Mapping Territorial Control, Contestation, and Activity in Yemen
Matthias J. Sulz, Emile Roy

This methodological document and the territorial map are based on an initial assessment implemented for mapping territorial control in Syria by Kars de Bruijne and Stephanie Anderson. Their methodological explanations, which are heavily relied upon throughout this document, can be found [here](#).

The current conflict in Yemen, which began in 2014, has been well-mapped by a number of distinct initiatives. There are daily maps detailing the presence of armed groups, the activities of NGOs, the distribution of public goods, and – most commonly – territorial control. This increase of maps has been driven by the explosion of available data as well as the availability of (open-source) mapping software, although there has been a lower proliferation of maps for Yemen relative to other conflicts, like Syria.[1]

While the wide-scale availability of conflict maps is welcome for understanding otherwise complicated conflict patterns, there is a drawback: conflict mapping is beset by issues of how to define, measure, and communicate concepts, particularly around territorial control. Given the prominence of conflict maps and the political role these maps may play, more clarity about how maps are produced is needed.

The Armed Conflict Location & Event Data Project (ACLED), therefore, presents the rationale behind the creation and calculation of its map measuring territorial control in Yemen below. The exact steps (i.e. methodology) taken by ACLED to assign control to warring parties is presented. The descriptions presented here allow any user with access to ACLED data and knowledge of Yemen to, in theory, reproduce the map themselves or to alter the calculations to explore different underlying concepts or assumptions.

1. Conflict maps on Yemen: Source, method, and transparency

Mapping territorial control often leads to different representations of control. As such, the following is meant to provide transparency about ACLED's choices as well as to stimulate an open discussion around territorial control. Regardless of the armed group, timing of the conflict, or interest of the reporting organization, an impartial method to define and display territorial control is needed.

To illustrate the need for clarity and openness about methodology, four other providers of maps on territorial control in Yemen are reviewed here: the map produced by the Council on Foreign Relations (CFR), Political Geography Now's (PolGeoNow) Yemen control map, the social media map of Suriyakmaps, and the social media map of Liveuamap. The general conflict representation is similar, yet there are important differences between the maps. For example, some illustrate different levels of 'influence'

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[1] For example, the Institute for the Study of War, the Carter Center, and Janes, all produce conflict maps on Syria, but do not produce conflict maps on Yemen.

of the warring factions while others do not; some depict Al Qaeda in the Arabian Peninsula (AQAP) presence while others do not; some do not provide specific contestation lines across the Southern Transitional Council (STC)-Government of Yemen (GoY) conflict while others do.

Two key reasons for differences between the maps generated across these organizations are: (1) a reliance on different information, and (2) different definitions of control (see Table 1). Suriyakmaps and PolGeoNow collect open-source information on conflict events. Liveuamap harvests, selects, and curates information through social media platforms. Contrastingly, the CFR lists "Risk Intelligence," and "Congressional Research Service" as sources.[2] Different sources, unsurprisingly, lead to different representations of control.

CFR, PolGeoNow, and Suriyakmaps do not publicly share their definitions of control, yet appear to draw on a mixture of battlefronts and insurgent attacks. Liveuamap attributes control by drawing a polygon around events; given the large number of social media events that Liveuamap collects, it seems to be able to generate areas of control from this information in this way. The other control maps appear to have a qualitative component in their categorization, though these processes are not publicly described.

The differences amongst these four mapping initiatives are outlined in the table below.

Comparing maps on Yemen

Project	Data	Definition of Control	Actors
Suriyakmaps	Own compilation of open-source data	Not disclosed	Houthi, GoY,[3] STC, Southern Resistance, AQAP
PolGeoNow	Own compilation of open-source data	Not disclosed	Houthi, GoY, STC, AQAP
CFR	Partners	Not disclosed	Houthi, GoY, STC, AQAP
Liveuamap	Own compilation of social media conflict data	Algorithm based on geographic proximity (formulas not disclosed)	Houthi, GoY/STC, AQAP

2. Defining territorial control in Yemen: Contestation, control, and activity

Territorial control is notoriously hard to define. It is often defined as the monopoly of the usage of force. As such, it could be argued that the internationally-recognized government has not been in control of Hadramawt, certain areas of Marib, and Al Mahrah since 2015, as these areas have been under intense contestation by AQAP and Islamic State cells. Given the absence of any other fighting force, AQAP has had the monopoly on the use of force in certain areas and could impose its will. Another illustration of the challenging nature of control is the overlap of control between the STC and pro-GoY forces since 2017 in several southern governorates, where contestation has increased gradually.

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[2] See the website of Risk Intelligence and the Congressional Research Service for additional information.
[3] GoY is referred to as Yemen Security Forces (YSF) by this project.

