

Special Report

Corroboration of Widespread Body Disposal and Significant Increase in Gravesite Activity from RSF Attacks in El-Gezira

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Yale SCHOOL OF PUBLIC HEALTH
Humanitarian Research Lab

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I. Key Findings

The Yale School of Public Health's Humanitarian Research Lab (HRL) identifies significant expansion of grave sites in Al-Sariha, Rufaa, and Abu Jalfa, El-Gezira state, between 29 September and 31 October 2024, as well as evidence consistent with body disposal in Tamboul during the same period. This corroborates reports that Rapid Support Forces (RSF) allegedly committed widespread mass atrocities against civilians and their communities across El-Gezira state. Yale HRL corroborates looting and damage to markets and medical facilities in Tamboul and Al-Shorfa, as well as thermal scarring in agricultural fields near Azraq consistent with arson. Yale HRL also corroborates activity consistent with significant increase in internally displaced persons (IDPs) from Gezira between 8 September and 28 October 2024 in Al Fao, Gedaref state.

The mortality and damage verified through imagery analysis likely underrepresent events on the ground. Reports by international organizations, local news media and aid groups, and on social media corroborate that RSF allegedly conducted widespread and systematic attacks on civilians including mass targeted extrajudicial killings, detainment and torture of men and boys, conflict-related sexual violence (CRSV) against women and girls, and looting and destruction of property, health facilities, and agriculture. The United Nations confirmed at least 124 deaths in attacks on over 30 villages, while local media report that the RSF has killed at least hundreds of people in attacks on at least six cities and over 50 villages in the area.¹ The exact number of fatalities is unknown and cannot be determined based on remote sensing alone.

Rufaa

Analysis of satellite imagery of two cemeteries in Rufaa show a rapid increase in earth disturbances consistent with burial mounds compared to archival imagery. The first cemetery shows an increase of approximately 80 mounds between 5 July and 31 October 2024; the second cemetery's total area increased from approximately 660 m² to approximately 1,000 m² (52% increase) between 29 September and 31 October 2024. Local news organizations and social media accounts reported that between 20-22 October 2024, the RSF killed at least 12 people, sexually assaulted multiple women, forced residents to leave their homes, demanded ransoms for residents, and looted houses and the city market.²

Tamboul

Analysis of satellite imagery collected between 29 September and 31 October 2024 shows newly visible light-colored reflective bundles or objects approximately 2.0m long and 1m wide at the police station and two other locations in Tamboul. are consistent with visual indicators often seen during body disposal; local media reported that the RSF prevented citizens from burying bodies in the hospital neighborhood.³ The 31 October image also shows two excavators and a possible security checkpoint in central Tamboul. Imagery from the same period shows conflict-related damage from shelling to the market area in Tamboul, as well as the removal of all solar panels and debris consistent with possible looting at the Al Tayeb Qurashi Medical Complex. After

recapturing Tamboul on 22 October 2024, RSF reportedly tortured and killed dozens of unarmed civilians in the city and conducted widespread looting of markets and medical facilities.⁴ Local news outlets and videos circulating on social media depict mass displacement on foot in agricultural areas reportedly near Tamboul, and hundreds of residents reportedly remain missing.⁵

Al-Sariha

Satellite imagery analysis of an area next to a cemetery in Al-Sariha shows 17 newly identified mounds of disturbed earth along with several light-colored reflective objects consistent with visual indicators of ongoing burial between 28 May and 30 October 2024. Located 30 and 65 meters from the cemetery, respectively, an excavator and newly present excavated hole measuring 7 meters in diameter are also visible in the 30 October image. These findings are consistent with reports of a 25 October 2024 RSF attack on Al-Sariha which killed at least 124 people and wounded 200 others.⁶ Videos from the attack depict RSF shooting at unarmed civilians with heavy artillery and small arms as well as mass detainment, torture, and humiliation of male residents.⁷ A widely circulated video from 26 October 2024 in Al-Sariha depicts dozens of shrouded bodies; corpses were reportedly discovered in the streets and inside homes, as well as in agricultural fields and irrigation canals following the attack.⁸

