

**SUDAN**

**CONFLICT OBSERVATORY**

**WIDESPREAD HUMAN SECURITY & HUMANITARIAN  
CONFLICT IMPACTS**

**REPORT 01 | 09 JUNE 2023**

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# EXECUTIVE SUMMARY

## SYSTEMATIC VIOLATIONS OF INTERNATIONAL HUMANITARIAN AND HUMAN RIGHTS LAW, JEDDAH DECLARATION, AND 20 MAY CEASEFIRE

Both the Sudanese Armed Forces (SAF) and the Rapid Support Forces (RSF) with their aligned paramilitaries have allegedly committed widespread violations of the Jeddah Declaration, the 20 May Ceasefire, and gross human rights abuses violating International Humanitarian and Human Rights Law (IHL and IHRL). The Yale School of Public Health's Humanitarian Research Lab and PlanetScape Ai, members of the Sudan Conflict Observatory, find widespread and targeted humanitarian and human security impacts due to the conflict in Sudan.

Yale HRL has documented significant impacts to human security in Khartoum, North Kordofan, South Darfur, West Darfur, and North Darfur states. Open source reporting shows that communication is declining across Sudan, including Khartoum

state and South Darfur. This corresponds with a known attack on Sudatel towers in Nyala. Incidents that damage information communication technologies (ICT) infrastructure, either intentionally or unintentionally, prevent civilians from being able to access humanitarian aid; limit humanitarian organizations ability to assess and respond to needs; and may prevent gross human rights abuses from being documented.

PlanetScape Ai has recorded numerous attacks following the 20th May Ceasefire Declaration. These attacks have been documented using moderate resolution satellite imagery with high resolution imagery and earth-orbiting thermal sensors, in some cases. This evidence includes several damaged buildings and fire incidents in Khartoum from May 23rd to 28th. In El-Geneina,

substantial damage to civilian infrastructure from May 14th to 24th has been documented. Several attacks on towns and villages in West and South Darfur from May 18th to 29th have also been recorded in Darfur.

Moreover, PlanetScape Ai has further recorded a considerable shift in Sudan's population distribution since the onset of the conflict. The population of Khartoum has consistently decreased, while cities in the east like Atbara and Port Sudan have seen a rise in their population. More recently, a significant drop in population has been observed in El Fasher and Nyala following the surge in violence. These population shifts are likely indicative of regional mobility constraints and the migration of residents seeking to escape the violence.

## FINDINGS



Widespread and targeted bombardment and destruction of critical infrastructure including water and sanitation facilities, power, and ICT;



Eight (8) confirmed, targeted, and systematic arson attacks reportedly by the RSF across Darfur's rural villages and urban centers;



Parties to the conflict have engaged in widespread, systematic, and targeted attacks on humanitarian facilities that include the looting of supplies across Sudan;



Widespread and targeted destruction of facilities that constitute protected civilian infrastructure, including marketplaces, civilian neighborhoods, schools, and food production facilities; and



The deployment of roadblocks and checkpoints by both parties to the conflict, impeding freedom of movement of civilians and the delivery of humanitarian aid.

# METHODOLOGY



PlanetScape Ai fuses imagery data from Planet Lab’s moderate resolution satellite constellation Planetscope, high-resolution satellite imagery and thermal detections from NASA’s Fire Information for Resource Management System (FIRMS) to identify conflict-related phenomena.

Mobility data is supplied by a commercial data company, Gravy Analytics which provides hundreds of companies aggregate location information products. All data is commercially available and maintains the highest privacy standards including containing no personal identification information, collected only from users who opt-in to sharing their data and meeting all legal and privacy guidelines including the EU’s General Data Protection Regulation (GDPR). Under no circumstances can this information be used to track or identify specific devices or users.

Gravy Analytics aggregates locational information from many different sources (i.e., apps), and from time to time, these sources of data obtained by Gravy Analytics may change. This may result in a decrease or increase in device counts independent of overall population numbers. Because these changes happen at a national level across all of Sudan, device counts are normalized using national level personal electronic device counts.

# METHODOLOGY

Yale SCHOOL OF PUBLIC HEALTH  
*Humanitarian Research Lab*

The Yale School of Public Health's Humanitarian Research Lab (Yale HRL) fuses remote sensing and open source data to analyze and geolocate events. Open source data range from social media accounts to reports from humanitarian, government, and media organizations. All data is assessed for validity and corroboration of other independent sources, including remotely sensed imagery data and thermal anomalies. The primary thermal anomaly sensor used for this report is VIIRS (Visible Infrared Imaging Radiometer Suite).

Yale HRL's monitoring of the conflict in Sudan is marked by the challenges of a limited digital information environment. Multiple factors affect the quality and volume of field-level accounts. These factors include potential source identification and reprisal, as well as targeted attacks and conflict-related impacts on information and communications technology infrastructure (ICT). Additionally, open source analysis favors event assessments which include remotely visible indicators or robust open source reports. This means it is challenging to robustly analyze potential events that may appear initially under-documented in open source data or lack direct remote sensing indicators.

Redacted sources are provided to verified media outlets, accountability mechanisms, and researchers upon request. Contact [hrl@yale.edu](mailto:hrl@yale.edu).

