



START

Update on Geospatial Patterns of Precursor Behavior among Terrorists

*Report to Human Factors/Behavioral Sciences
Division, DHS Science and Technology
Directorate*

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National Consortium for the Study of Terrorism and Responses to Terrorism
A Department of Homeland Security Science and Technology Center of Excellence
Based at the University of Maryland

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About This Report

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About START

The National Consortium for the Study of Terrorism and Responses to Terrorism (START) is supported in part by the Science and Technology Directorate of the U.S. Department of Homeland Security through a Center of Excellence program based at the University of Maryland. START uses state-of-the-art theories, methods and data from the social and behavioral sciences to improve understanding of the origins, dynamics and social and psychological impacts of terrorism. For more information, contact START at infostart@start.umd.edu or visit www.start.umd.edu.

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Introduction

As part of the Terrorism and Extremist Violence in the United States (TEVUS) database integration effort, researchers at the Terrorism Research Center in Fulbright College at the University of Arkansas and University of Oklahoma have been adding: 1) federal terrorism court cases and associated data and 2) incident and precursor geospatial data from these court cases to the American Terrorism Study (ATS) in order to examine geospatial patterns in terrorist behavior and determine if the patterns identified in earlier studies¹ have changed significantly.

The ATS allows examination of a number of different units of analysis. Analyses may examine: (1) characteristics of federal terrorism *court cases*; (2) the characteristics of persons indicted in each court case or involved in incidents, otherwise referred to as *indictees*; (3) characteristics of *incidents* and *planned incidents*; and (4) *precursor activities* that lead up to the incident and are necessary to carry it out and/or achieve the goals of the persons or groups.

The database allows researchers to examine detailed characteristics of the terrorism *incidents* associated with each of these federal court cases. Since some court cases involved arrests prior to an incident, these cases are not associated with a geocoded incident location unless the conspiracy had progressed to the point of target identification. Other court cases may be associated with multiple incidents. Therefore, the number of cases and number of incidents do not match. In addition to geocoded information on incident or target locations, the ATS includes geocoded information on what are variously referred to as “precursor,” “pre-incident,” or “antecedent” activities. We make no distinction between these terms, and they may be used interchangeably. For clarity, we will refer to these activities in this report as “*antecedent*” activities. However, we do distinguish between two types of antecedent activities: (1) *preparatory activities* are antecedent activities that are clearly committed in preparation for a terrorist incident; while (2) *ancillary activities* include any other activities conducted by the person or group associated with a terrorist incident that cannot be directly labeled as preparatory. These may include order maintenance offenses, thefts merely to ensure group survivability, target practice, etc.

In the ATS database, *case studies* involving 521 terrorist incidents from 1972 through 2011 – both planned and carried out – have been coded. These *case studies* group data related to one or more incidents and/or court cases based on spatial, temporal, or perpetrator similarities. In order for geospatial analysis to be performed, at a minimum location data for incident locations and associated terrorist residences and antecedent activities must be available at the city level. Because of this requirement, only 256 terrorism incidents were available for geospatial analysis. The number of antecedent activities coded currently totals 3,451. Of these 1,129 had sufficient location data and an associated incident with location data to be included in the analysis. The current analysis focuses upon the general relationships between terrorists’ residences, antecedent activities, and incident locations.

Additional information regarding the characteristics of incidents and associated precursor activities and breakdowns by category of terrorism is provided in Figures 1-20. Table 1 provides definitions of terms used in the analysis.

¹ “Geospatial Patterns of Precursor Behavior among Terrorists” Final Report to Human Factors/Behavioral Sciences Division, Science and Technology Directorate, U.S. Department of Homeland Security. July 2011; Pre-Incident Indicators of Terrorist Activities (PITA), NIJ Grant #2003-DT-CX-0003; Geospatial Analysis of Terrorist Activities (GATA), NIJ Grant #2005-IJ-CX-0200; and Terrorism in Time and Space (TITAS), NIJ Grant #2006-IJ-CX-0037

Table 1. American Terrorism Study Terminology

Definitions	
Case Study	Consists of one or more terrorism incidents, planned incidents, or conspiracies that are closely related either temporally, spatially, or through perpetrators. One or more court cases may be linked to a case study depending on if the perpetrators were tried individually or as a group.
Incident	An act of terrorism as defined in the Attorney General’s (AG) guidelines. ² In some case studies where a violent terrorism incident was not identified (often due to early interdiction by law enforcement) a conspiracy is listed as the incident. Examples include court cases involving material support of terrorism and funding of terrorist groups.
Court Case	A terrorism-related federal court case. The majority of the cases were investigated by the Federal Bureau of Investigation (FBI) under the AG’s terrorism guidelines. Additional cases were terrorism-related as designated by the Department of Justice (DOJ) or the Executive Office of U.S. Attorneys (EOUSA).
Indictee	A person indicted in a federal court case. People can be indicted multiple times, and so when referencing the number of indictees this is not the number of unique persons in the dataset.

² Terrorism is defined in the Code of Federal Regulations as “the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives” (28 C.F.R. Section 0.85).