According to the Strategic Initiative for Women in the Horn of Africa (SIHA), RSF's reported torture and rape of women and girls in Al-Sariha prompted at least two women to commit suicide, and rumors have circulated over social media that over 130 women in a single village in Gezira committed suicide to avoid sexual violence by the RSF.⁹ Yale HRL cannot confirm these reports through remote sensing analysis, but the UN has reported more than 27 cases of sexual violence across Gezira state.¹⁰

Azraq

Analysis of satellite imagery collected over Azraq shows thermal scarring due to the burning of agricultural fields between 22 and 27 October as well as between 27 and 28 October 2024. Rapid Support Force reportedly attacked Azraq on 23 and 25 October 2024 and killed at least twelve people, including a child.¹¹ Local media and videos circulated on social media have described RSF burning homes and agricultural fields in their recent attacks on Gezira state, and the United Nations Resident Humanitarian Coordinator (RHC) in Sudan condemned RSF deliberate arson attacks on farms in Gezira state.¹²

Al Shorfa

Analysis of satellite imagery collected between 29 September and 29 October 2024 shows activity consistent with looting and the destruction of stalls in the Al Shorfa market, as well as the removal of all solar panels at the Al Shorfa hospital. Local media reported that RSF attacks on 21 October 2024 resulted in significant looting, destruction, and displacement in Al-Shorfa and other nearby communities.¹³

Abu Jalfa

Analysis of satellite imagery of the cemetery in Abu Jalfa shows an increase of approximately 15 graves between 29 September and 28 October 2024, a rapid increase compared to archival imagery of this grave site. RSF attacks on Abu Jalfa on 26 October 2024 reportedly killed at least one person and displaced others.¹⁴

Al Fao

Analysis of satellite imagery collected between 8 September and 28 October 2024 shows an increase of approximately 163 tents across two locations, as well as a significant increase in light technical-type vehicles and open-bed transport trucks in Al Fao, Gedaref state. These findings are consistent with estimates by the International Organization for Migration (IOM) that between 20-30 October approximately 135,405 people (27,081 households) were displaced from Sharg El-Gezira and Um Al-Quraa localities and primarily sought shelter in Al-Fao and other localities of Gedaref, as well as in Kassala and River Nile states.¹⁵ Joint military units from Sudanese Armed Forces (SAF) and the Joint Forces are also reportedly stationed in the Al Fao area.¹⁶

II. Human Security Analysis

RSF's attacks on communities across Gezira followed the 20 October 2024 defection of RSF Gezira commander Abu Aqla Keikel to SAF and have reportedly targeted members of his ethnic group, the Shukriya.¹⁷ Local media and international organizations such as UN OHCHR have characterized the attacks as at least partially motivated by retaliation against Keikel.¹⁸ RSF has attempted to justify these attacks by claiming that SAF was arming and collaborating with residents of these areas. Although some villagers in Gezira state have reportedly received weapons from SAF, these latest killings do not appear to be the result of armed clashes.¹⁹

These attacks mark a significant and rapid escalation of hostilities in El-Gezira, with severe consequences for civilians. The UN RHC in Sudan compared attacks in Gezira to those in Darfur in 2023, which the United States declared as crimes against humanity and ethnic cleansing.²⁰ Given current information, these acts are consistent with mass atrocities including extrajudicial killing, looting, and destruction of critical civilian infrastructure, including farmland and health facilities. Attacks on at least six health facilities and the deaths of two health workers will cause severe disruptions to healthcare services in the area.²¹ Additionally, FEWS NET has described El-Gezira as one of Sudan's historical agricultural breadbaskets; mass displacement and razing of agricultural areas will exacerbate current extreme levels of food insecurity locally and across Sudan.²² Following these alleged events, there are credible reports, including from the United Nations, of large numbers of unaccompanied minors appearing without adults near where these events took place, which may be consistent with alleged extrajudicial execution of adults.²³

III. Methodology

Yale HRL utilizes data fusion methodologies of open source and remote sensing data analysis. Yale HRL produced this report through the cross-corroboration of open source data, including social media, local news reporting, multimedia, and other reports, and remote sensing data, including satellite imagery and thermal sensor data. Researchers assessed unclassified, public, and commercial data across social media, news reports, and other publicly available sources to identify, chrono- and geolocate, and verify incidents. Analysts assess the credibility and reliability of open source data based on a source's level of detail, past credibility, and the corroboration of other independent sources. Remote sensing and satellite imagery analysis relies on multi-temporal change detection, which involves the comparison of two or more satellite images of the same area captured at different times to detect differences in coloration, visual properties, and presence, absence, or positional change of objects across the images.