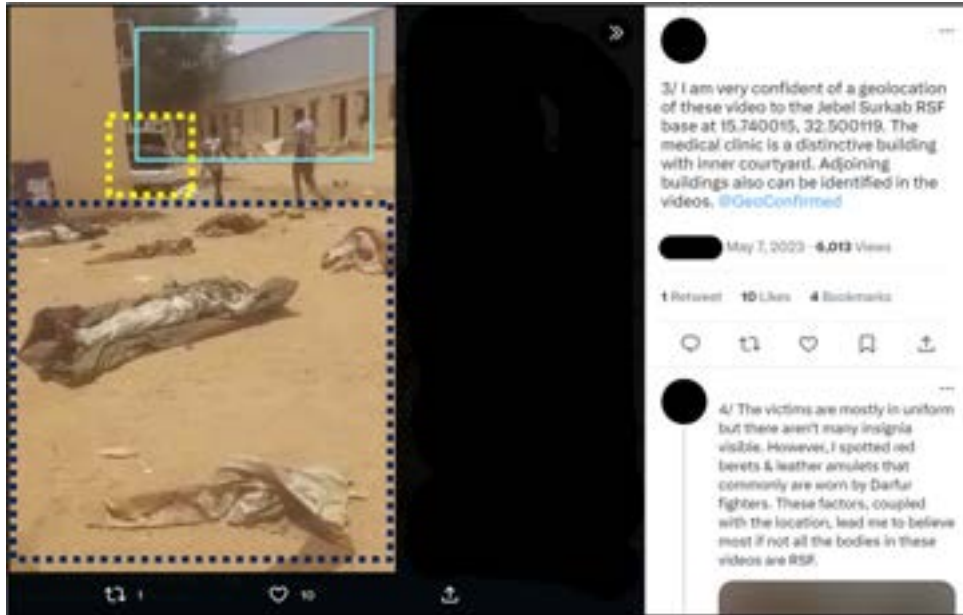
# ALLEGED MASS FATALITY INCIDENT

## SCO\_001 | MT. SERKAB BASE, OMDURMAN

Objects consistent with the dimensions of human bodies, alleged in open sources to have been killed during clashes between SAF and RSF on 15 April, are observed arrayed outside a medical facility in imagery of Mt. Serkab base on 17 April 2023.

SAF's control of the base, as well as the presence and later absence of the objects, suggest that body treatment – including possible disposal – may have occurred.

The structural damage caused by a fire event in proximity to the medical facility between 24 April and 06 May, though possibly unrelated, raises concerns of potential body disposal.



SOURCE SCO.01\_01 has been withheld for protection purposes.

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# WIDESPREAD & TARGETED DESTRUCTION OF CRITICAL INFRASTRUCTURE

## WATER AND SANITATION

SCO\_002 | Damaged Water & Sanitation Plant | Khartoum

SCO\_003 | Damaged Water & Environmental Sanitation | El-Geneina, West Darfur

## INFORMATION COMMUNICATIONS TECHNOLOGY (ICT)

SCO\_004 | Damaged Sudatel® ICT Infrastructure | Nyala, South Darfur



# DAMAGED WATER & SANITATION PLANT

## SCO\_002 | KHARTOUM

Evidence of damage and burning to the south and east of a Bahri water treatment facility is clearly visible by 17 April. Human Rights Watch reported a water treatment center was attacked within this time frame.



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# DAMAGED WATER & ENVIRONMENTAL SANITATION

## SCO\_003 | EL-GENEINA

Significant damage to Water and Environmental Sanitation facility in El-Geneina. The area appears intact in imagery previously captured on 20 April. Reports indicate widespread water and electricity shortages in El-Geneina since the start of the fighting.



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# DAMAGED SUDATEL® ICT INFRASTRUCTURE

## SCO\_004 | NYALA, DARFUR

Damage consistent with fire is visible in imagery captured 21 May over the Sudatel® Nyala, Darfur facility. A 19 May VIIRS fire detection event corroborates the finding that the damage is highly likely fire-based. Internet traffic monitoring by independent sources indicates widespread disruption and continuous communication and power outages across Darfur from 20 May to the date of this report's publication. It is highly likely that fire damage at this site worsened the regional telecommunications outage.



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# WIDESPREAD & SYSTEMATIC TARGETED ARSON ATTACKS

## SOUTH DARFUR

SCO\_005 | 2023.05.18 | Razed Village at Daraba | 14.7km NE Nyala, South Darfur

SCO\_006 | 2023.05.18 | Village Razed | 30km NE Nyala, South Darfur

## NORTH DARFUR

SCO\_007 | 2023.05.12-23 | Village Destruction near Tawilah | North Darfur

## WEST DARFUR

SCO\_008 | 2023.05.29 | Widespread Fires in Kurru | Kurru, West Darfur

SCO\_009 | 2023.05.21 | Razing Confirmed in El-Geneina | El-Geneina, West Darfur

SCO\_010 | 2023.05.25 | Burning Detected in Abu Luk | 25km S El-Geneina, West Darfur

SCO\_011 | 2023.05.22-23 | Burning Detected in Settlement (A) | West Darfur

SCO\_012 | 2023.05.22-23 | Burning Detected in Settlement (B) | West Darfur

Widespread and systematic targeted arson attacks on multiple rural villages and in cities across Darfur appear consistent with attacks on ethnic Masalit communities. Credible reports indicate that these attacks have been conducted by RSF and their aligned forces.

# RAZED VILLAGE | DARABA

## SCO\_005 | SOUTH DARFUR

An 18 May thermal anomaly detection using VIIRS indicated that a likely fire event occurred at Daraba. Visible burn scar patterns appear consistent with a likely arson attack. Insufficient open source reporting and more recent satellite imagery makes it difficult to establish the precise time of attack or attribution to party.



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# VILLAGE RAZED NEAR NYALA

## SCO\_006 | SOUTH DARFUR

Analysis of moderate resolution imagery approx. 30km northeast of Nyala, South Darfur, Sudan indicates burning in the populated area between 16 and 20 May (red arrows). NASA FIRMS corroborates an active fire on 18 May indicating the likely date of the attack.



# VILLAGE DESTRUCTION NEAR TAWILAH

SCO\_007 | NORTH DARFUR

Satellite imagery indicates damage from a likely fire-event having occurred at a village near Tawilah, 42km west of El Fasher.

Burn scar analysis – their isolated location and lack of connecting burns – suggests that a targeted attack likely occurred at this location. Despite a lack of open source reporting, imagery analysis indicates that this fire event occurred between 12 and 23 May.



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# RAZING CONFIRMED | EL-GENEINA

## SCO\_008 | WEST DARFUR

Analysis of moderate resolution detected burn scars (red arrows) in El Geneina, West Darfur, Sudan on 21 May. NASA FIRMS (red circle) corroborates an active fire on 21 May.

