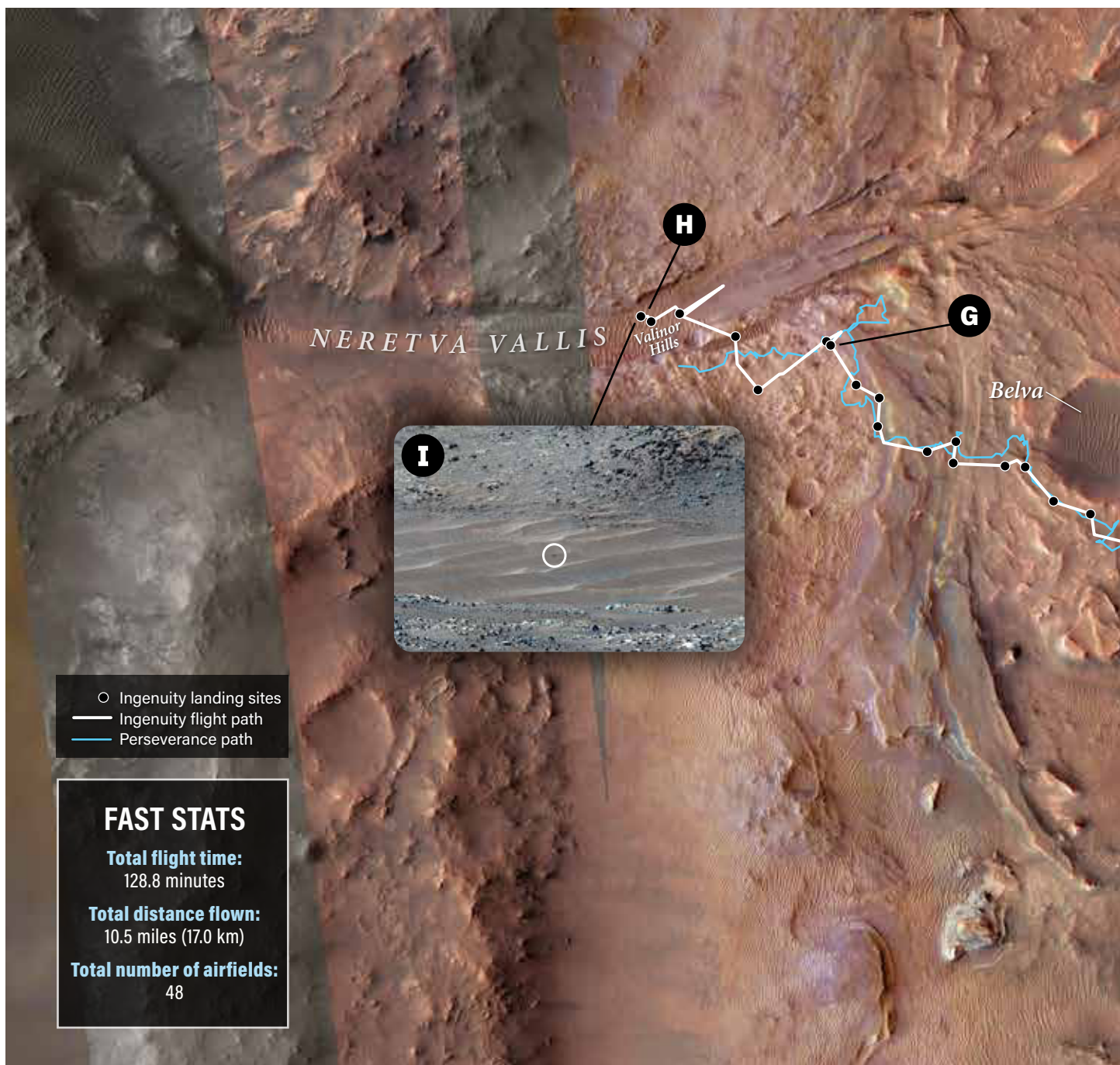
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# INGENUITY'S FLIGHT LOG

» When NASA's Perseverance rover landed in Mars' Jezero Crater on Feb. 18, 2021, it carried a small companion: the helicopter drone Ingenuity. The twin-rotor craft was originally conceived as a technology demonstration with the goal of making a

handful of flights to show that powered flight in Mars' thin air was possible.

Ingenuity passed this test with flying colors — and then kept flying, surviving the harsh martian winter. It became a key part of Perseverance's mission, acting as an aerial scout for the rover as it



\* Some landing sites for flights that returned to nearly the same location have been removed for legibility.