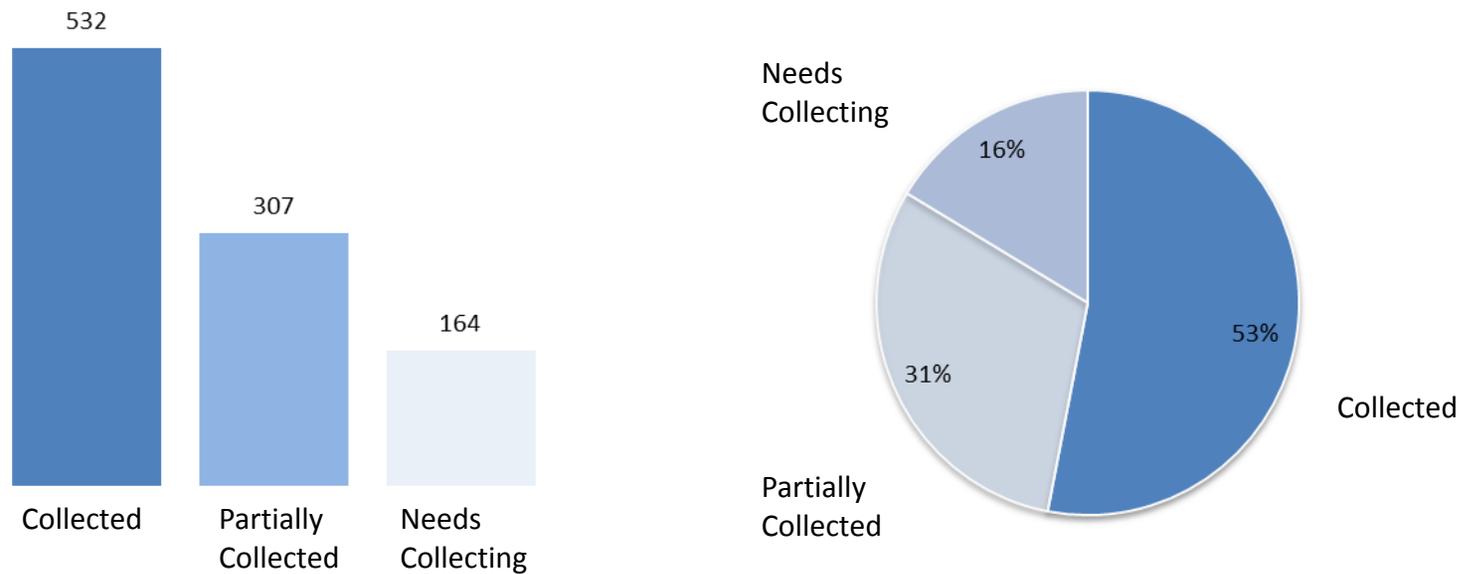
Notable Overall Patterns

- In most cases, the residential locations of terrorists seem to be predictors of both the locations of terrorists' antecedent activities and their eventual target locations.
- Slightly over one-third (35%) of terrorists lived within 30 miles of the target location during at least one phase of the preparation for an incident (Figure 6).
- Despite an increase in the number of measurements involving residence to antecedent activities (from 2,079 to 2,693 over the last year), these patterns remained remarkably consistent. Nearly one-half of the antecedent behaviors (46%) committed by terrorists occurred within thirty miles of their residences (Figure 8).
- Terrorists appear to make an effort to keep more distance between their residential locations and those activities that are most directly related to a terrorist incident. Specifically, while 57% of ancillary activities occurred within 30 miles of their residences (Figure 10), 40% of preparatory activities and 35% of incidents occurred within 30 miles (Figures 12 and 6).
- This pattern is confirmed when examining the locations of antecedent activities in relation to incident locations (Figure 14). A greater percentage of overtly preparatory behaviors (versus other types of antecedent activities) occur closer to the target location (Figures 18 and 16).
- Specifically, terrorists engaged in 38% of their preparatory behaviors within 30 miles of the target locations (Figure 18). This may be extremely relevant for local law enforcement.
- Overall, the general relationships identified in earlier studies have remained stable. Like traditional criminals, most terrorists are temporally and spatially bound by their environment. Although terrorists typically venture farther from their homes to commit acts of terrorism than traditional criminals do when plying their trade, terrorists do tend to *act locally*.
- Examining these relationships by category of terrorism, a greater proportion of al-Qa'ida-related (AQ-related) and environmental terrorists (44% and 43%) lived within 30 miles of the terrorist incident location than did either far-right (32%) or far-left (28%) terrorists (Figure 7).
- AQ-related terrorists committed more than two-thirds (68%) of their antecedent behaviors (both ancillary and preparatory) within thirty miles of where they lived. In contrast, environmental terrorists committed only about one-fourth (27%) of their antecedent behaviors (both ancillary and preparatory) within thirty miles of their residences. The percentages for other terrorist group types were closer the mean (46%) (Figure 9).
- When calculating the distance between antecedent activities and incident locations, the reverse is true: only about one-third (32%) of the antecedent activities of AQ-related terrorists occurred within thirty miles of the incident location, while nearly two-thirds (64%) of environmental terrorists' antecedent activities occurred within this range (Figure 15). In other words, prior to a terrorist event, AQ-related terrorists commit most of their antecedent behaviors close to where they live, while environmental terrorists commit most of these activities near the target location.

- When examining only preparatory activities, environmental terrorists stand out – they were nearly twice as likely (62%) to commit their preparatory crimes near the incident location compared to AQ-related (34%), Far-right (34%), and Far-left (40%) terrorists (Figure 19).
- Earlier comments regarding the tendency of AQ-related terrorists to “stick close to home” are exemplified in Figure 11. An overwhelming majority (85%) of ancillary activities by AQ-related terrorists are committed within 30 miles of their place of residence, a figure that far exceeds that of other group types. Although less dramatic, Figure 13 confirms that this trend also applies when examining only preparatory behaviors.
- Environmental terrorists are particularly likely to commit their preparatory behaviors near the terrorist incident location. Components for Improvised Incendiary Devices (IIDs) tend to be bought near the target location, constructed in a nearby staging area, and placed at the target location over a very short planning cycle. Note in Figure 19 the median distance of 21 miles between preparatory behaviors and incident locations for environmental terrorists (i.e., 50% of preparatory behaviors occurred farther away from the target and 50% nearer) compared with the median distances for other types of groups.