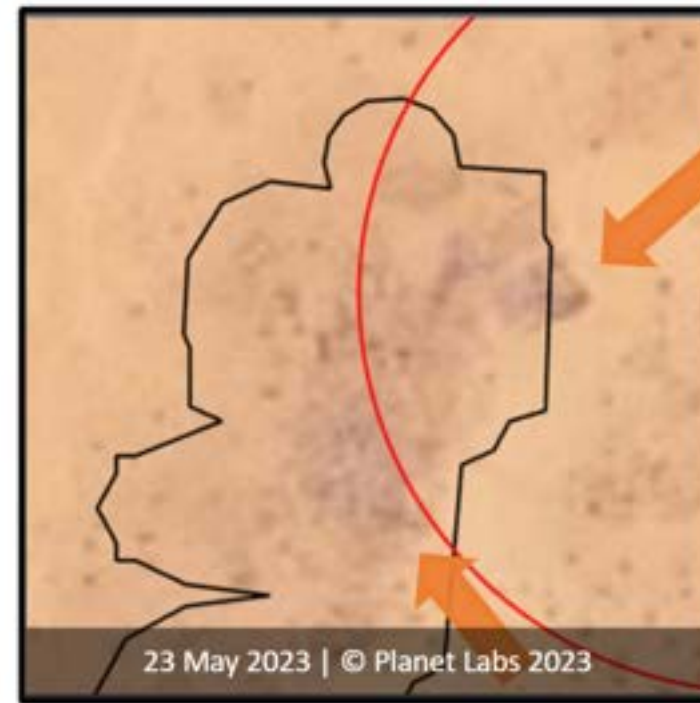
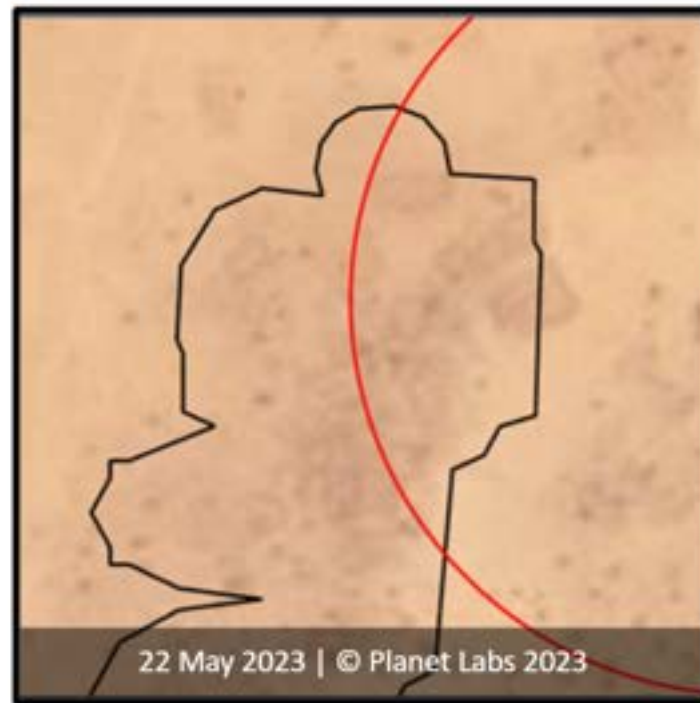




# BURNING DETECTED IN SETTLEMENT (A)

SCO\_009 | WEST DARFUR

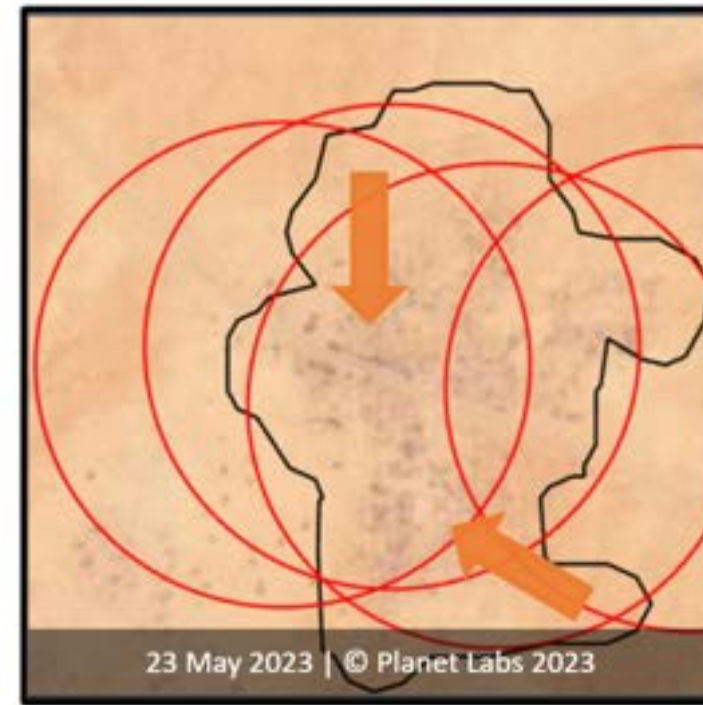
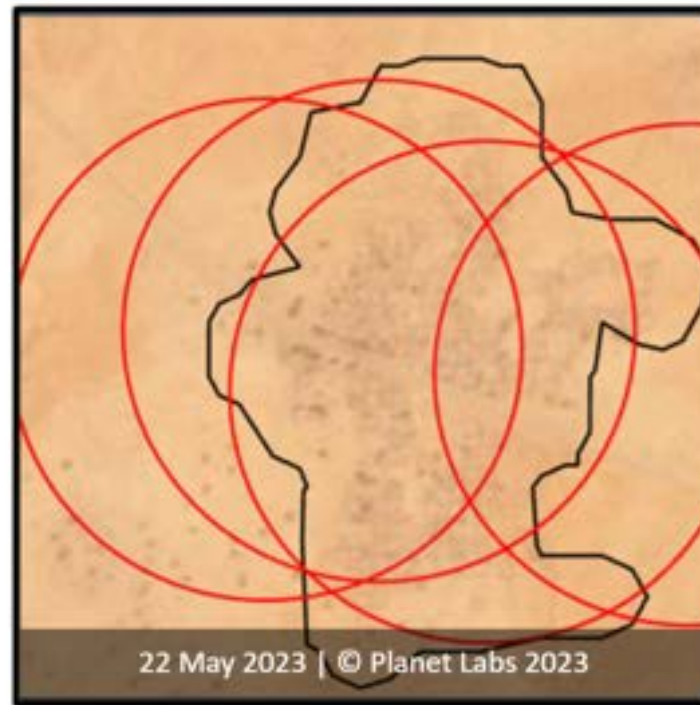
Analysis of moderate imagery detected burning (red arrows) at a West Darfur settlement (A) between 22 and 23 May. Thermal detections were present on 23 May (red circles) indicating the likely day of the attack.



