Orbital Insight

Orbital Insight Executive White Paper

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Orbital Insight Overview

Orbital Insight is a Palo Alto, California-based geospatial analytics company with U.S. offices in Washington, D.C., and New York. Orbital Insight analyzes satellite, drone, balloon and other unmanned aerial vehicle imagery, as well as cell phone geolocation data, to study a range of human activity to provide strategic insights. Orbital Insight is a privately-held U.S. small business serving both commercial and government clients. © Orbital Insight

The Evacuation of Kabul, Afghanistan
Geospatial Analysis Powered by Artificial Intelligence Informs Analysts What's Happening on the Ground

Between August 14th and August 25th, the U.S. and its allies evacuated over 80,000 people from Kabul through Hamid Karzai International Airport. It was one of the largest airlifts in history. Using Orbital Insight GO, analysts can understand what is happening on the ground in very dynamic environments in near real-time. GO draws from multiple sources of intelligence—from Electro-Optical (E/O) and Synthetic Aperture Radar (SAR) satellites to geolocation data from devices like cell phones, connected cars, and signals transmitted by ships and aircraft—to provide insights powered by big data processing and artificial intelligence.

Timeline of Kabul Evacuation
Aug 13
U.S. Marines arrive in Kabul

Aug 14
Taliban reach outskirts of Kabul

Aug 15
Taliban enters Kabul

Aug 16
Commercial flights cease

Aug 30
Last U.S. troops depart Kabul

August 16 - Airbus Pleiades imagery caught a glimpse of the extraordinary number of people gathered trying to board "Reach 871," a C-17 that transported a record-breaking 640 Afghan refugees (north side of airport).

## Time Series Data with Multiple Satellites

On August 16th, the world watched as hundreds of people at Hamid Karzai International Airport desperately tried to get aboard a C-17A U.S. military aircraft with the call sign "Reach." The aircraft reportedly transported over 600 people out of Kabul, and the parents of a baby girl born on-board named her "Reach" in honor of the plane that carried them all to safety.

Using GO, we were able to witness this incredible event from above. At 10:57 a.m. local time on August 16th, an Airbus Pleiades satellite caught a C-17A on the tarmac, as an enormous crowd—looking like a swarm of ants—veered towards the plane.

Satellite imagery shows operations on the ground not just at that unbelievable moment in time, but on subsequent days as military aircraft, large and small, as well as commercial aircraft and helicopters, come and go from the area to assist with the evacuation effort. GO delivers a time series showing the fluctuation in count and type of aircraft from both Airbus Pleiades and Planet SkySat constellations from day-to-day as

they conduct evacuation operations. Computer vision algorithms use Convolutional Neural Networks (CNNs) to automatically identify the objects at the site.

