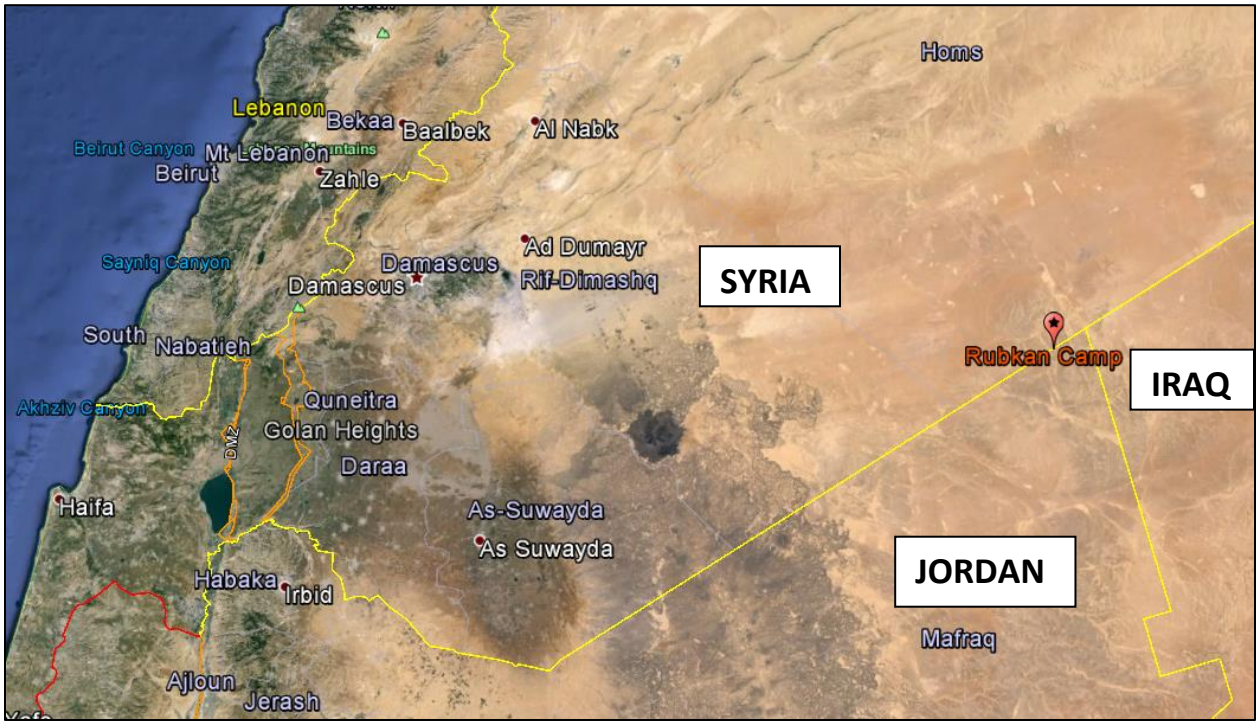
Rubkan – Trapped on the Edge of Nowhere

Introduction

The Syrian civil war has resulted in the largest refugee crisis since WWII. An estimated 5 million Syrian residents (documented and undocumented) have left the country, while another 4-5 million residents have been internally displaced (IDPs – internally displaced persons). Displaced Syrian citizens now total more than 50% of country's population at the time civil unrest began in 2011. While some refugees have found housing in urban areas in Lebanon, Jordan, Iraq and Egypt, many refugees are forced to live outside Syria's borders in camps or at ad-hoc settlements near the border with neighboring countries. One such location is Rubkan, an isolated settlement on the southeastern Syrian border with Jordan, not far from Iraq.



Imagery provided by Google Earth 2016

Regional location of the Rubkan settlement

Case Study Purpose

This case study focuses on the problem of identifying the characteristics of dispersed refugee settlements for which there is limited documentation. The Rubkan settlement was the result of Syrians fleeing their country's conflict and attempting to cross into Jordan at a remote location. However, they were prohibited crossing the border. Instead, an ad-hoc settlement developed on the Syrian side of the border. UNITAR first reported on the settlement from the summer of 2014 to the fall of that year[1]. This case study examines Rubkan from imagery acquired by the PLEIADES satellite in November of 2014 and in April of 2015[2] for the purpose of determining the feasibility of using high resolution remote imagery to estimate the habitation numbers, size and occupancy pattern in a remote refugee settlement. Subsequent to the acquisition of the imagery from AirBus Defence & Space for this research in early November 2015 and undertaking the analysis presented here, reports were published in late November and mid-December 2015 that the

