High-Resolution Satellite Imagery Assessment of Osh, Kyrgyzstan

Summary Report
25 June 2010

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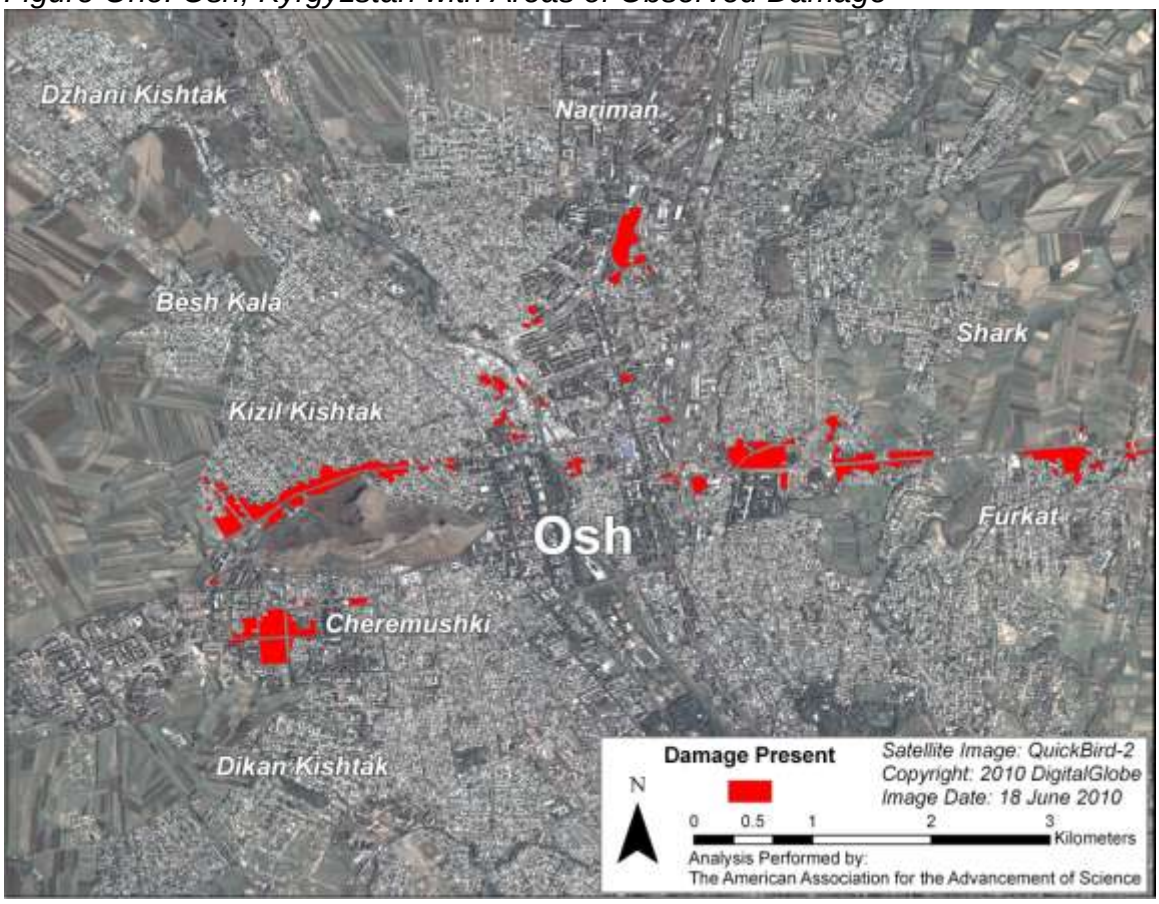
Executive Summary

The American Association for the Advancement of Science (AAAS) conducted a damage assessment of the city of Osh, Kyrgyzstan and surrounding neighborhood areas at the request of Amnesty International, USA (AI) in order to corroborate on the ground and news media reports of widespread burning, violence, and corresponding movements in the population. This report documents the areas of observed damage based on a satellite image collected on 18 June 2010 by DigitalGlobe's QuickBird-2 satellite. The study area encompassed the entire city of Osh, along with its suburbs from Furkat in the east to Kizil Kishtak in the west, and from the Uzbek border in the north to Dzhani Kishtak in the south (Figure One).