The project took minutes to create and was delivering insights almost immediately, automatically ingesting and processing data as it became available.
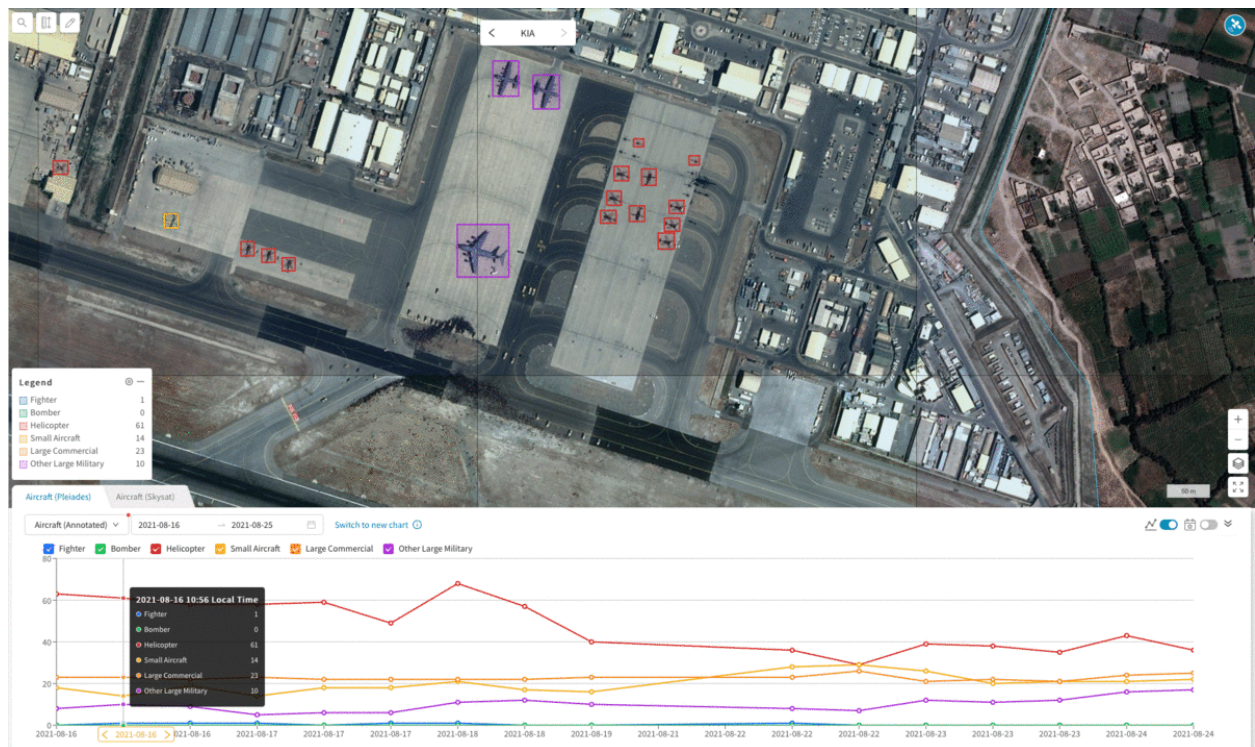
August 23 and 24 - Groups of people (likely civilians preparing to leave) gathered in the Northwest side of the airport on a parking apron, including a nearby arriving military transport aircraft (C-17) on the 23rd.

Foot Traffic in Kabul during Evacuation

In addition to seeing what is happening using multiple sources of satellite imagery, we can use geospatial data to monitor what is happening on the ground on an hourly basis with data from cell phones. Our foot traffic analysis shows count of unique devices at a variety of Areas of Interest throughout Kabul, including at the airport, the U.S. Embassy, U.S. AID, and the larger city as a whole. On August 14th, the embassy is full of activity. By August 17th, the area emptied out entirely, according to analysis of cell phone data.

USAID on August 14th shows lots of activity from cell phone devices.
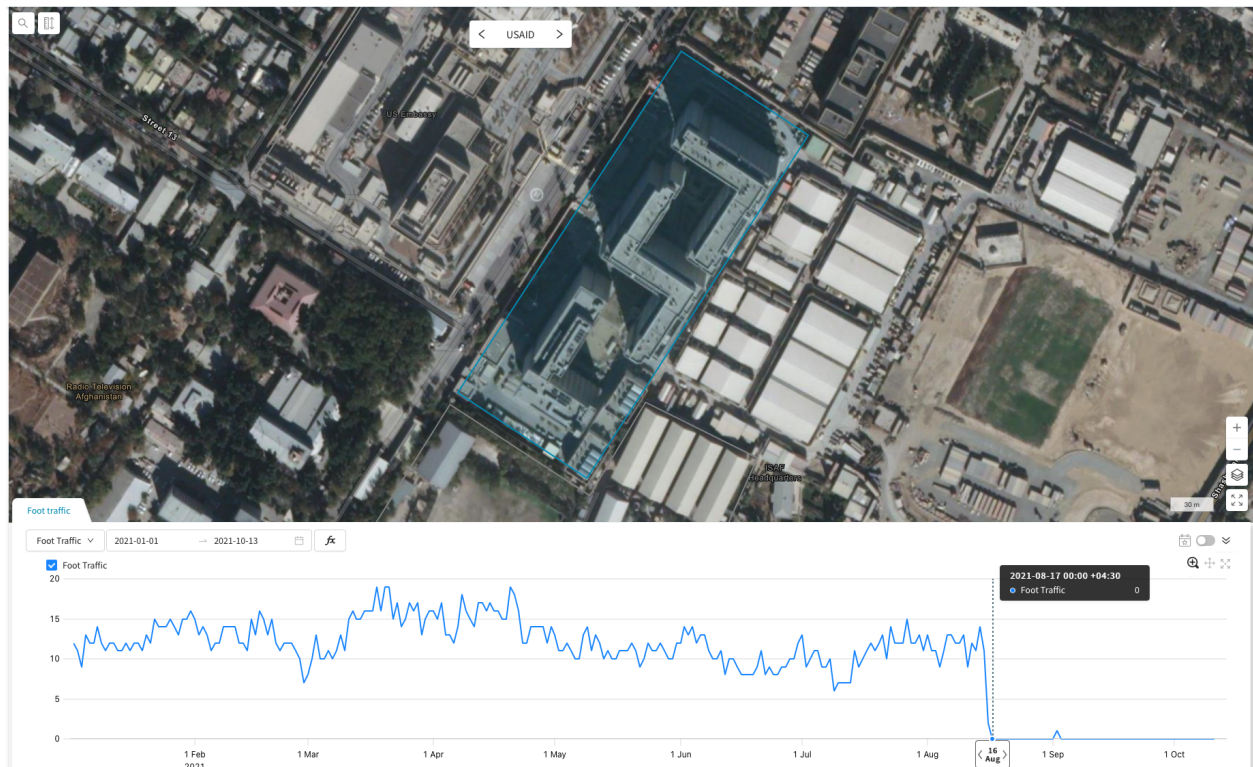
USAID on August 17th shows the facility has completely emptied.