ACLED does not rely on geographic features or actual battle lines to depict control, but instead relies on *administrative districts*. This choice was made because reliance on geographic features allows for a less systematic capture of control and contestation due to the often vague reporting around battlefronts. Using Yemen's 333 districts renders this capture more systematic, yet is a small-enough analytical unit to display granular changes. ACLED's map, moreover, moves beyond the notion of territorial control alone; rather, it attempts to highlight how the reality of the Yemen conflict is more varied and includes more statuses. The map proposes three innovations.

First, the map highlights how areas nominally under the control of some groups still experience some levels of violence. Some areas under Houthi control, for example, were still experiencing high levels of infighting while other areas under their control were relatively quiet. Similar dynamics were observed for all other controlled areas (e.g. pro-GoY, STC, and National Resistance controlled areas). As such, ACLED distinguishes between areas that are under the control of one actor but exhibit some levels of violence, and areas that are under the control of one actor without recorded violence.

Second, ACLED relies on actual and observable military behavior, not the degree to which armed groups have set up administrative structures. This means that groups are in *de facto* control when they are able to move around freely or are able to engage in activity without being substantially challenged. This situation is perhaps best understood in reference to violent gangs in control of areas with very weak police presence: in these instances, armed gangs have the ability to move around freely and manipulate public resources. Hence, the map that ACLED has created reflects this empirical reality, rather than assuming control based on historical takeover.

Finally, ACLED displays areas that are contested. Displaying battle lines has the advantage of showing where the centers of violence are located. Yet the downside is that Yemen has never been a purely conventional war with fixed battle lines; areas close to the battle fronts often experience high levels of violence. Hence, ACLED's display of districts that are contested helps to account for this fuzzy nature of front lines.

ACLED, therefore, allows for three statuses: territory can be (1) controlled and active; (2) controlled and inactive; or (3) contested.

ACLED defines **Contestation** when no single armed group is in control.

Control means that an armed group is militarily dominant in a district. This happens in one of the following cases:
1. The armed group has *gained control* over the (vast) majority of populated areas in the district and other groups are not actively challenging their dominance;
2. The group is *dominant* in the district based on its violent activity;
3. The armed group has *historical control* over the district (e.g. the district was conquered very early in the war or never changed hands, like certain districts in Amran) and is not actively challenged.

3. Methodology: Quantitative data-based and qualitative assessments

The key challenge for producing a map on Yemen is to develop a reliable methodology. ACLED is a data-producing organization and understands the role of data in analyses; the uncritical usage of data to determine control, contestation, and activity in Yemen (and other conflict contexts), however, is less helpful. Data-based metrics alone will lead to 'false-positives' by which armed groups are incorrectly assigned control (as described below). ACLED's design is therefore based on a two-step approach: a quantitative step with data-based calculations to assign an initial status, and a context-informed systematic assessment to verify and finalize each district's status assignment on a quarterly basis. The two steps are described below alongside various examples.

As of July 2021, ACLED's Yemen data cover 2015-present; hence, statuses for areas controlled prior to 2015 are not assigned here.[4] Senior team members conducted baseline research on the historical control of each district based on existing maps and secondary evidence, checking all statuses and reconciling differences.

Step 1: A quantitative data-based baseline

ACLED data are used to determine armed groups' control, contestation, and activity for each district of Yemen on a quarterly basis. Each status is based on a specific calculation, described below, and involves the number of events and the event types that occurred in the district during a given quarter.[5] ACLED 'event types' used in this map include: battles between armed groups; explosion/remote violence events; and strategic developments events, specifically non-violent transfers of territory and the movement of forces, which are systematically collected.[6]

Measuring territorial control
An armed group is said to be in control of a district in Yemen in one of three ways: (1) if it engages in a takeover of the district; (2) if it possesses militarily dominance and has a *de facto* monopoly on violence; or (3) if it has unchallenged historical control.

1. **Takeover.** *A group is assumed to have territorial control if the armed group is involved in twice as many territorial takeovers than all other armed groups during one quarter in a district. Three sub-event types, falling under the event types of 'Battles' and 'Strategic developments' are used for this calculation: 'Non-state actor overtakes territory,' 'Government regains territory,' or 'Non-violent transfer of territory.'* The calculation will occasionally lead to false positives; for example: pro-GoY forces accomplish the only territorial takeover in a given quarter in a district and calculations hence code the district as pro-GoY control while the rest of the district is firmly in control of Houthi forces. Or, if AQAP takes the same village five times while pro-GoY forces take two different villages, calculations would code the district as under AQAP control while it may be more appropriate to code it as under pro-GoY control. To control for these false positives, a qualitative review is carried out.