[1] UNITAR/UNOSAT- July 31, 2014 (http://www.unitar.org/unosat/node/44/2040) and November 3, 2014
[2] November 2, 2014 and April 21, 2015 - Imagery provided by ©CNES 2014 & 2015, Distribution Airbus DS

Rubkan settlement had expanded to 12,000 inhabitants[3]. This is a dramatic increase from the initial imagery from November 2014 reported here which suggests a substantially smaller population!

The most basic question the analysis of the imagery seeks to answer is whether the number of inhabitants at Rubkan increased or decreased between the late fall of 2014 and the spring of 2015. During the month of January 2015 a major snowstorm and atypical cold weather affected the entire region. These conditions alone would adversely affect the size and sustainability of any population living in temporary shelters. The analysis also sought to determine if the type of structures occupied by the inhabitants could be consistently determined from the imagery. Analysis of any pattern of internal settlement was also attempted for the imagery.

Rubkan represents a 'worst case' situation. Hundreds of thousands of Syrians have fled the urban centers in the western portions of the country in the hope of crossing into Jordan in the eastern desert. However, Jordan is no longer accepting Syrian refugees and has closed its borders. The remote Rubkan crossing may have attracted fleeing refugees because its remoteness offered some measure of safety and the possibility that crossing into Jordan would be easier than at more western locations. Jordan has constructed a physical barrier or 'berm' along its border and controls border access at specific locations. Currently, monitoring organizations report that Syrians crossing into Jordan are detained and then deported back to Syria.

The nearest desert road is approximately two kilometers northwest of Rubkan. The distance to Syrian Route 2, the nearest paved highway, is at least 25 kilometers.

Methodology & Analysis

After comparing the both images of the Rubkan settlement, a visual analysis evaluating the occupation areas suggested that the most common unit of analysis would be a 'habitation site' – a location at which the imagery suggests a single structure or cluster of structures are associated with adjacent land use indicated by terrain patterns of soils disturbance. In some instances, a number of structures were clustered together, in which case they were individually counted. Adjacent terrain disturbance is typically represented by rings or lighter colored soils. Sufficient detail did not exist within each image or between the two images to permit a consistent (i.e. reliable) and identification of structure types – i.e. a canvas tent versus a metal structure. Where structures were clustered together, each structure was assigned a single symbol. The symbols assigned to each structure were produced by creating a separate feature class created for each image using ArcGIS 10.3. A green square was assigned to each 'habitation site' in the November 2014 image and a yellow square in the April 2015 image. The total count of habitation sites for the separate images is the measure used to indicate a comparative level of occupation at the separate time periods.

Image: November 2014

The image for November 2014 indicates a mix of tents and metal structures. Due to the angle of sunlight, it is possible that some metal structures may appear only as dark rectangles, thereby preventing visual differentiation between the two types of construction materials. A total of 145 habitation sites could be counted in the November 2014 image. The settled area is divided into two clusters, the larger one to the southwest and a smaller one to the northeast. An unoccupied area separates the two clusters and appears to contain previously occupied sites that were abandoned. Reflected surfaces indicate that several structures with metal roofs existed in both clusters in November 2014.

[3] *12,000 Syrian Refugees Are Stranded in a Desert Purgatory Because Jordan Won't Admit Them*, Samuel Oxford, December 8, 2015 https://news.vice.com/article/12000-syrian-refugees-are-stranded-in-a-desert-purgatory-because-jordan-wont-admit-them– accessed 1/12/2015– accessed 1/12/2015

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A large earthen 'berm' demarcates the Syrian-Jordanian border. A least one structure, two water towers (Nov 2014) and a surface water storage area were located on the Jordanian side of the berm.