# BURNING DETECTED IN SETTLEMENT (B)

SCO\_010 | WEST DARFUR

Analysis of moderate imagery detected burning (red arrows) at a West Darfur settlement (B) between 22 and 23 May. Thermal detections were present on 23 May (red circles) indicating the likely day of the attack.



# BURNING IN ABU LUK

## SCO\_011 | WEST DARFUR

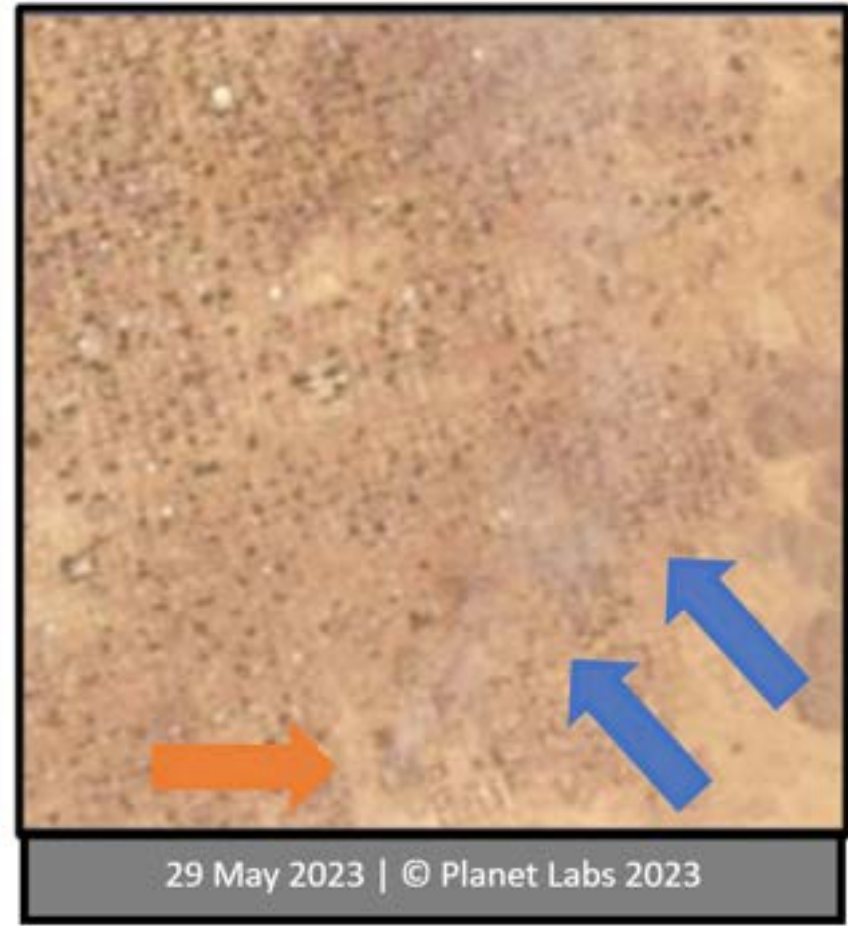
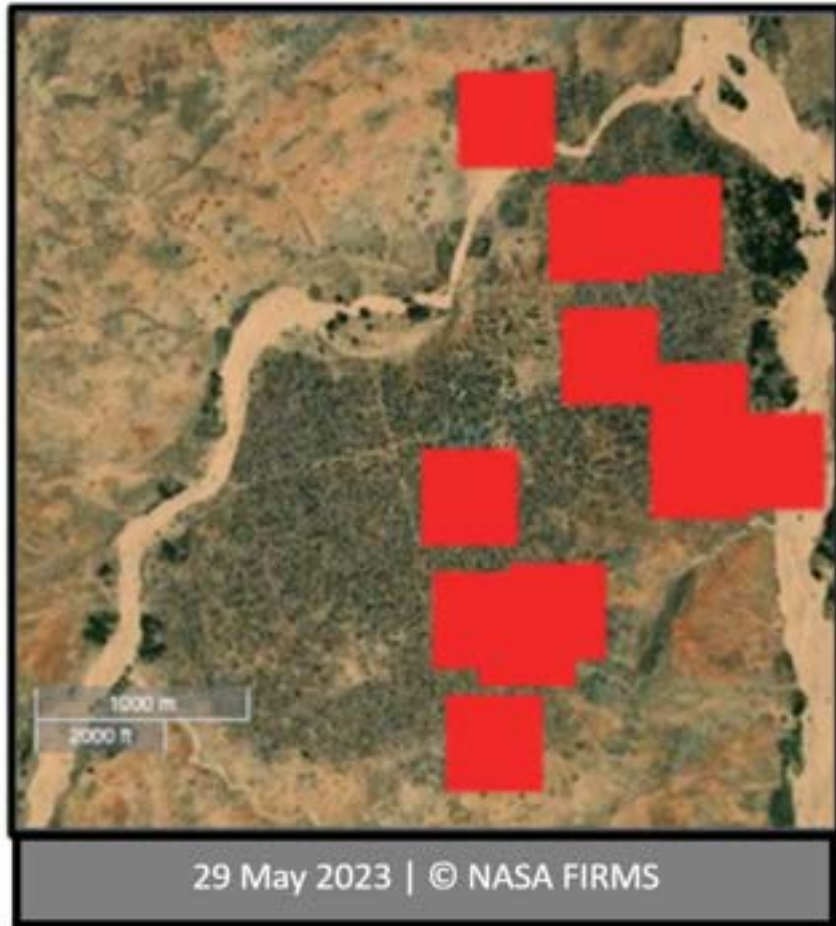
Moderate resolution imagery detected the continued burning of Abu Luk approx. 20km S of El Genenia, West Darfur on 26 May. Thermal imagery confirms active fires in the vicinity on 25 May.