Figure 1. ATS Federal Terrorism Court Case Collection Status

The ATS database is currently tracking 1,003 terrorism-related federal court cases from 1978 through 2012. During the TEVUS effort 280 court cases have been completely collected and 201 partially collected.

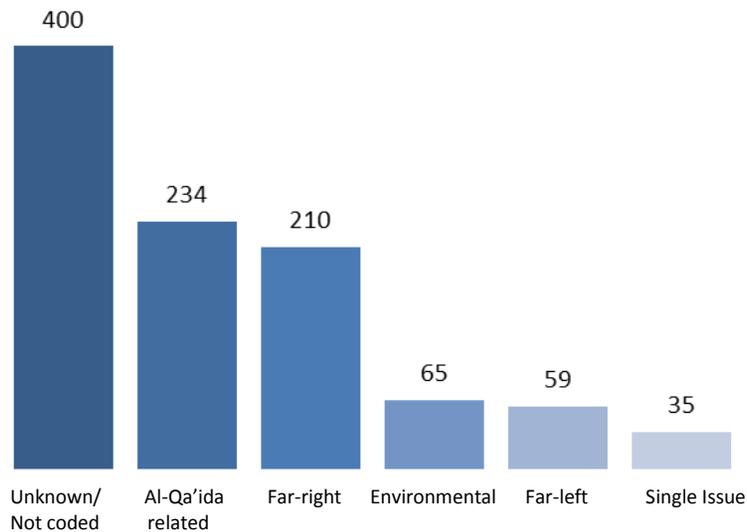


Court case documents are collected either by traveling to U.S. District court houses and photocopying the court records or by downloading them electronically from the PACER website. All court documents are not always available on PACER, and these cases are marked as “partially collected” until collection can be completed at the courthouse. Open court cases are periodically checked for availability of new court documents in an attempt to be as up-to-date as possible with court document collection.

Figure 2. Breakdown of ATS Court Cases by Terrorism Category

Identification of the category of terrorism for which each case belongs is currently underway and over the next year the large number of cases in the “Unknown/Not coded” category should diminish. From preliminary inspection a large number of these cases have been indicted under the International AG guidelines and will more than likely be al-Qa’ida-related.

Number of Cases by Category



Percentage of Cases by Category

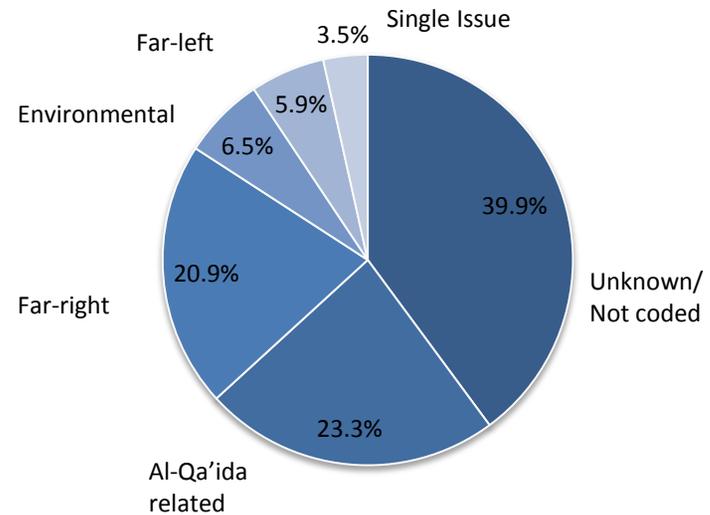


Figure 3. Geospatial Coding of ATS Terrorism Court Cases

Of the 356 court cases that have been coded for legal variables, 259 have been coded for geospatial and temporal variables. The database now includes 521 terrorism incident acts and 3,451 antecedent activities coded from geospatial data collection.

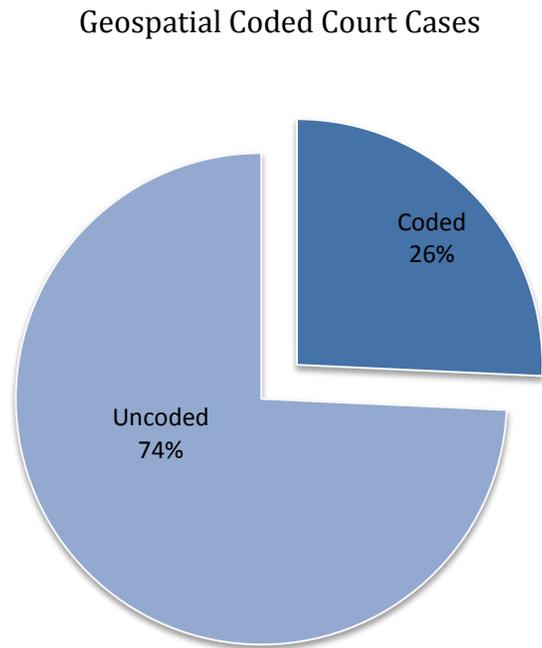


Figure 4. Prevalent Antecedent Activities

We have linked a total of 2,764 antecedent activities to terrorism incidents. These antecedent acts have been sub-coded into 1,019 ancillary and 1,745 preparatory activities.

