High-Resolution Satellite Imagery and Possible Mass Graves in Sheberghan, Afghanistan

June 26, 2009
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American Association for the Advancement of Science
Science and Human Rights Program
1200 New York Avenue, NW
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Summary

In May of 2009 the Science and Human Rights Program of the American Association for the Advancement of Science (AAAS) undertook a review of satellite imagery acquired of the Sheberghan area in the Jowzjan Province of northern Afghanistan (Figure One). This review was done at the request of Physicians for Human Rights (PHR), who asked AAAS to provide satellite imagery analysis for their investigation of possible mass graves at Dasht-e-Leili, near Sheberghan1. According to PHR, the graves had reportedly been created in 2001. Then, at some point prior to July, 2008, two large pits were dug in the area and the fill taken away. Hoping to clarify the excavation date, PHR requested that AAAS research and acquire available satellite imagery of the area to determine when two of the sizeable pits possibly comprising the graves might have first appeared.

Using coordinates provided by PHR, AAAS located and analyzed multiple images of the site acquired by the QuickBird, Ikonos, TopSat, and SPOT-5 satellites. A QuickBird image from 2004 indicates no pits present (Figure Two). Another QuickBird image from August 5, 2006 indicates one of the pits present, and two possible vehicles atop the site of what develops into the second pit (Figure Three). While it is impossible to positively identify the two vehicles, their dimensions and appearance are consistent with the dimensions of a truck and a hydraulic excavator (Figure Four). A lower resolution TopSat image from January 29, 2007, indicates both pits are present, and a high-resolution image of them was acquired by QuickBird on October 24, 2007 (Figure Five). Results are summarized in Table One, and samples of the imagery are available on Google Earth via this link. A full description of all imagery analyzed in this study is provided below, and note not all images analyzed are reproduced in this report.

1 36.65° latitude, 65.70° longitude
Figure Two: Possible Grave Site, July 2, 2004

This image shows the Dasht-e-Leili site on July 2, 2004, and indicates no open pits visible. Copyright 2009 Digital Globe.
Figure Three: Possible Grave Site, August 5, 2006

This image shows the Dasht-e-Leili site on August 5, 2006, and indicates one open pit visible, with two likely vehicles atop the area which would become the second pit. See Figure Four for close-up of possible vehicles. Copyright 2009 Digital Globe.
Figure Four: Vehicles at Possible Grave Site, August 5, 2006

This image show a close up of the vehicles shown in Figure Three, unannotated in the left hand sample and with dimensions indicated on the right hand sample. The top-most vehicle, a possible truck, has a height estimated at 3.25 meters, based on the extent of the shadow. The bottom vehicle could be a hydraulic excavator, and a survey of hydraulic excavator dimensions indicate track lengths between 3.49 and 5.36 meters, and track widths between 2.59 and 3.22 meters. Copyright 2009 Digital Globe.
Figure Five: Possible Grave Site, October 24, 2007

This image shows the Dasht-e-Leili site on October 24, 2007, with both open pits visible. Copyright 2009 Digital Globe.
Table One: Summary of Imagery Results

<table>
<thead>
<tr>
<th>Image</th>
<th>Satellite</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 2, 2004</td>
<td>QuickBird</td>
<td>No pits visible (Figure Two)</td>
</tr>
<tr>
<td>August 5, 2006</td>
<td>QuickBird</td>
<td>One pit present; possible excavation vehicles visible (Figures Three and Four)</td>
</tr>
<tr>
<td>May 8, 2007</td>
<td>SPOT-5</td>
<td>Two pits visible (lower resolution)</td>
</tr>
<tr>
<td>January 27, 2007</td>
<td>TopSat</td>
<td>Two pits visible (lower resolution)</td>
</tr>
<tr>
<td>October 24, 2007</td>
<td>QuickBird</td>
<td>Two pits visible (Figure Five)</td>
</tr>
</tbody>
</table>

About the Imagery

Since 2000, high-resolution commercial satellite operators have acquired imagery, largely for areas where customers request images. Once imagery is acquired from a satellite, it is then added to the companies’ archives and generally made available for resale. Based on the information about the location of the purported graves provided by PHR, AAAS searched these archives for available imagery, ultimately utilizing several sources.

One source was the Ikonos satellite, operated by the GeoEye company. Ikonos has a multispectral sensor with one meter panchromatic resolution and has been in operation since 1999. Ikonos provided an image of the site dated May 12, 2000. Another satellite utilized was QuickBird, operated by DigitalGlobe, which has 60 centimeter panchromatic resolution. QuickBird became operational in 2002 and provided the bulk of the images used in this project, acquired on July 2, 2004, August 5, 2006, and October 24, 2007.

Finally, two lower resolution satellites also contributed imagery to this analysis. Specifically, the British research satellite TopSat, with two meter resolution, provided an image from January 27, 2007. In addition, the French SPOT-5 satellite, operated by Spot Image, provided an image with 2.5 meter resolution, acquired on May 8, 2007. Though the SPOT and TopSat images are of lower resolution and barely indicate the presence of the pits, they did provide confirmation of their existence at that time and led to acquisition of further imagery.