2. **Dominance.** *A group is assumed to have territorial control if an armed group is involved in two-thirds of all conflict events during one quarter in a district. Eleven*

sub-event types falling under the event types of 'Battles,' 'Strategic developments,' and 'Explosions/Remote violence' are used for this calculation: 'Non-state actor overtakes territory,' 'Government regains territory,' 'Armed clash,' 'Change to group/activity,' 'Non-violent transfer of territory,' 'Chemical weapon,' 'Air/drone strike,' 'Suicide bomb,' 'Shelling/artillery/missile attack,' 'Remote explosive/landmine/IED,' and 'Grenade.'[7] This calculation may also lead to false positives; for example: if there is only one event in a district, the control of that district would be automatically assigned to the armed group involved. Or, if AQAP detonates 10 IEDs in a district while Houthi forces attack five villages across the district, control is assigned to AQAP when this may not be the case in reality. To control for these false positives, a qualitative review is carried out.

3. **Historical control.** *A group is assumed to have territorial control if the armed group previously satisfied criteria (1) or (2) above and the number of events during one quarter in the district is below the mean number of events in the district over a 6-month period minus one standard deviation, re-calculated for each quarter.[8] Eleven event types falling under the event types of 'Battles,' 'Strategic developments,' and 'Explosions/remote violence,' are used for this calculation: 'Non-state actor overtakes territory,' 'Government regains territory,' 'Armed clash,' 'Change to group/activity,' 'Non-violent transfer of territory,' 'Chemical weapon,' 'Air/drone strike,' 'Suicide bomb,' 'Shelling/artillery/missile attack,' 'Remote explosive/landmine/IED,' and 'Grenade.'* Hence, the historical control of an armed group in a district is not altered if the number of events occurring in one quarter (e.g. 3) is equal or lower than the mean minus the standard deviation (e.g. 5 minus 2).

Measuring contestation
A district in Yemen is contested when: (1) it is active (see below); and (2) an armed group does not take over twice as much territory *or* when the most active armed group is responsible for less than a third of events *or* when there is no historical control.

A district is assumed to be contested if the district is active and not controlled (the inverse of the control definition laid out above).

Because contestation is the inverse of control, there may be false negatives. For example: if AQAP overtakes the same village five times while Houthi forces take two different villages in the same district, the calculation used here would assign control of the district to AQAP while the district may better in fact be thought of as contested. Or, if AQAP carries out eleven bombings, while Houthi forces and pro-GoY forces are fighting three battles in the same district, the calculation would assign control of the district to AQAP while the district may again better be considered to be contested.

For this reason, the contested status is the most context-dependent status that is encountered in producing ACLED's map. As a result, the majority of the qualitative review carried out involves checking whether districts are in reality contested rather than controlled.

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[7] 'Violence against civilians' events are not used here since they do not involve contestation activity with other groups.
[8] Or were designated as being controlled before 2015.

Measuring activity
Controlled districts can be 'active' or 'inactive' based on the amount of armed activity reported. *A district is assumed to be 'active' when it experiences at least 10 conflict events over the previous six months; it is assumed to be 'inactive' when fewer than 10 events are recorded over the course of six months. Thirteen sub-event types falling under the event types of 'Battles,' 'Strategic developments', and 'Explosions/Remote violence' are used for this calculation: 'Non-state actor overtakes territory,' 'Government regains territory,' 'Armed clash,' 'Headquarters or base established,' 'Non-violent transfer of territory,' 'Change to group/activity' (e.g. movement of forces), 'Disrupted weapons use,' 'Chemical weapon,' 'Air/drone strike,' 'Suicide bomb,' 'Shelling/artillery/missile attack,' 'Remote explosive/landmine/IED,' and 'Grenade.'* No qualitative review of the activity status is carried out.

Step 2: A qualitative review of the controlled and contested statuses

The data baseline for the map is subsequently reviewed qualitatively to ensure accuracy and consistency, to correct false positives and negatives from the calculations, and to consider context-specific information. These checks are carried out by comparing results and reconciling any differences. The information in the examples below is taken from ACLED event notes, and from additionally conducted research.

Reviewing territorial control
The qualitative review for control explores territorial takeover and historical control while also accounting for the dominance of armed groups.

For the former, factors of timing and the geographic spread of territorial takeover events are in particular reviewed and contextual information is considered. For example, the status of Wald Rabi district in Al Bayda governorate would be manually changed in the following situation: *Across both 25 and 26 March 2019, AQAP claimed to have taken control of six Islamic State positions in Al Qayfa region (Wald Rabi, Al Bayda) through four different attacks, with no report of fatalities nor injuries. Overtaken areas include Jabal as Surah, Aqabat as Salul, Tibbat Hajar al Ghara, Tibbat Hamra Mafadah, and Al Aghar.*

Here, ACLED calculations would designate Wald Rabi as 'AQAP-controlled.' However, it is clear from contextual knowledge that the district is still contested given that the Islamic State controlled more than those six positions within the district; hence, the status is changed to 'contested.'