Place names were identified using UN P-codes obtained via the United Nations Humanitarian Data Exchange (HDX) and International Organization for Migration (IOM)'s Displacement Tracking Matrix (DTM) Sudan. This baseline was then verified and informed through open source analysis by Yale HRL's analysts with relevant cultural and linguistic skills.

Limitations

There are significant limitations to the data fusion methodology. The information environment in Sudan does not have the breadth of data available in other locations and there is likely a significant reporting bias for those who provide open source reporting. The tools and techniques present significant challenges to assess activities such as extrajudicial detention, conflict-related sexual violence (CRSV), and conflict-related casualties, particularly in environments with limited data. Satellite imagery analysis is limited by available imagery over time and space. Available nadir angles of satellite imagery can produce challenges to assess structural damage, until multiple angles and ground-level photographic and video materials emerge to help inform the analysis. Image resolution level can also limit the analyst's ability to perceive the full extent of damage present.

¹ UN OHCHR, "Sudan: Escalating violence in Al-Jazirah," October 29, 2024, <https://www.ohchr.org/en/press-briefing-notes/2024/10/sudan-escalating-violence-al-jazirah>, archived at <https://archive.ph/GJpmr>; Radio Dabanga, "خوفا من القتل والاعتصاب.. 50 ألف نازح يفرون من الجزيرة إلى شرق السودان" October 28, 2024, <https://www.dabangasudan.org/ar/all-news/article/%D8%AE%D9%88%D9%81%D8%A7-%D9%85%D9%86-%D8%A7%D9%84%D9%82%D8%AA%D9%84-%D9%88%D8%A7%D9%84%D8%A7%D8%BA%D8%AA%D8%B5%D8%A7%D8%A8-50-%D8%A3%D9%84%D9%81-%D9%86%D8%A7%D8%B2%D8%AD-%D9%8A%D9%81%D8%B1%D9%88>, archived at <https://perma.cc/5MCL-W6T3>; Sudan Tribune, "صحيفة: «انتحار نساء تعرضن للتعذيب والاعتصاب من عناصر الدعم السريع بشرق الجزيرة" October 29, 2024, <https://sudantribune.net/article292682/>, archived at <https://perma.cc/JKN4-GH96>;

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² Nafisa Eltahir and Khalid Abdelaziz, “Sudan’s RSF attacks east Gezira villages following defection,” Reuters, October 22, 2024, <https://www.reuters.com/world/africa/sudans-rsf-attacks-east-gezira-villages-following-defection-2024-10-22/>; Hisham Ahmed, “لجان مقاومة رفاة: المليشيا تقوم بعمليات نهب واسعة” Sudafax, October 22, 2024, <https://sudafax.com/452224/%D9%84%D8%AC%D8%A7%D9%86-%D9%85%D9%82%D8%A7%D9%88%D9%85%D8%A9-%D8%B1%D9%81%D8%A7%D8%B9%D8%A9-%D8%BA%D8%A7%D8%BA%D8%AA%D8%B5%D8%A7%D8%A8-50-%D8%A3%D9%84%D9%81-%D9%86%D8%A7%D8%B2%D8%AD-%D9%8A%D9%81%D8%B1%D9%88>

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<https://www.aljazeera.net/politics/2024/10/27/10-%D8%A2%D9%84%D8%A7%D9%81-%D9%86%D8%A7%D8%B2%D8%AD-%D8%A8%D8%B9%D8%AF-%D8%A7%D8%AC%D8%AA%D9%8A%D8%A7%D8%AD-%D8%A7%D9%84%D8%AF%D8%B9%D9%85-%D8%A7%D9%84%D8%B3%D8%B1%D9%8A%D8%B9>, archived at <https://perma.cc/Z8RT-LGXH>

¹⁸ United Nations Human Rights Office of the High Commissioner, “Sudan: Escalating violence in Al-Jazirah”, 29 October 2024, <https://www.ohchr.org/en/press-briefing-notes/2024/10/sudan-escalating-violence-al-jazirah> , archived at <https://archive.ph/GJpmr>