# WIDESPREAD FIRES IN KURRU

SCO\_012 | WEST DARFUR

Twelve (12) thermal events (red squares) were detected on 29 May in Kurru, West Darfur indicating widespread fires in the city. Preliminary analysis of 29 May moderate resolution indicates multiple structures destroyed (blue arrows) and active fires (red arrow).



# SYSTEMATIC TARGETING OF HUMANITARIAN FACILITIES

EL-GENEINA, WEST DARFUR

SCO\_013 | Destroyed UNHCR Humanitarian Facilities | El-Geneina, West Darfur

SCO\_014 | Destroyed WFP Humanitarian Facilities | El-Geneina, West Darfur

Humanitarian facilities are protected objects at all times, particularly during during armed conflict. Intentional or indiscriminate targeting affecting these facilities is a violation of International Humanitarian Law (IHL).

# DESTROYED UNHCR HUMANITARIAN FACILITIES

SCO\_013 | EL-GENEINA

Visible fire damage is consistent with probable targeted destruction of United Nations High Commission for Refugees (UNHCR) humanitarian facilities in El-Geneina.



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# DESTROYED WFP FACILITIES

SCO\_014 | EL-GENEINA

Imagery analyzed indicates that the World Food Programme (WFP) facilities in El-Geneina have been targeted and destroyed in imagery captured on 17 May. Damage to WFP facilities is absent in pre-conflict images.



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# WIDESPREAD & SYSTEMATIC TARGETING OF FACILITIES NECESSARY FOR THE SUSTAINMENT OF LIFE

## KHARTOUM

- SCO\_015 | 2023.05.10 | Plumpy'Nut® Production Facility Destroyed | Khartoum
- SCO\_016 | 2023.05.10 | Damaged Food Production Facility | Khartoum
- SCO\_017 | 2023.05.06-10 | Damaged Flour Production Facility | Khartoum
- SCO\_018 | 2023.05.10 | Coca-Cola® Plant Destruction | Khartoum

## DARFUR

- SCO\_019 | 2023.04.20 | Razed Central Marketplace | Nyala, South Darfur
- SCO\_020 | 2023.05.17 | Razed Town Center | El-Geneina, West Darfur
- SCO\_021 | 2023.05.17 | Razed El Zahra School for Girls | El-Geneina, West Darfur
- SCO\_022 | 2023.05.17 | Razed El-Geneina Secondary School for Girls | El-Geneina, West Darfur
- SCO\_023 | 2023.05.17 | Razed Imam Al Kazem School | El-Geneina, West Darfur
- SCO\_024 | 2023.05.17 | Destroyed Mosque | El-Geneina, West Darfur

Facilities Necessary for the Sustainment of Life are protected civilian infrastructure. These objects are protected under international humanitarian law and may not be targeted unless certain conditions apply. Those conditions do not appear to be in place in these circumstances.



# PLUMPY'NUT® PRODUCTION FACILITY DESTROYED

## SCO\_015 | KHARTOUM

Conflict Observatory analysts geolocated and verified social media reports, circulated 12 May, of destruction at the SAMIL Plumpy'Nut® Production Facility in Khartoum. Extensive fire-based damage observed in satellite imagery appears consistent with a VIIRS fire-event detected on 10 May. Plumpy'Nut® is the main paste component in humanitarian child supplemental feeding programs. This plant was responsible for 60% of Ready to Use Therapeutic Foods in Sudan in 2022 and was the only local Plumpy'Nut supplier for UNICEF and WFP in Sudan.



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# DAMAGED FOOD PRODUCTION FACILITY

SCO\_016 | KHARTOUM

Damage to a food production facility in Khartoum was visible between 6 and 10 May. Visible smoke indicates an ongoing fire at the food production facility.



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# DAMAGED FLOUR PRODUCTION FACILITY

## SCO\_017 | KHARTOUM

Damage to a flour facility in Khartoum is assessed to have occurred between 6-10 May 2023. The visible smoke indicates that the incident was ongoing as of 10 May.



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# COCA-COLA® PLANT DESTRUCTION

## SCO\_018 | KHARTOUM

Imagery collected on 10 May indicates a burning fire in the vicinity of the Coca-Cola® bottling plant and structural damage to the facility. Geolocated open source media (below) appears to show structural damage and details consistent with satellite imagery analysis and related accounts.

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# RAZED CENTRAL MARKETPLACE

## SCO\_019 | NYALA, SOUTH DARFUR

Reports of large-scale razing of the main marketplace in Nyala, said to be South Darfur's largest crop market, is confirmed in satellite imagery captured on 20 April. Burned structures, missing roofs, and scorch marks consistent with razing are visible in satellite imagery throughout the market.