Figure One: Osh, Kyrgyzstan with Areas of Observed Damage



Introduction

AAAS staff began a review of satellite imagery for the Osh region after receiving reports of the conflict that began in the region around 10 June 2010. Specifically, AI was calling for the Kyrgyzstani interim government to protect its population and ethnic minorities in particular. AI reported the fleeing of thousands of people from clashes which erupted in the region. The deadly violence is said to have started with clashes between rival gangs of mostly Kyrgyz and Uzbek youths on 10 June and rapidly escalated into large-scale arson, looting and violent attacks,

including killings, on mainly Uzbek-populated districts in Osh and later in the city of Jalal-Abad and surrounding towns and villages.

Methods and Technologies

Satellite image analysis was conducted by AAAS and undertaken at the request of Amnesty International (AI) in order to document reported widespread burning in areas of Osh, Kyrgyzstan. Unfortunately, poor weather conditions in the area prevented the collection of a high-resolution image until 18 June. This image was tasked by a group other than AAAS, but AAAS purchased the image after it was made available in the DigitalGlobe[1] imagery archives. The other imagery source was Google Earth's base map imagery. The relevant details for each image source can be found in Table One. AAAS employed the software packages ERDAS Imagine and ArcView for processing satellite imagery and creating geo-referenced damage assessments.

Table One: Imagery Information

Satellite/Source	Image Date	Acquisition Time
QuickBird-2	18 June 2010	06:02:26
Google Earth (Quickbird)	15 March 2007	unknown

Results

While most of the city appears largely intact, where damage is present, it appears to be severe. Large swaths of buildings in the city appear to have been destroyed (Figures Two and Three). The discontinuous distribution of the destruction largely appears to follow the major east-west road in the city (Figure One), but is also found in the northern and eastern suburbs.

[1] http://www.digitalglobe.com

Figure 2A: 15 March 2007

Image © 2010 DigitalGlobe © 2010 Google

Figure 2B: 18 June 2010

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Entire neighborhoods appear to have been destroyed; their empty shells contrast sharply with the few undamaged buildings remaining in this area. The "before" image (top) is from 15 March 2007 and the "after" image date is 18 June 2010. The 18 June image illustrates a subset of damage to the Cheremushki neighborhood, to the west of Osh. Coordinates: 40.522525, 72.776595

Figure 3A: 15 March 2007

Image © 2010 DigitalGlobe © 2010 Google

Figure 3B: 18 June 2010

© 2010 DigitalGlobe

Figure Three: Subset of Furkat neighborhood, located east of central Osh, which sustained heavy damage. Coordinates: 40.536, 72.813

A damage assessment was conducted of the destroyed areas shown in Figure One. The results for the entire study area and for individual neighborhoods are included in Table Two. It is important to note that these are damage estimates, not exact counts, as it is difficult to count structures in such a dense urban area with a high level of confidence. Damage within the study area was concentrated in five main areas, listed in Table Two. These areas cover approximately 0.66km² and have a total damage count of 1640 structures.