¹⁹ Sudan War Monitor, “Sudan army continues offensive following savage RSF reprisal attacks,” 31 October 2024, <https://sudanwarmonitor.com/p/sudan-army-continues-offensive-following>, archived at <https://perma.cc/3Y9S-4PLM>

²⁰ Reliefweb, “Statement by the UN Resident and Humanitarian Coordinator in Sudan, Clementine Nkweta-Salami, on the attacks in Aj Jazirah State [EN/AR]”, 26 October 2024, <https://reliefweb.int/report/sudan/statement-un-resident-and-humanitarian-coordinator-sudan-clementine-nkweta-salami-attacks-aj-jazirah-state-enar>, archived at <https://perma.cc/7ERH-EYSL>; United States Department of State, “War Crimes, Crimes Against Humanity, and Ethnic Cleansing Determination in Sudan ,” 06 December 2023, <https://www.state.gov/war-crimes-crimes-against-humanity-and-ethnic-cleansing-determination-in-sudan/>, archived at <https://perma.cc/CY3F-JXZ2>

²¹ United Nations Office for the Coordination of Humanitarian Affairs (OCHA), “Sudan: Humanitarian Impact of Armed Violence in Aj Jazirah Flash Update No. 2,” 30 October 2024, <https://reports.unocha.org/en/country/sudan/flash-update/4G5X7WIB8yMRLDR2oQsfXI/>, archived at <https://perma.cc/UYV7-HFQK>

²² FEWS NET, “Sudan Alert September 5, 2024: Famine (IPC Phase 5) continues in part of Al Fasher amid conflict and flooding,” 2024, <https://fews.net/east-africa/sudan/alert/september-2024>, archived at <https://perma.cc/QX9S-E6KE>

²³ UN OCHA, “Sudan: Humanitarian impact of Armed Violence in Aj Jazirah - Flash Update No. 03 (As of 04 November 2024),” ReliefWeb, November 4, 2024, <https://reliefweb.int/report/sudan/sudan-humanitarian-impact-armed-violence-aj-jazirah-flash-update-no-03-04-november-2024,%20archived%20at%20https://perma.cc/7ARA-L52M>

Cemetery (1), Rufaa, Gezira

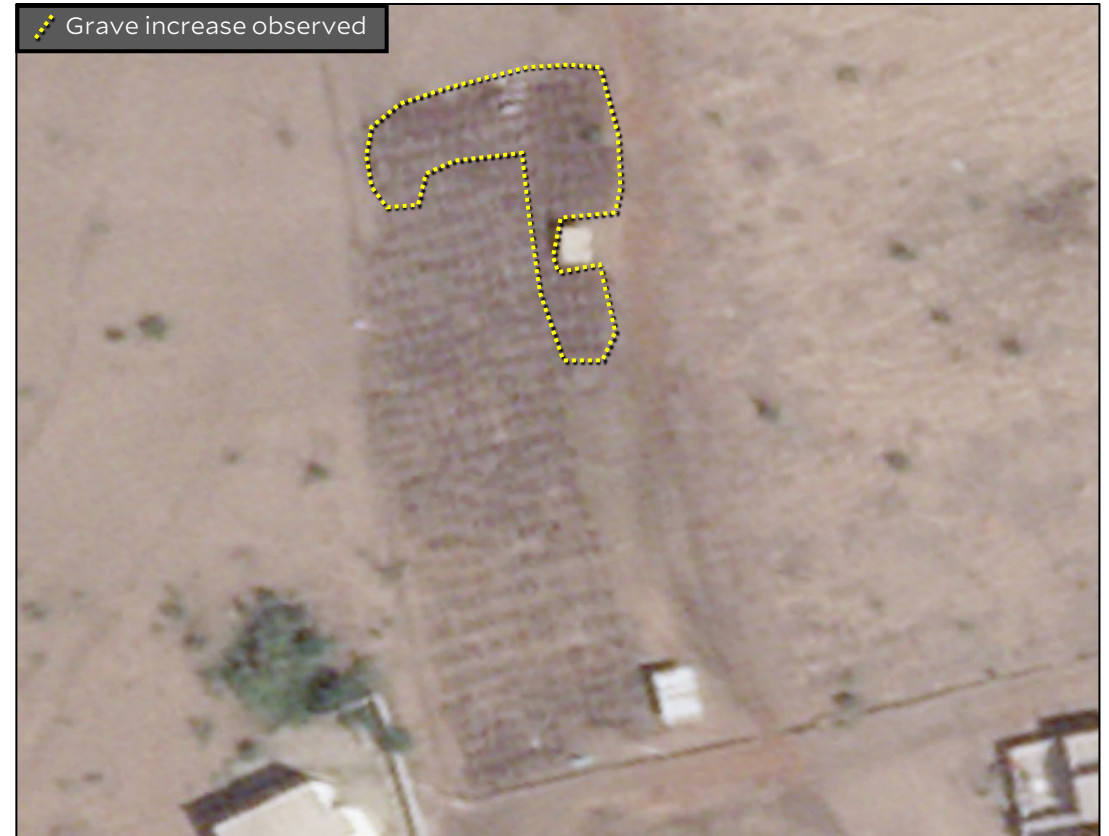
**GRAVE INCREASE OBSERVED
BETWEEN 05 JULY -31 OCTOBER 2024**