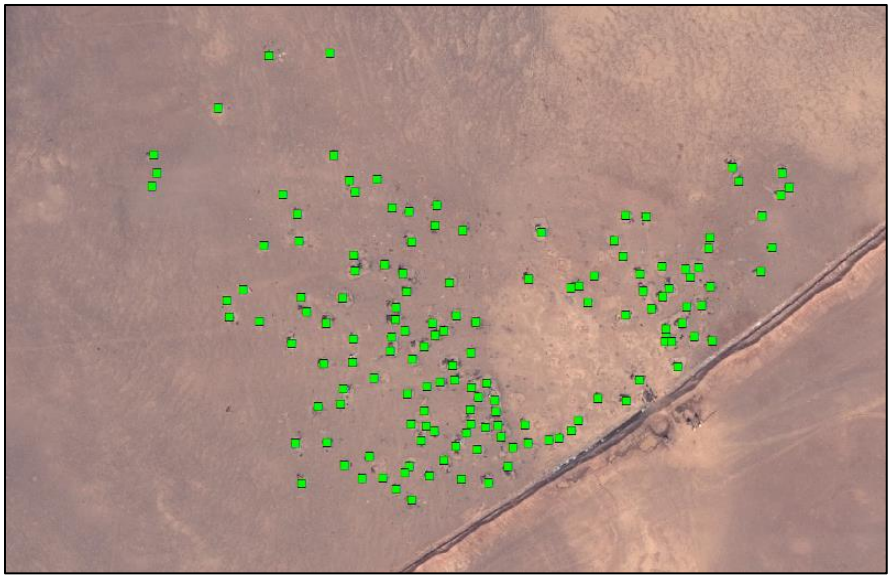

Figure 1

Imagery provided by ©CNES 2014, Distribution Airbus DS

Image: April 2015

The April 2015 image indicates a total of 209 habitation sites distributed in the same two clusters. The western cluster has substantially expanded the area of the settlement to the north. These new sites appear to parallel the one desert road which enters the site from the north. Habitation sites in the eastern cluster near the Jordanian outpost appear to have been abandoned, with new settlement sites constructed to the north and east. Metal structures appear to have been maintained, with a newer northern portion of the western cluster containing a higher proportion of metal buildings than the rest of the settlement.

On the Jordanian side, a single, elevated water tower appears to have replaced the two previous structures.

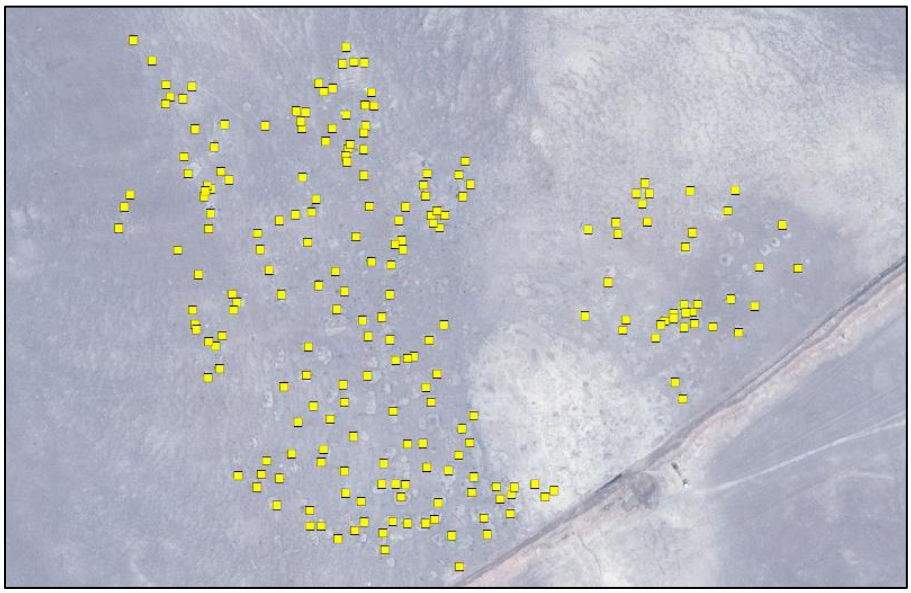

Figure 2

Imagery provided by ©CNES 2015, Distribution Airbus DS

Settlement Comparison of November 2014 versus April 2015

The image below presents the habitation sites of the two images and illustrates the change of the settlement pattern. The expansion of settlement in the western cluster is particularly apparent. The eastern cluster has abandoned settlement sites nearer the Jordanian outpost in favor of newer sites to the northeast.