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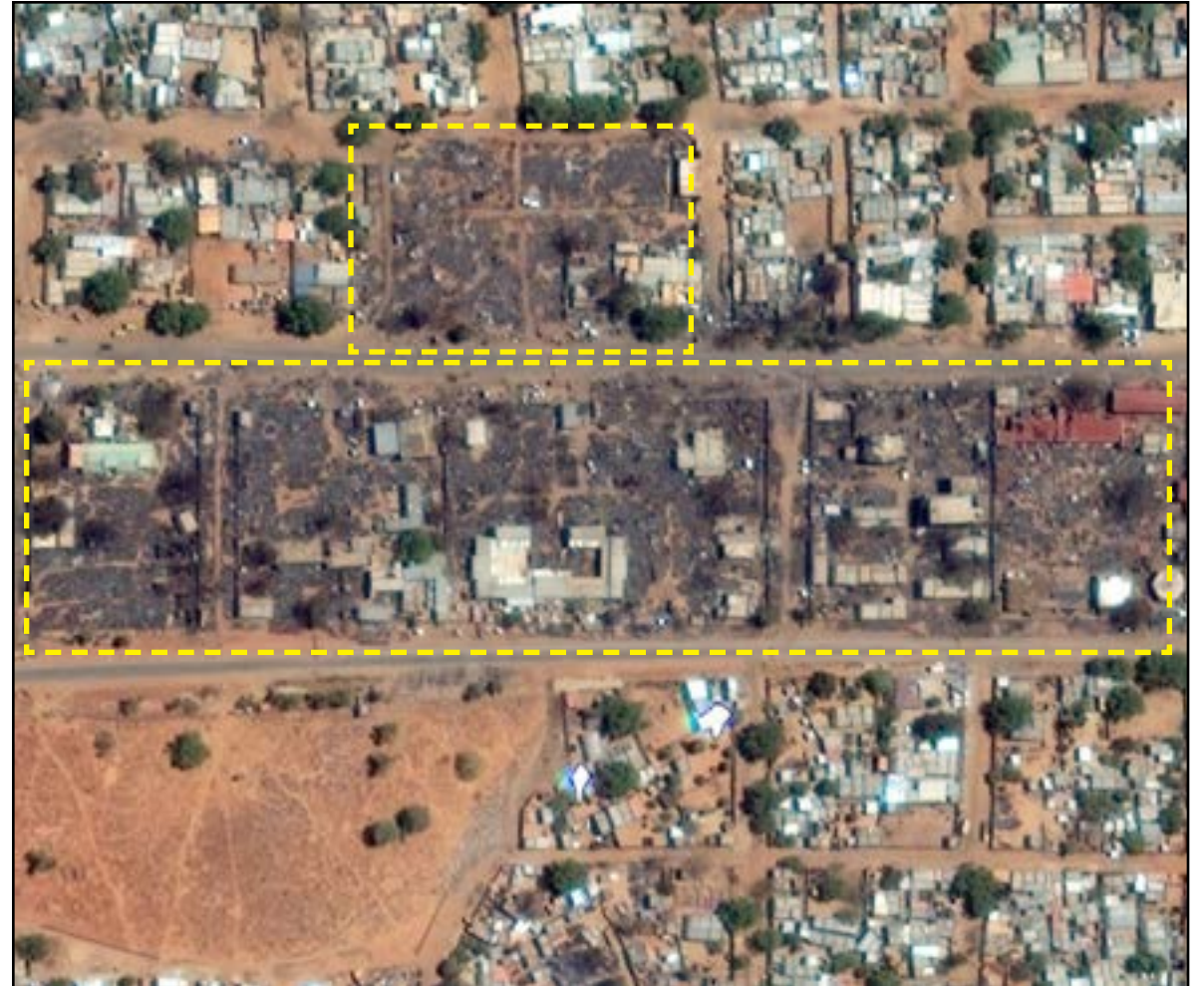
# RAZED TOWN CENTER

SCO\_020 | EL-GENEINA, WEST DARFUR

Widespread destruction is visible throughout El-Geneina town center. Hundreds of civilian structures appear razed and destroyed. The same civilian structures were intact in imagery captured on 20 April.



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# RAZED EL ZAHRA SCHOOL FOR GIRLS

## SCO\_021 | EL-GENEINA, WEST DARFUR

Imagery indicates the targeted burning and destruction of structures at the El Zahra school for girls in El-Geneina. Of three documented attacks on schools, two appear to have targeted schools for girls.

The area appears intact in previously captured imagery on 20 April.



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# RAZED EL-GENEINA SECONDARY SCHOOL FOR GIRLS

## SCO\_022 | EL-GENEINA, WEST DARFUR

Significant and concentrated fire damage to El-Geneina Secondary School for Girls is indicative of intentional targeting. This damage is consistent with reported attacks to facilities during 12-14 May. Visual analysis is corroborated by VIIRS detection data from 14 May. Limited damage in the surrounding area supports the assessment that the school was intentionally targeted.



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# RAZED IMAM AL KAZEM SCHOOL

## SCO\_023 | EL-GENEINA, WEST DARFUR

Imagery analysis indicates that the Imam al Kazem school was targeted and destroyed. Caved roofs, structural damage, and burned structures can be observed. The school appears intact in imagery captured on 20 April.



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# DAMAGED MOSQUE

SCO\_024 | EL-GENEINA, WEST DARFUR

A mosque in El-Geneina appears visibly damaged in imagery captured 17 May. No damage to the site is observed in imagery captured 20 April.



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# CONFLICT IMPACT ON CIVILIAN AND PUBLIC INFRASTRUCTURE

## KHARTOUM

SCO\_025 | 2023.05.21 | Fire at Probable Government Building | Khartoum

SCO\_026 | 2023.05.24 | Sudan Ministry of Agriculture | Khartoum

SCO\_027 | 2023.05.19-28 | Gold Refinery & Currency Printing Press | Khartoum

SCO\_028 | 2023.05.27 | Sudan Currency Printing Press | Khartoum

SCO\_029 | 2023.05.28 | Freedom of Movement, Shambat Bridge | Khartoum & Omdurman

# FIRE AT PROBABLE GOVERNMENT BUILDING

SCO\_025 | KHARTOUM

A fire event at a purported government facility very likely occurred between 06:00 and 10:00 UTC on 21 May 2023. Smoke emanations are no longer observable by approximately noon UTC on the same day indicating that the fire had very likely been controlled.