Table Two: Damage Assessment

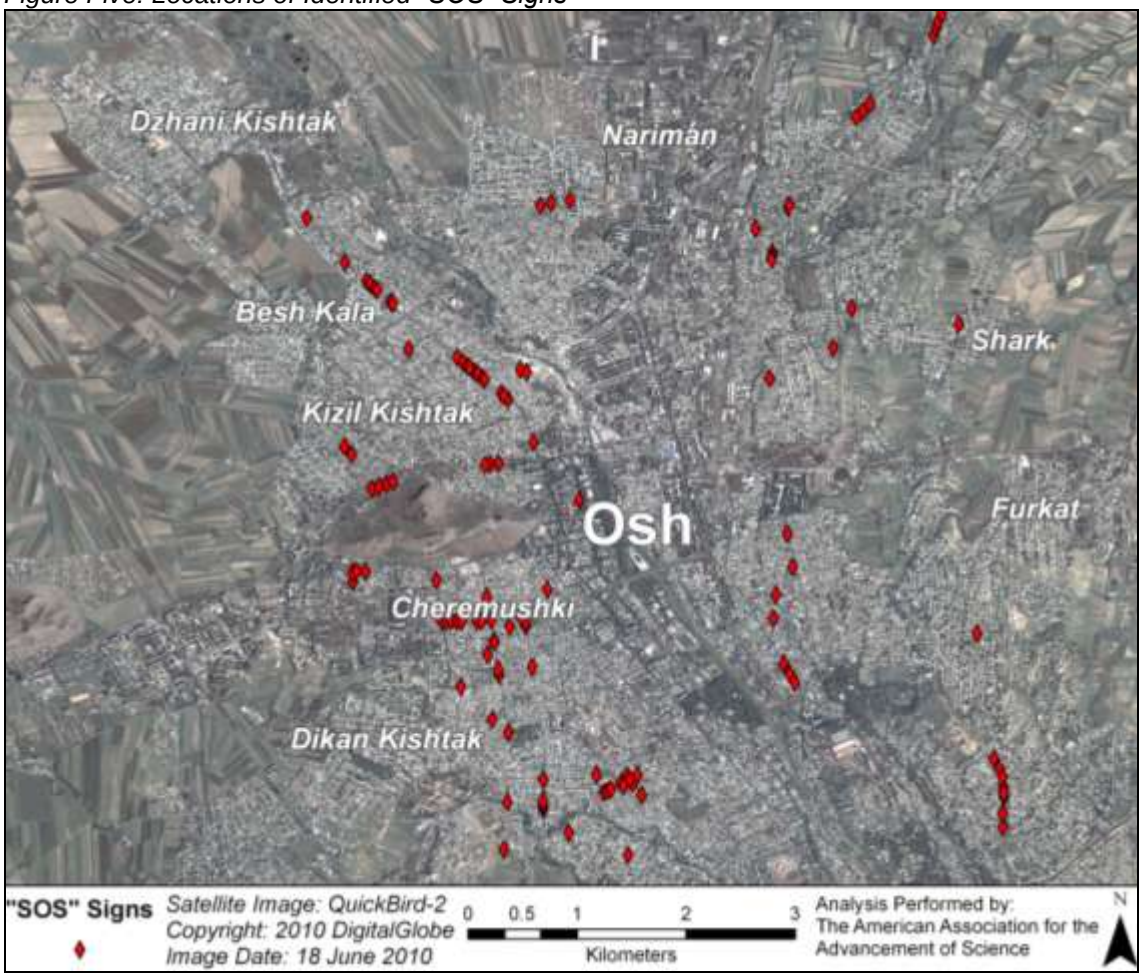
Location	Damage Estimate
Total Area of Damage	0.66km²
Damaged/Destroyed Structures	1640
Cheremushki	297
Furkat	172
Kizil Kishtak	448
Nariman	172
Osh	551

In addition, on numerous occasions the letters “SOS” appear on roadways and athletic fields throughout the city (Figure Four). The sizes of these messages are at times quite large, and their shape and orientation shows little regard for the viewing angle or perspective of ground-based observers; it is likely that many of them would be difficult to read, except from above. The total count of “SOS” messages within the study area is 116 (Figure Five), the majority of which appear in intact neighborhood areas.

Figure Four: "SOS" Signs in Osh

Several of the 116 identified "SOS" messages appear throughout the city, many painted on roads. These particular examples are painted across two lanes of roadway. Coordinates: 40.523, 72.788

Figure Five: Locations of Identified "SOS" Signs



The distribution of "SOS" signs within the study region. A total of 116 were identified.

Discussion

Consistent with on-the-ground reporting, the city of Osh and surrounding neighborhoods appear to have been substantially damaged by widespread violence that completely destroyed some neighborhoods while leaving other, adjacent ones, undamaged. The presence of many "SOS" messages painted on horizontal surfaces throughout the city, in many different sizes and orientations seems indicative of a population that is looking for outside intervention. Despite reports of large numbers of internally displaced persons (IDP) massing near the Uzbek border no evidence of this was immediately visible; it is possible that groups of refugees are located beyond the bounds of the study area.