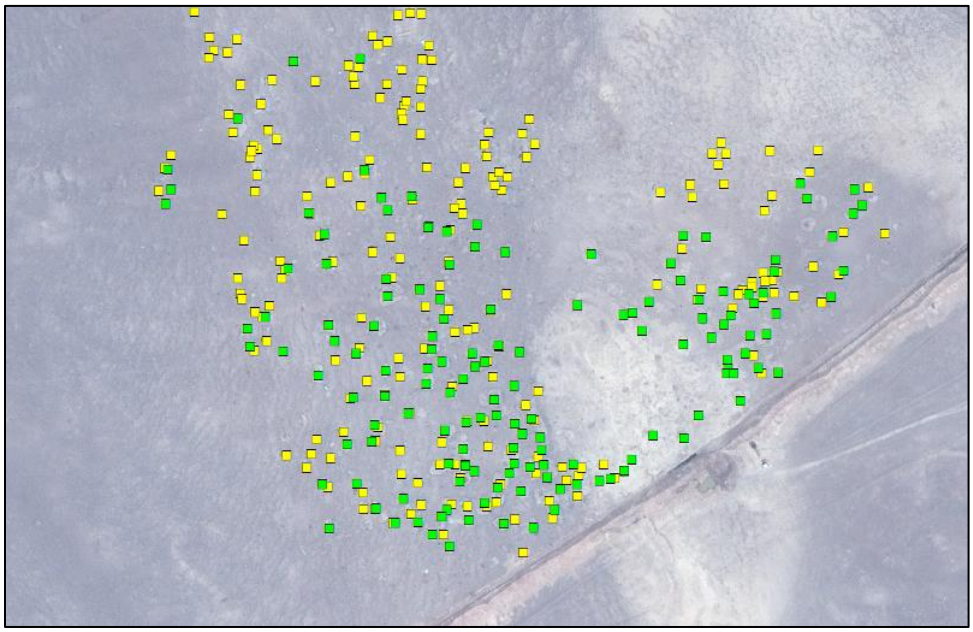

Figure 3

Imagery provided by ©CNES 2015, Distribution Airbus DS

Conclusions: During the winter months from November 2014 to April 2015, the number of habitation sites increased approximately 45%. The western cluster saw the greatest expansion and addition of metal structures. Specific population estimates are not possible without ground verification[4], but, clearly, the population likely increased.

The recent news reports from November and December 2015[5], along with partial aerial imagery published in the December online report of the VICE news service, suggests that during the summer and fall of 2015 the total population increased exponentially to an estimated 12,000 individuals.

Recommendations

1 - In order to improve the accuracy of interpreting the imagery, a reference catalog of images should be created that contain both on-the-ground photos and aerial images of individual structures. A reference image catalog will allow analysts to accurately identify the various buildings and features of refugee settlements. The structures in refugee settlements represent a limited number of materials which could be reliably interpreted with the aid of site-specific analytical aids. The designed or intended capacity of separate structure types would provide a minimal benchmark for the number of occupants.

[4] The occupancy of tents could vary significantly. The metal structures could be for sanitary facilities, food preparation or medical treatment.

[5] See *Closed Borders and Live Ammunition: How Syria's Neighbors Are Starting to Treat Refugees* http://muftah.org/closed-borders-live-ammunition-syrias-neighbors-starting-treat-refugees/#.VpFItl7t22l June 3, 2015 and *Jordan: Syrians Blocked, Stranded in Desert* https://www.hrw.org/news/2015/06/03/jordan-syrians-blocked-stranded-desert Erin Kilbride November 22nd, 2014 – accessed 1/12/2015

2 - Imagery of Rubkan from December 2015 should be analyzed to evaluate how the settlement has expanded. The development of ad-hoc settlements and the ways in which habitation sites are distributed could provide valuable guidance as to how to manage and support remote settlements, to the extent feasible.

[i] See Endnotes for general information on the Jordanian border situation.

End Notes

Jordanians Restrict Border Crossings, Leaving Hundreds of Stranded Syrian Refugees in Remote Desert Areas. a Human Rights Watch Report Al-Jazeerah, CCUN, June 8, 2015
http://www.ccun.org/Opinion%20Editorials/2015/June/8%20o/Jordanians%20Restrict%20Border%20Crossings,%20Leaving%20Hundreds%20of%20Stranded%20Syrian%20Refugees%20in%20Remote%20Desert%20Areas,%20a%20Human%20Rights%20Watch%20Report.htm – accessed 1/14/2015