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# STATE MINISTRY OF AGRICULTURE

## SCO\_026 | EL-GENEINA, WEST DARFUR

Imagery captured on 24 May indicates substantial damage and burning of structures at the State Ministry of Agriculture in El-Geneina. The structures appear intact in imagery captured on 18 May. It is likely that the fire event occurred on 18 May based on a VIIRS fire detection event on the same day. El-Geneina has witnessed fighting between RSF and SAF forces amidst a near total communication blackout since 19 May.



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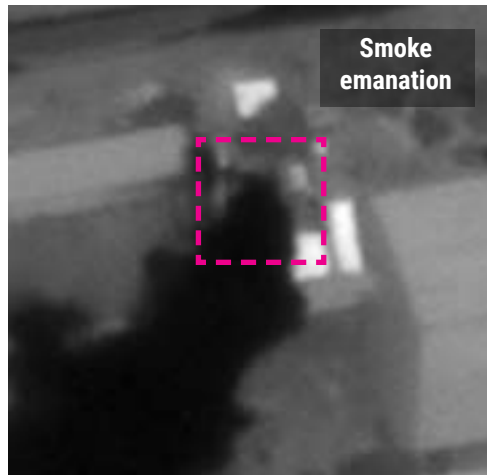
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# GOLD REFINERY & CURRENCY PRINTING PRESS

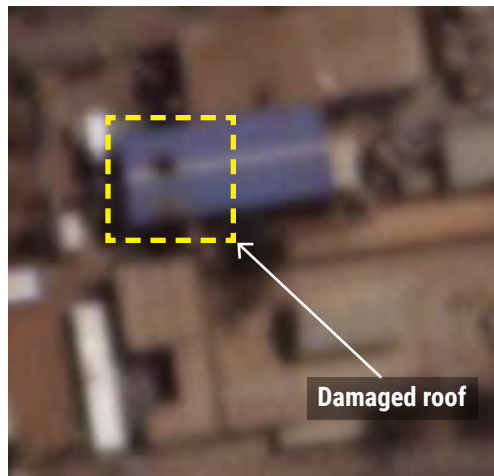
## SCO\_027 | KHARTOUM



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Satellite imagery analysis confirms a fire event across the road from the Sudan Currency Printing Press and expanded structural damage at the Sudan Gold Refinery. This area was alleged to contain an RSF presence at time of image capture. Activity at these locations is consistent with reported occupation and looting at the Gold Refinery and Sudan Currency Printing Press.



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# SUDAN CURRENCY PRINTING PRESS

SCO\_028 | KHARTOUM

Imagery analysis confirms the presence of fire and structural damage to the Sudan Currency Printing Press, also known as the “mint buildings,” 27 May as of 09:19 local time. News media have quoted RSF claims that SAF conducted airstrikes against this facility. The immediate vicinity of this site has seen several fires in the week prior to 27 May with reports of RSF occupation of the area and SAF airstrikes. Damage observed in imagery captured 27 May appears highly consistent with the explosive effect caused by an airstrike.



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# FREEDOM OF MOVEMENT | SHAMBAT BRIDGE

## SCO\_029 | KHARTOUM & OMDURMAN



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Satellite imagery confirms that containers on Shambat Bridge were repositioned to form roadblocks between 27 May and 28 May, based on multimedia circulated online and analysed as of 28 May. These containers are observed to be in a non-obstructive position on the bridge between 30 March and 27 May in available imagery.

The use of the containers as roadblocks is assessed as a near certain violation of the ceasefire agreement. Shambat Bridge links Omdurman and Bahri and is a critical ingress/egress route for both civilian and humanitarian mobility and access needs. It is probable that RSF seek to control movement across the bridge.



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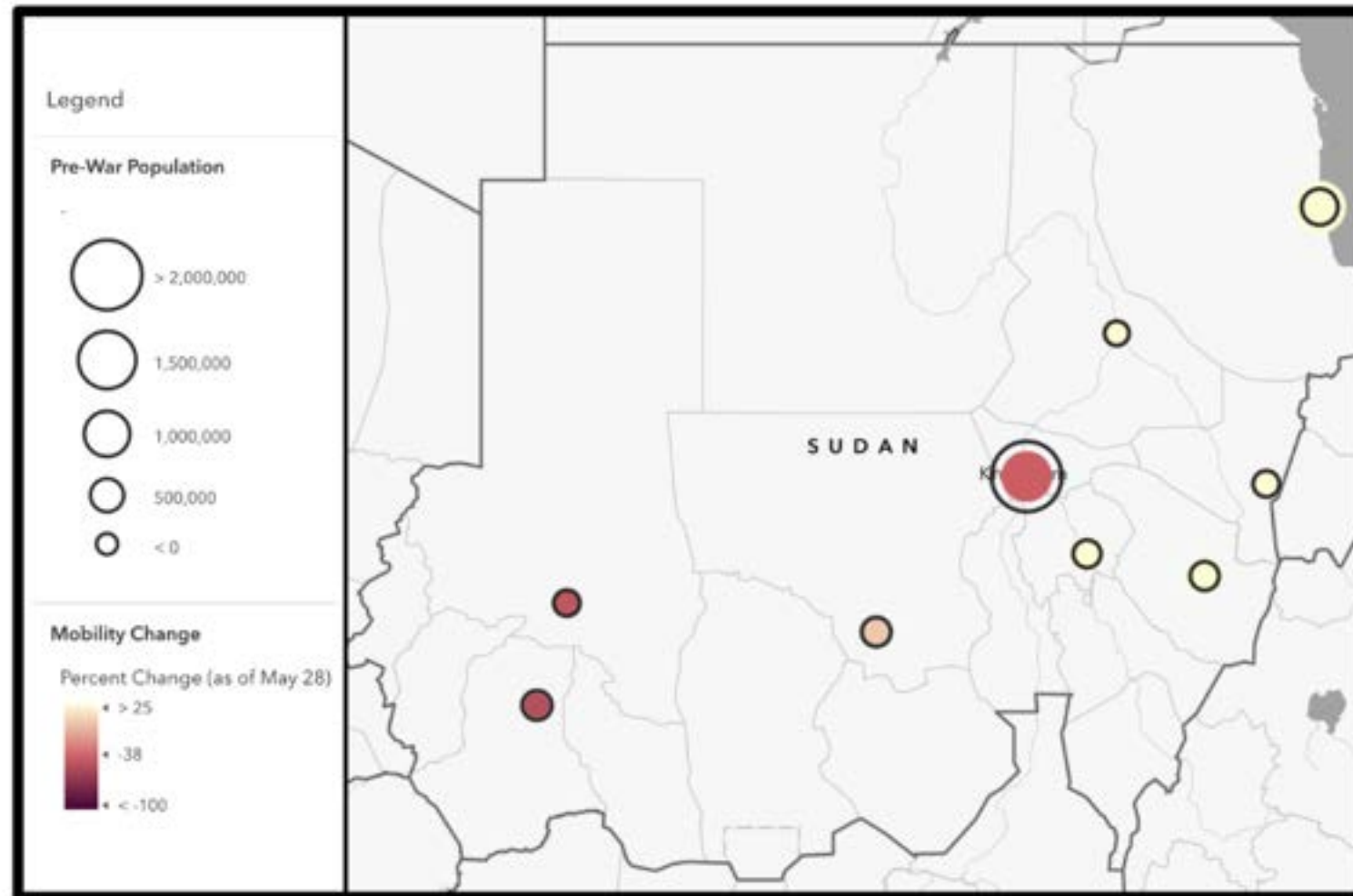