Category	# Ancillary	# Preparatory	Total
Meetings	176	423	599
Communications	156	372	528
Travel	212	227	439
Fraud	260	176	436
Surveillance/Reconnaissance	26	127	153
Acquire Bombs/Weapons	11	140	151
Training	40	67	107
Violent Acts	36	45	81
Smuggling	26	56	82
Transport Weapons/Bombs	9	45	54
Establish Residence/Business	38	13	51
Manufacturing Weapons/Bombs	2	46	48
Other	27	8	35
Total	1,019	1,745	2,764

Figure 5. Activity Per Incident Analysis

Category	Ancillary acts	Preparatory acts	Antecedent acts	Incidents acts	Antecedent acts per Incident	Preparatory acts per Incident
Far-right	358	461	819	124	6.60	3.72
Far-left	97	243	340	91	3.74	2.67
Environmental	31	136	167	136	1.23	1.00
Al-Qa'ida related	194	613	807	62	13.02	9.89
Totals	680	1,453	2,133	413	1.65	3.52

Note: Ancillary and preparatory acts are subcategories of antecedent acts. Only antecedent acts in the database that were associated with an Incident are included in the table above. Additional case studies have antecedent acts, but no incident could be identified for analysis.

Figure 6. Analysis of linear distance measurements from residences to incident locations.

Distance Between Residence of Perpetrator and Terrorist Incident Locations

Data

- 180 Unique perpetrators
- 239 Residential locations*
- 256 Incident locations

*Some perpetrators had multiple addresses where they stayed prior to the incident.

Quick Stats

Avg. distance	321.90 miles
Median**	120.18 miles
Std. dev.	502.82
Min. distance	0 miles
Max. distance	2,696 miles

**Medians are particularly useful, indicating that 50% of the measurements were greater and 50% were less, thus providing some control over the effect of outliers.

Distance Range	# of Measurements
0 -30 miles	268
31-90 miles	97
91-270 miles	137
271-810 miles	179
811+ miles	93
Total 774	

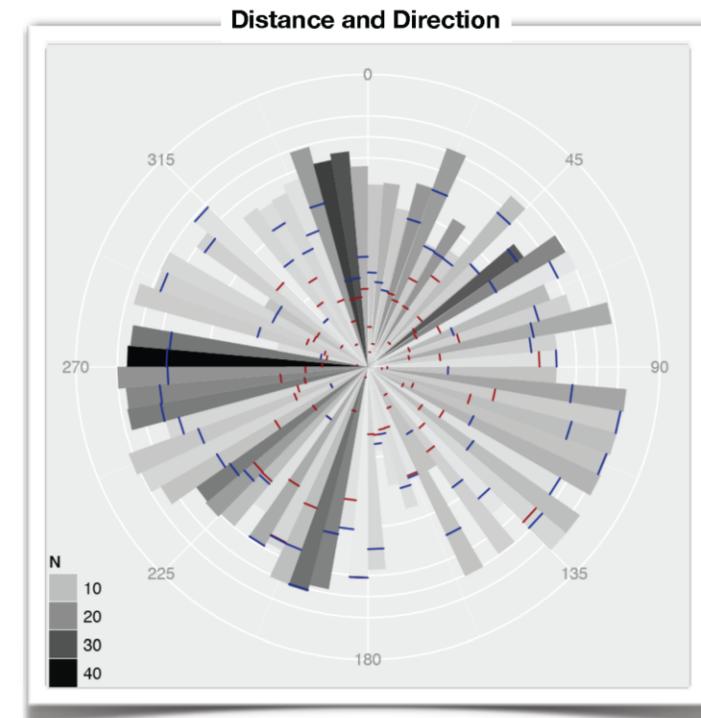
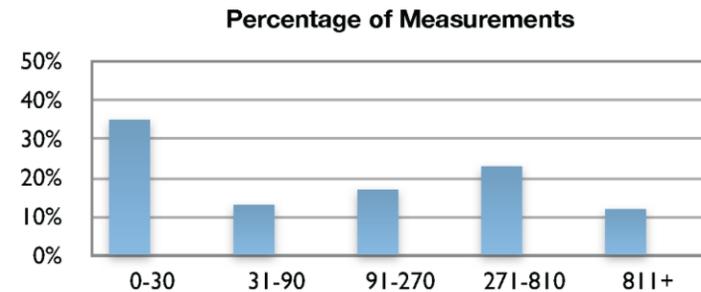
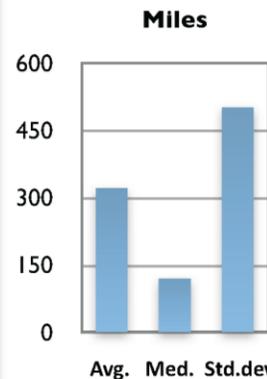
Source: American Terrorism Study Database, 2012

Distance Breakdown

Range	%
0-30	34.63%
31-90	12.53%
91-270	17.70%
271-810	23.13%
811+	12.02%

Stats

Type	Miles
Avg.	321.90
Median	120.18
Std. dev.	502.82



The rose diagram above shows the spatial relationship between the location of residences and incidents. The center point represents the location of all incidents. The bars show the location of residences in reference to what distance and direction the residence was from the location of the incident. The darker the bar the greater the number of residences that were located in that direction relative to the incident. The blue line on each bar represents the average distance for all measurements in that segment, while the red bar represents the minimum measured distance.