Where did Evacuees from Kabul Go?

With cell phone data Orbital Insight helps analysts understand trends in movement of people by looking at where unique cell phone devices in a given area went later, or where they originated. Analyzing movements from Hamid Karzai International Airport, we can detect a lot of activity locally, indicating there were people making multiple trips to and from the airport either providing security, helping evacuations, working, or trying unsuccessfully to find a spot on a transport aircraft. We can also see where people who passed through the airport traveled from over longer distances, and where they might have been evacuated to.
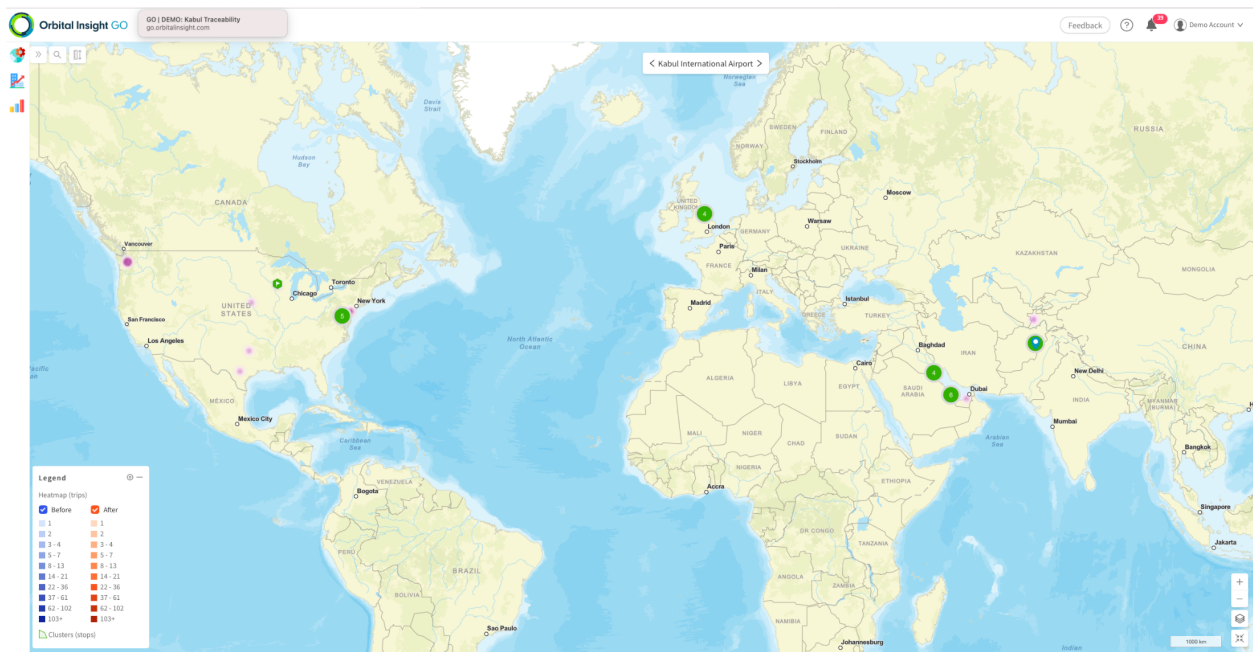
Traceability provides analysis on where cell phone devices originated from and went to from a target Area of Interest. This graphic shows origins and destinations o cell phone devices detected at the airport in Kabul during the evacuation.