For the latter, the geographic distribution of events and the number of events are reviewed while also taking into account contextual information. Based on this, the status of Dhi Naim district in Al Bayda governorate would be manually changed in the following situation: *Dhi Naim (Al Bayda) has been under Houthi control since it was retaken from pro-GoY forces, AQAP, and Islamic State (IS) forces in April 2019. In the first quarter of 2021, the only conflict events to occur were three detonations of IEDs planted by AQAP.*

Here, ACLED calculations would designate Dhi Naim as 'AQAP-controlled.' However, it is clear from contextual knowledge that the district is still controlled by Houthi forces; hence, the status is changed to 'Houthi-controlled.'

Reviewing contestation

The qualitative review for contestation explores, in addition to contextual information, three common situations: (1) whether fighting is actually ongoing; (2) whether there is a need for a comparison of historical activity in the district; and (3) whether control of a district is *de facto* shared.

The first case involves districts where, even despite cases of apparent control, there is clearly a situation of ongoing intensive conflict between two or more groups to establish control. For example, the status of Jabal Habashy district in Taizz governorate would be manually changed in the following situation: *Pro-GoY forces began an offensive to take over Jabal Habashy (Taizz) from Houthi forces in March 2021. Pro-GoY forces took over a high number of locations and the entire Jabal Habashy frontline in the southern parts of the district by 15 March.*

Here, ACLED calculations would designate Jabal Habashy as 'pro-GoY-controlled.' However, it is clear from contextual knowledge that in the northern parts of the district, there are other frontlines which are contested without activity; hence, the status is changed to 'contested.'

In the second case, there is a prior history of activity that suggests the area is contested rather than controlled (a false positive), or controlled rather than contested (a false negative).

For example, the status of Al Mansura district in Aden governorate would be manually changed in the following situation: *STC-controlled Al Mansura (Aden) had experienced over ten conflict events in the first quarter of 2021.*

Here, ACLED calculations would designate Al Mansura as 'contested.' However, it is clear from contextual knowledge that the nature of the political violence taking place in the district does not contest the STC control; hence, the status is changed to 'STC-controlled.'

Similarly, the status of Al Mansura district in Aden governorate would be manually changed in the following situation: *Al Mansura (Aden) has seen only a few conflict events in the third quarter of 2017.*

Here, ACLED calculations would designate Al Mansura as 'pro-GoY-controlled.' However, it is clear from contextual knowledge that the STC declaration of April 2017 fractured control over many districts of Yemen's south, with several military brigades and armed groups changing their allegiances to the STC; hence, the status is changed to 'contested.'

The third case concerns districts that are split in their territorial control. In these situations, the calculations for control and activity fail. In some cases, there will be territorial takeovers or activity yet the general situation does not alter. In other cases, the district appears inactive yet is actually contested. This usually occurs in areas where historical control has been established by two or more groups, each of which holds significant territory, who have reached an (implicit or explicit) understanding to maintain the current status quo of territorial divide.

For example, a 'contested' situation would be assigned to Al Maafer district in Taizz governorate in the following situation: *Pro-GoY forces control a majority of Al Maafer*

(Taizz). However, the Kadahah frontline of the district has long been under Houthi control and has seen no conflict events in the last 3 months.

4. Conclusion

The current conflict in Yemen, which began in 2014, has been well mapped, with maps depicting refugee flows, infrastructural destruction, NGO presence, and territorial control. The way in which control maps are produced remains, however, often unclear because organizations rely on different sources of information and different definitions. This report argues for more clarity about the definitions, information, and methods used by mapping initiatives.

This report presents in detail how ACLED produces its quarterly map. Districts in Yemen are categorized in one of three ways: (1) active control; (2) inactive control; and (3) contestation. Rather than only mapping control based on territorial acquisition, ACLED determines status also on *de facto* activity, highlighting how those able to move (relatively) unopposed are in *de facto* control of areas. Moreover, territorial control is varied. In some instances, there still are (minor) challenges to the rule of those in control -- with important security consequences for NGOs, policymakers, and civilians. As such, ACLED's map takes a dynamic view of control.

ACLED map-making relies on a baseline of quantitative data from the ACLED dataset, supplemented by a qualitative review of the same dataset. This report describes the specific quantitative calculations employed for each status as well as the specific discussion of common false positive/negative statuses that require correcting through qualitative processes. It is ACLED's contribution to transparent map-making.