Analysis of satellite imagery of a cemetery in Rufaa shows an increase of approximately 80 mounds between 05 July and 31 October 2024.

This is a significantly rapid rate of increase for this timeframe compared to archival imagery of this grave site.



05 July 2024 © 2024 Maxar, USG-Plus



31 October 2024 © 2024 Planet Labs

Cemetery (2), Rufaa, Gezira

GRAVE INCREASE OBSERVED BETWEEN
29 SEPTEMBER-31 OCTOBER 2024

Analysis of satellite imagery of a cemetery in Rufaa shows its area had increased from a total area of approximately 660 m² to approximately 1,000 m², an increase of 52% between 29 September-31 October 2024. Also observed in 31 October imagery are several light color-reflective objects near the grave mounds, likely indicative of ongoing activity relating to excavations or burials.

This growth is a significantly rapid rate of increase for this timeframe compared to archival imagery of this grave site.



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Market, Tamboul, Gezira

CONFLICT-RELATED DAMAGE OBSERVED BETWEEN 29 SEPTEMBER-31 OCTOBER 2024

Analysis of satellite imagery collected between 29 September and 31 October 2024 shows conflict-related damage from shelling to a building in the market area of Tamboul in Gezira.



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Al Tayeb Qurashi Medical Complex, Tamboul, Gezira

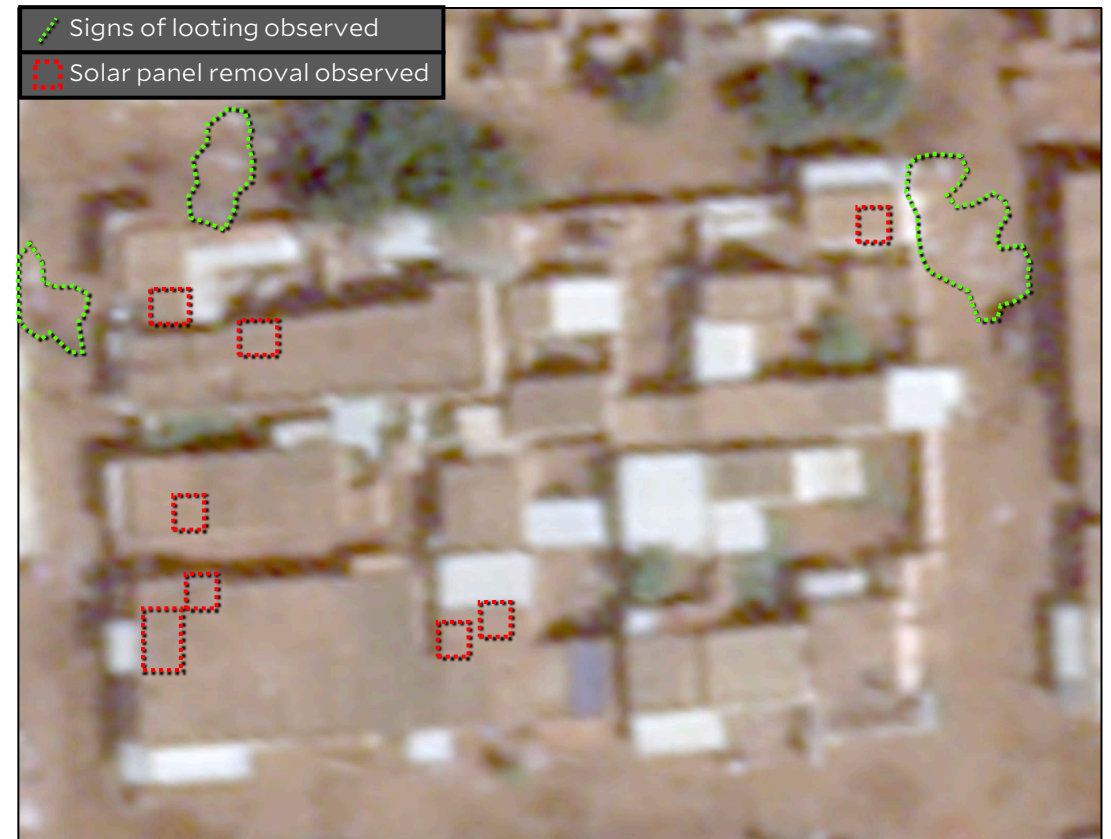
VISUAL SIGNATURES CONSISTENT WITH LOOTING AND SOLAR PANEL REMOVAL OBSERVED BETWEEN 29 SEPTEMBER-31 OCTOBER 2024