# SIGNIFICANT EST. POPULATION REDISTRIBUTION

SCO\_030 | NATIONWIDE

There has been a significant re-distribution of Sudan's estimated population since the start of the conflict.

Khartoum has consistently declined while Atbara, Port Sudan and other eastern cities have increased.

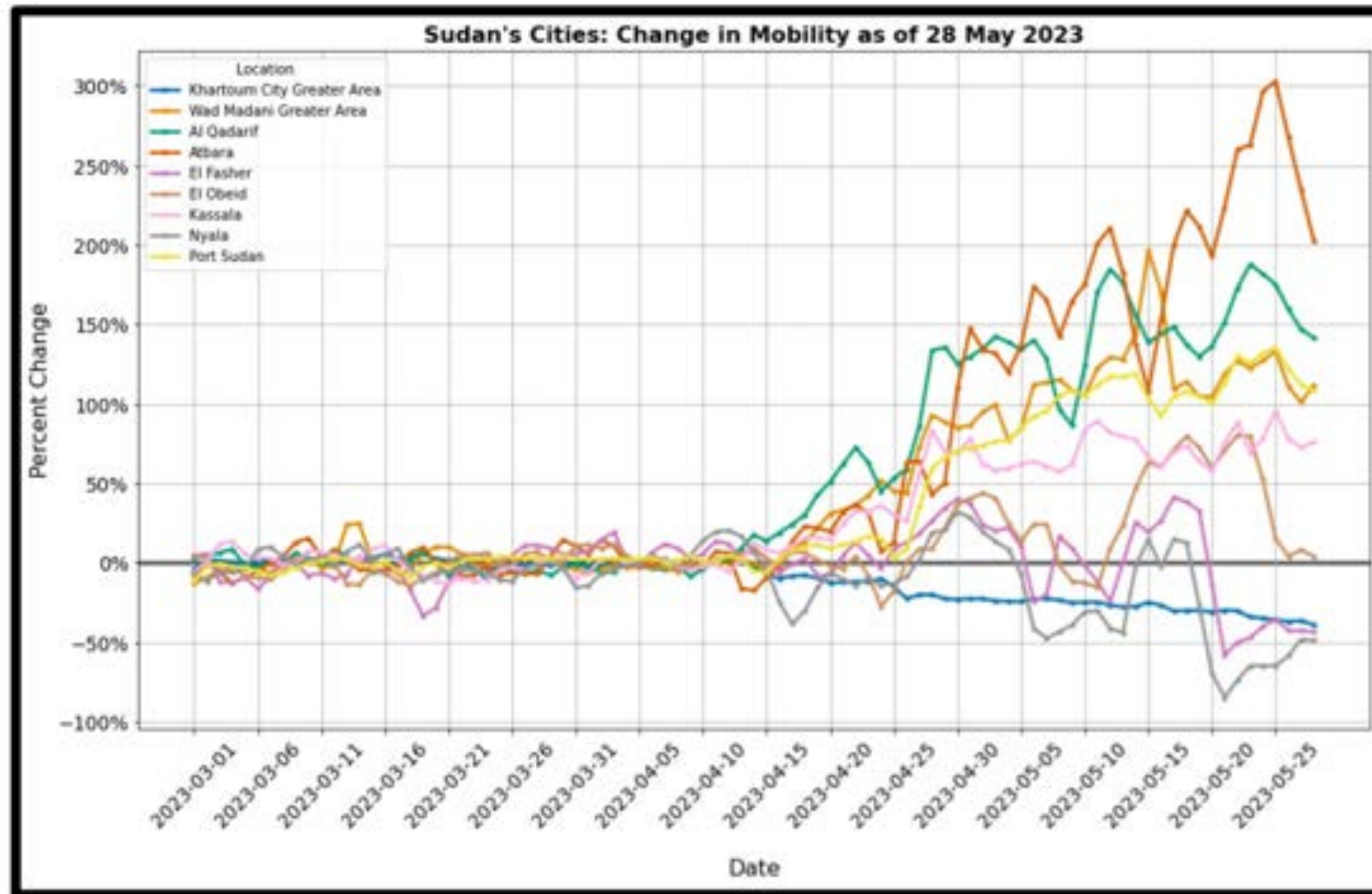


# SIGNIFICANT EST. POPULATION REDISTRIBUTION

SCO\_031 | NATIONWIDE

Recent estimated population movement in El Fasher and Nyala has dramatically decreased following the outbreak of violence in Sudan.

Changes likely represent regional mobility restrictions as well as migration as residents flee violence.



SOURCE | Gravy Analytics