Figure 7. Comparison by category of terrorism for measurements from residences to incident locations.

	Al-Qa'ida related	Environmental	Far-right	Far-left	All Categories
0 - 30 miles	44%	43%	32%	28%	35%
31 - 90 miles	3%	14%	8%	16%	13%
91 - 270 miles	19%	12%	19%	21%	18%
271 - 810 miles	15%	12%	19%	35%	23%
811 + miles	19%	18%	20%	0%	12%
Minimum Distance	0	0	0	1	0
Maximum Distance	2,273	2,696	1,411	557	2,696
Mean	324	408	344	194	322
Median	121	53	210	132	120
Std. dev.	480	700	392	183	503
Unique Perpetrators	43	65	48	17	180
Unique Incidents	25	85	56	67	256
Measurements	86	260	108	295	774

Note: The statistics for "All Categories" include Single Issue, Nationalist/Separatist, and Unknown categories but are not shown individually as there were not enough data for meaningful analysis. The numbers above may not add up to 100% because of rounding error.

Figure 8. Analysis of linear distance measurements from residences to antecedent activity locations.

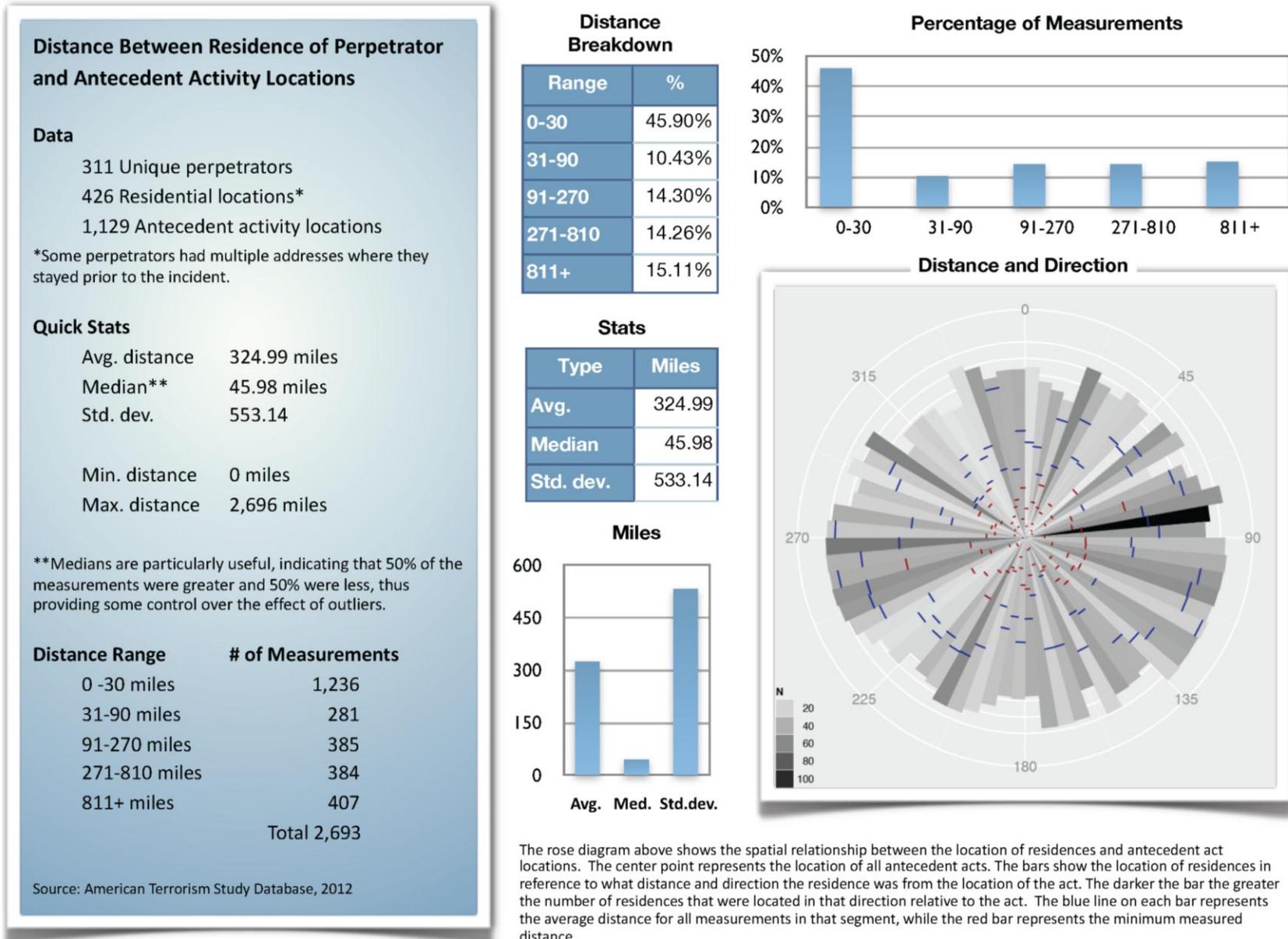
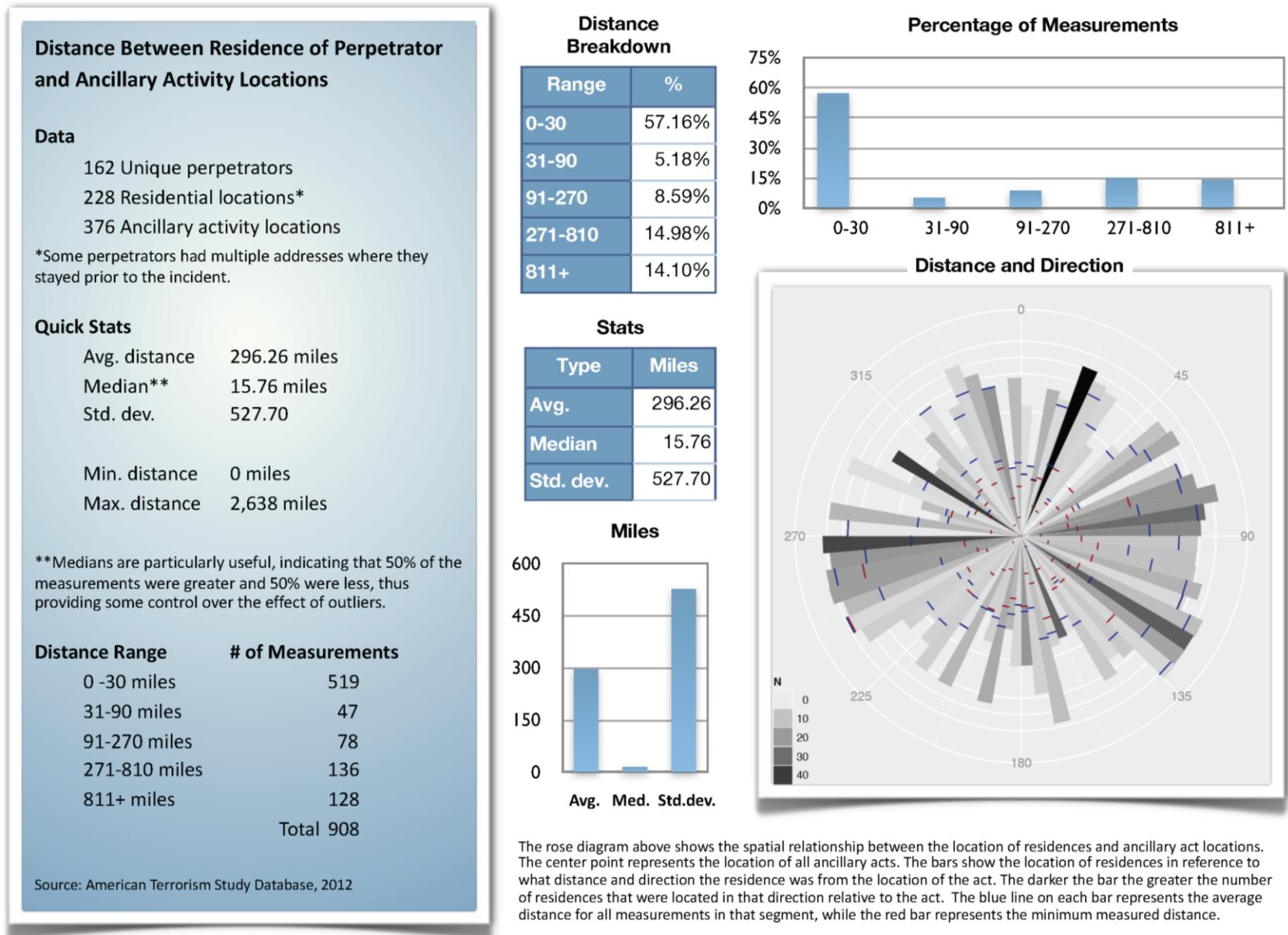