Analysis of satellite imagery collected between 29 September and 31 October 2024 shows white reflective objects on the ground consistent with material from possible looting at the Al Tayeb Qurashi Medical Complex in Tamboul, Gezira.

Additionally, the medical complex has been entirely stripped of panels for its solar power system during this timeframe.



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31 October 2024 © 2024 Planet Labs

Police station, Tamboul, Gezira

OBJECTS OBSERVED BETWEEN 29 SEPTEMBER-31 OCTOBER 2024

Analysis of satellite imagery collected between 29 September and 31 October 2024 shows light-colored reflective bundles or objects averaging in size to 2.0m long and 0.9m wide on the grounds of the police station in Tamboul, Gezira.



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Tamboul, Gezira

OBJECTS OBSERVED BETWEEN 29 SEPTEMBER-31 OCTOBER 2024

Analysis of satellite imagery collected between 29 September and 31 October 2024 shows light-colored reflective bundles or objects averaging in size to 2.0m long and 1.0m wide in Tamboul, Gezira.

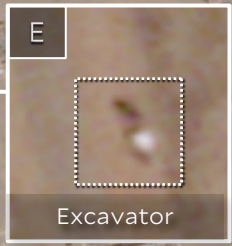
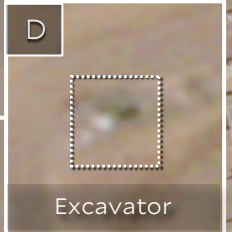
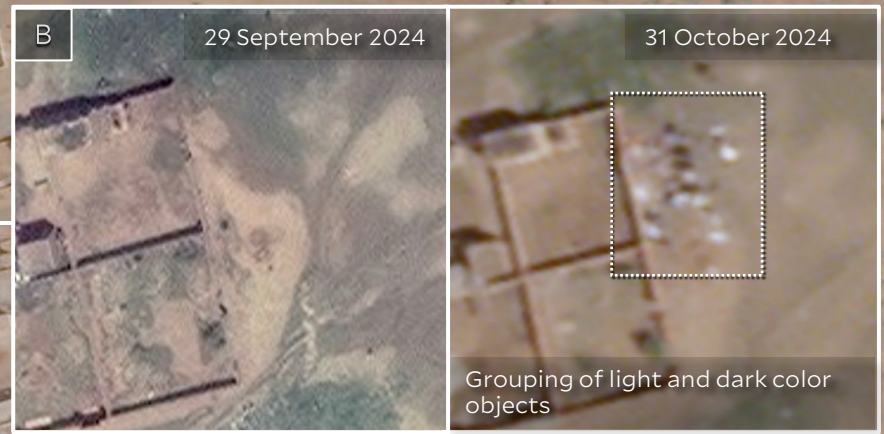