Some activity—presumably troops helping with the evacuation—originated from places like Joint Base Charleston, South Carolina, the Duke of Glouscester Barrack in the U.K., and air bases in Kuwait, Qatar, and the UAE. Outbound movements included air bases in Kuwait and Qatar, Dulles International Airport in Virginia, and U.S. cities like Seattle, Dallas, and Atlanta.
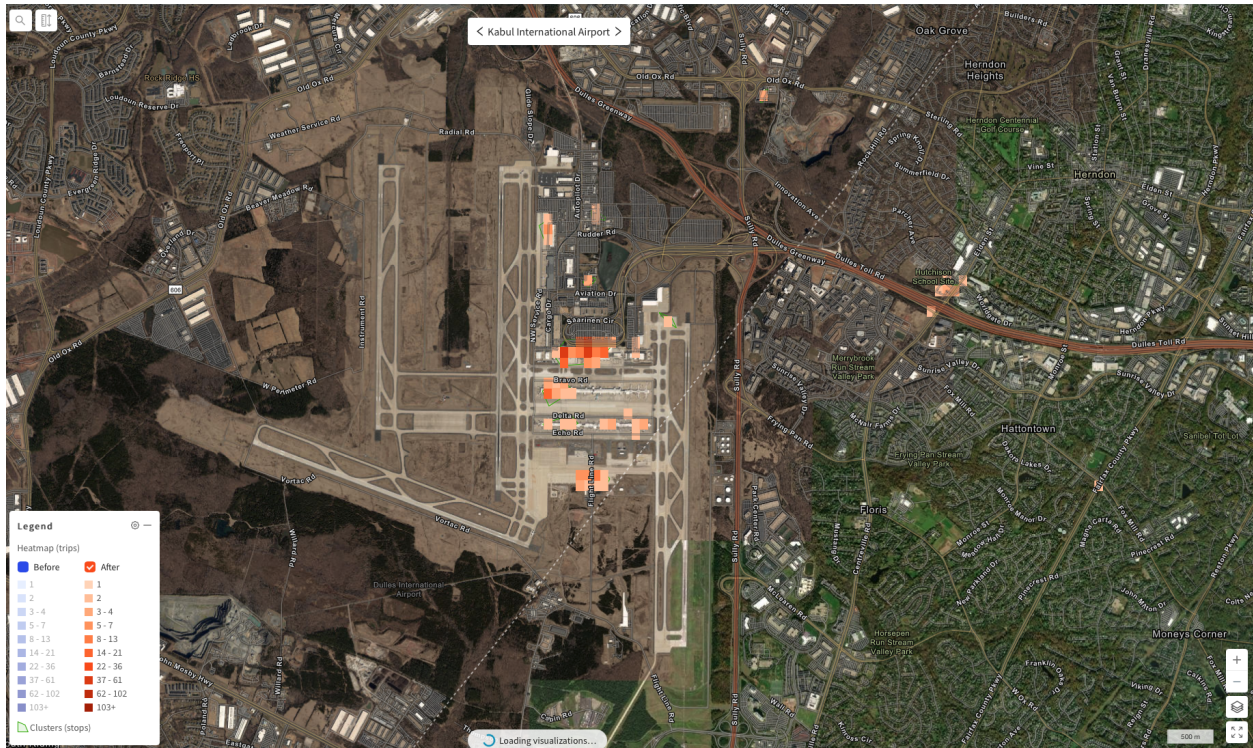
Devices originating at the Kabul Airport were detected at Dulles International Airport in Virginia.

Post-evacuation Orbital Insight's GO analysis tools can be used for continued monitoring of the area, alerting analysts to any potential anomalous changes in what's happening on the ground.