Figure 9. Comparison by category of terrorism for measurements from residences to antecedent activity locations.

	Al-Qa'ida related	Environmental	Far-right	Far-left	All Categories
0 - 30 miles	68%	27%	34%	44%	46%
31 - 90 miles	5%	11%	10%	16%	10%
91 - 270 miles	7%	20%	17%	14%	14%
271 - 810 miles	8%	9%	21%	16%	14%
811 + miles	12%	33%	18%	10%	15%
Minimum Distance	0	0	0	0	0
Maximum Distance	2,462	2,696	2,599	1,929	2,696
Mean	241	701	361	257	325
Median	12	163	128	63	46
Std. dev.	532	906	482	437	553
Unique Perpetrators	60	45	128	43	311
Unique Acts	288	84	380	241	1,129
Measurements	539	271	1,001	600	2,693

Note: The statistics for "All Categories" include Single Issue, Nationalist/Separatist, and Unknown categories but are not shown individually as there were not enough data for meaningful analysis. The numbers above may not add up to 100% because of rounding error.

Figure 10. Analysis of linear distance measurements from residences to ancillary activity locations.



The rose diagram above shows the spatial relationship between the location of residences and ancillary act locations. The center point represents the location of all ancillary acts. The bars show the location of residences in reference to what distance and direction the residence was from the location of the act. The darker the bar the greater the number of residences that were located in that direction relative to the act. The blue line on each bar represents the average distance for all measurements in that segment, while the red bar represents the minimum measured distance.

Figure 11. Comparison by category of terrorism for measurements from residences to ancillary activity locations.