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- [A] Grouping of light color-reflective objects on roadside near vehicles
- [B] Grouping of light color objects and dark color objects in front of compound wall
- [C] Possible vehicle stoppage at security checkpoint
- [D] Excavator on bend in road facing northeast
- [E] Excavator on road facing north



Cemetery, Al-Sariha, Gezira

GRAVE INCREASE OBSERVED BETWEEN
28 MAY- 30 OCTOBER 2024



28 May 2024 © 2024 Maxar, USG-Plus

Analysis of satellite imagery of Al-Sariha shows 17 new mounds appearing next to a cemetery between 28 May and 30 October 2024. Next to the mounds are several light-colored reflective objects, likely indicative of ongoing activity relating to excavations or burials.

Approximately 30 meters southeast an excavator is observed in this area; 65 meters south of the excavator a newly present excavated hole measuring 7 meters in diameter is present.



30 October 2024 © 2024 Planet Labs

Azraq, Gezira

AGRICULTURAL BURNING OBSERVED BETWEEN 22 OCTOBER-28 OCTOBER 2024

Analysis of satellite imagery collected over Azraq village in Gezira shows thermal scarring due to the burning of agricultural fields between 22 and 28 October 2024.

Imagery collected on 28 October 2024 shows new locations of thermal scarring in addition to extensions of thermal scarring to the previously observed patterns on 27 October 2024.



22 October 2024 © 2024 Planet Labs



27 October 2024 © 2024 Planet Labs



28 October 2024 © 2024 Planet Labs

Market, Al Shorfa, Gezira

DAMAGE AND SIGNS OF LOOTING IN MARKET
BETWEEN 29 SEPTEMBER-29 OCTOBER 2024

Analysis of satellite imagery collected between 29 September and 29 October 2024 shows the destruction of stalls in the market of Al Shorfa in Gezira Sate.

White reflective objects on the ground are possible material consistent with reports of looting having occurred in this village.



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29 October 2024 © 2024 Maxar, USG-Plus

Hospital, Al Shorfa, Gezira

REMOVAL OF SOLAR PANELS OBSERVED
BETWEEN 29 SEPTEMBER-29 OCTOBER 2024

Analysis of satellite imagery collected between 29 September and 29 October 2024 shows the removal of the totality of panels of the solar power system at the hospital in Al Shorfa, Gezira.



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29 October 2024 © 2024 Maxar, USG-Plus

Cemetery, Abu Jalfa, Gezira

GRAVE INCREASE OBSERVED BETWEEN
29 SEPTEMBER-27 OCTOBER 2024

Analysis of satellite imagery of the cemetery in Abu Jalfa shows an increase of approximately 15 graves between 29 September and 28 October 2024.

This is a significantly rapid rate of increase for this timeframe compared to archival imagery of this grave site.



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27 October 2024 © 2024 Planet Labs

Al Fao Sports Stadium, Al Fao, Gedaref

INCREASE IN STRUCTURES 08 SEPTEMBER-29 OCTOBER 2024

Analysis of satellite imagery collected between 08 September and 28 October 2024 shows the increase in approximately 148 tents in the Al Fao Sports Stadium.



08 September 2024 © 2024 Maxar, USG-Plus



29 October 2024 © 2024 Maxar, USG-Plus

Al Fao

INCREASE IN STRUCTURES BETWEEN 23 JUNE, 08 SEPTEMBER & 29 OCTOBER 2024

Analysis of satellite imagery collected on 23 June and 08 September shows the new presence of approximately 105 tents in a compound in Al Fao.

Imagery collected between 08 September and 29 October 2024 shows an additional increase of 15 tents at this location.



23 June 2024 © 2024 Maxar, USG Plus



08 September 2024 © 2024 Maxar, USG plus



29 October 2024 © 2024 Maxar, USG plus

Al Fao

INCREASE IN VEHICLES 08 SEPTEMBER-29 OCTOBER 2024

Analysis of satellite imagery collected between 08 September and 29 October 2024 shows the increase in a collection of light technical-type vehicles and open-bed transport trucks in a compound in Al Fao.



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29 October 2024 © 2024 Maxar, USG-Plus

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<https://medicine.yale.edu/lab/khoshnood/>