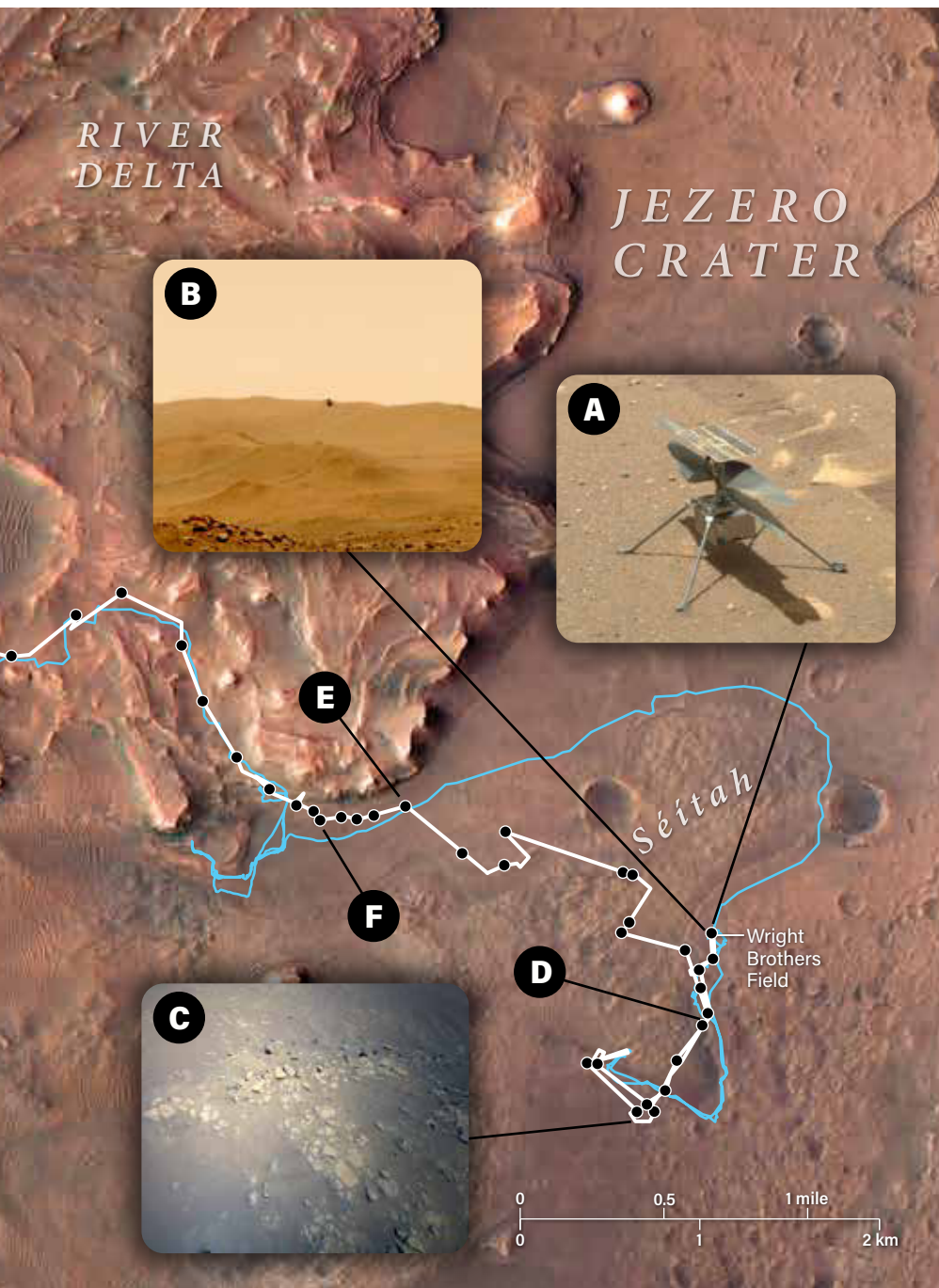
## MISSION MILESTONES

traversed dunes and explored an ancient river delta, looking for samples to cache.

NASA announced Jan. 25 that Ingenuity was being retired due to a damaged rotor. But its performance and longevity were impressive enough to convince the agency to rework its plans for its Mars Sample

Return mission, which will send a rover to return Perseverance's cached samples to Earth. The new plans also call for a pair of drones that will carry on Ingenuity's legacy with the capability to buzz around Jezero Crater and retrieve the samples.

—M.Z.



INSET I: NASA/JPL-CALTECH/ASU/MSSS; ALL OTHER IMAGES: NASA/JPL-CALTECH

### A. FLIGHT 1

April 19, 2021

Ingenuity successfully takes off, reaching an altitude of 33 feet (10 m) and hovering for 30 seconds.

### B. FLIGHT 5

May 7, 2021

Ingenuity completes its tech demo phase and departs its first airfield, dubbed Wright Brothers Field, heading south to begin exploring Jezero Crater.

### C. FLIGHT 10

July 24, 2021

Ingenuity makes its first official scouting flight, taking aerial images of surface fractures and ridges on the crater floor.

### D. FLIGHT 19

scheduled Jan. 5, 2022;  
departed Feb. 7, 2022

An unexpected dust storm causes the first-ever weather delay to a flight on another planet. After wiggling its rotors to shake off settled dust, Ingenuity finally takes off over a month later.

### E. FLIGHT 29

June 11, 2022

A low battery due to approaching winter forces a change to operations, with Ingenuity hibernating during martian nights to conserve power.

### F. FLIGHT 34

Nov. 23, 2022

Ingenuity gets a navigation software update with better terrain awareness, enabling it to scout ahead of Perseverance as it climbs through a canyon on its way up the steep slopes of the river delta.

### G. FLIGHTS 61 AND 62

Oct. 5 and 12, 2023

Ingenuity sets new records for maximum altitude (79 feet [24 m]) and ground speed (22.4 mph [36.0 km/h]).

### H. FLIGHT 71

Jan. 6, 2024

Ingenuity cuts short its scheduled flight plan and makes an emergency landing.

### I. FLIGHT 72

Jan. 18, 2024

A flight intended to check Ingenuity's systems is the helicopter's last. Images reveal damage to one of its rotor blades, permanently grounding it. The mission team nicknames the craft's final airfield Valinor Hills after the western realm of the immortals in J.R.R. Tolkien's *The Lord of the Rings*.