	Al-Qa'ida related	Environmental	Far-right	Far-left	All Categories
0 - 30 miles	85%	36%	32%	58%	57%
31 - 90 miles	2%	3%	7%	8%	5%
91 - 270 miles	1%	18%	13%	10%	9%
271 - 810 miles	3%	5%	25%	19%	15%
811 + miles	9%	38%	23%	5%	14%
Minimum Distance	0	0	0	0	0
Maximum Distance	2,462	2,638	2,565	1,662	2,638
Mean	196	837	439	178	296
Median	12	139	233	16	16
Std. dev.	553	1,018	521	310	528
Unique Perpetrators	19	20	71	29	162
Unique Acts	91	15	125	93	376
Measurements	192	39	359	189	908

Note: The statistics for "All Categories" include Single Issue, Nationalist/Separatist, and Unknown categories but are not shown individually as there were not enough data for meaningful analysis. The numbers above may not add up to 100% because of rounding error.

Figure 12. Analysis of linear distance measurements from residences to preparatory activity locations.

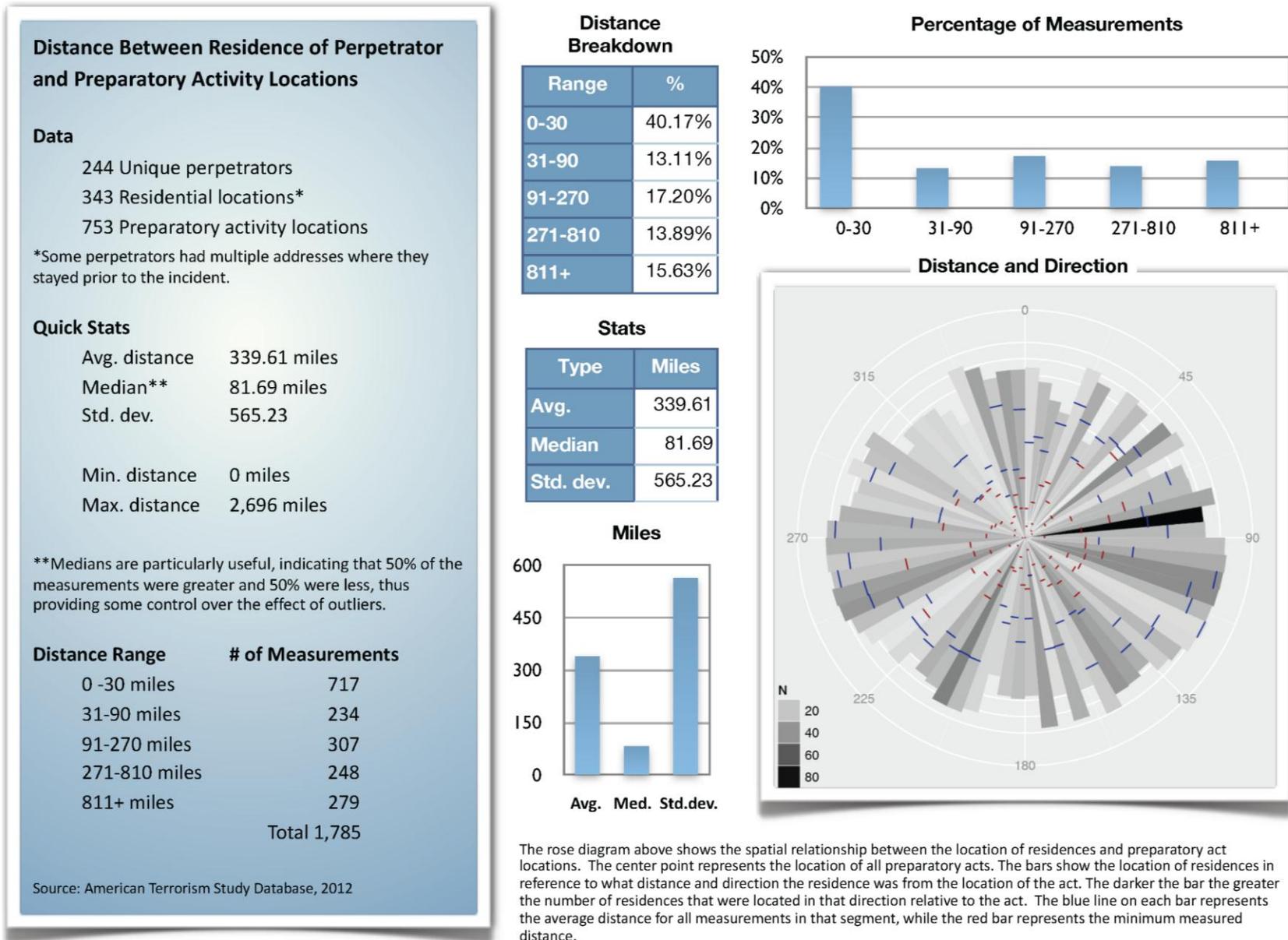
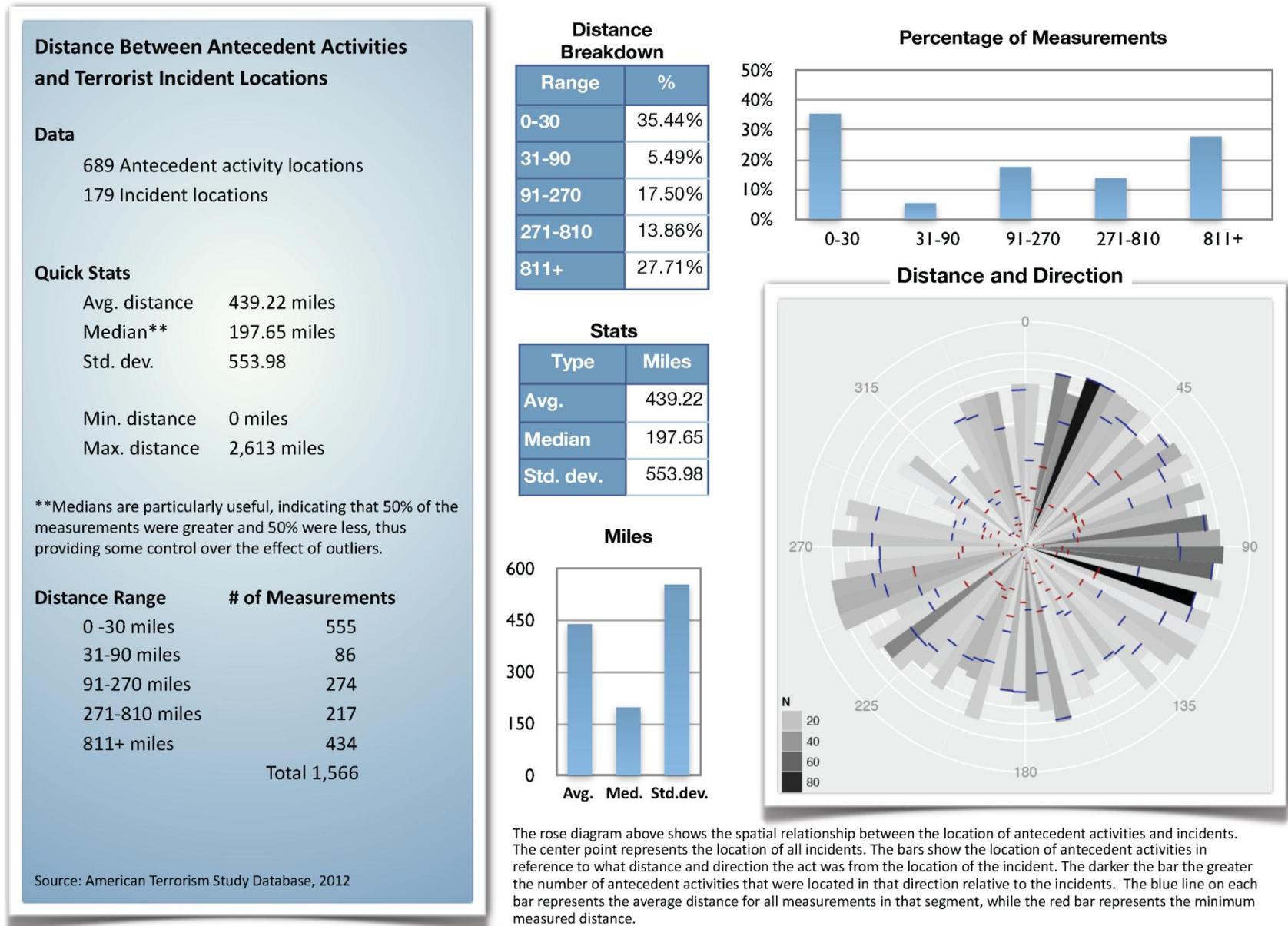


Figure 13. Comparison by category of terrorism for measurements from residences to preparatory activity locations.

	Al-Qa'ida related	Environmental	Far-right	Far-left	All Categories
0 - 30 miles	59%	25%	34%	37%	40%
31 - 90 miles	7%	12%	14%	19%	13%
91 - 270 miles	10%	20%	19%	16%	17%
271 - 810 miles	10%	10%	18%	15%	14%
811 + miles	14%	32%	15%	13%	16%
Minimum Distance	0	0	0	0	0
Maximum Distance	2,462	2,696	2,599	1,929	2,696
Mean	266	678	330	293	340
Median	13	163	115	83	82
Std. dev.	518	886	487	480	565
Unique Perpetrators	55	35	104	34	244
Unique Acts	197	69	275	148	753
Measurements	347	232	682	411	1,785

Note: The statistics for "All Categories" include Single Issue, Nationalist/Separatist, and Unknown categories but are not shown individually as there were not enough data for meaningful analysis. The numbers above may not add up to 100% because of rounding error.

Figure 14. Analysis of linear distance measurements from antecedent activities to incident locations.



The rose diagram above shows the spatial relationship between the location of antecedent activities and incidents. The center point represents the location of all incidents. The bars show the location of antecedent activities in reference to what distance and direction the act was from the location of the incident. The darker the bar the greater the number of antecedent activities that were located in that direction relative to the incidents. The blue line on each bar represents the average distance for all measurements in that segment, while the red bar represents the minimum measured distance.

Figure 15. Comparison by category of terrorism for measurements from antecedent activities to incident locations.

	Al-Qa'ida related	Environmental	Far-right	Far-left	All Categories
0 - 30 miles	32%	64%	27%	35%	35%
31 - 90 miles	3%	9%	4%	11%	5%
91 - 270 miles	8%	7%	24%	29%	18%
271 - 810 miles	9%	7%	31%	14%	14%
811 + miles	47%	13%	14%	11%	28%
Minimum Distance	0	0	0	0	0
Maximum Distance	2,613	2,443	1,619	1,191	2,613
Mean	644	264	332	242	439
Median	513	14	260	115	198
Std. dev.	658	594	327	326	554
Unique Acts	205	89	212	127	689
Unique Incidents	33	58	42	45	179
Measurements	703	135	320	352	1,566

Note: The statistics for "All Categories" include Single Issue, Nationalist/Separatist, and Unknown categories but are not shown individually as there were not enough data for meaningful analysis. The numbers above may not add up to 100% because of rounding error.

Figure 16. Analysis of linear distance measurements from ancillary activities to incident locations.

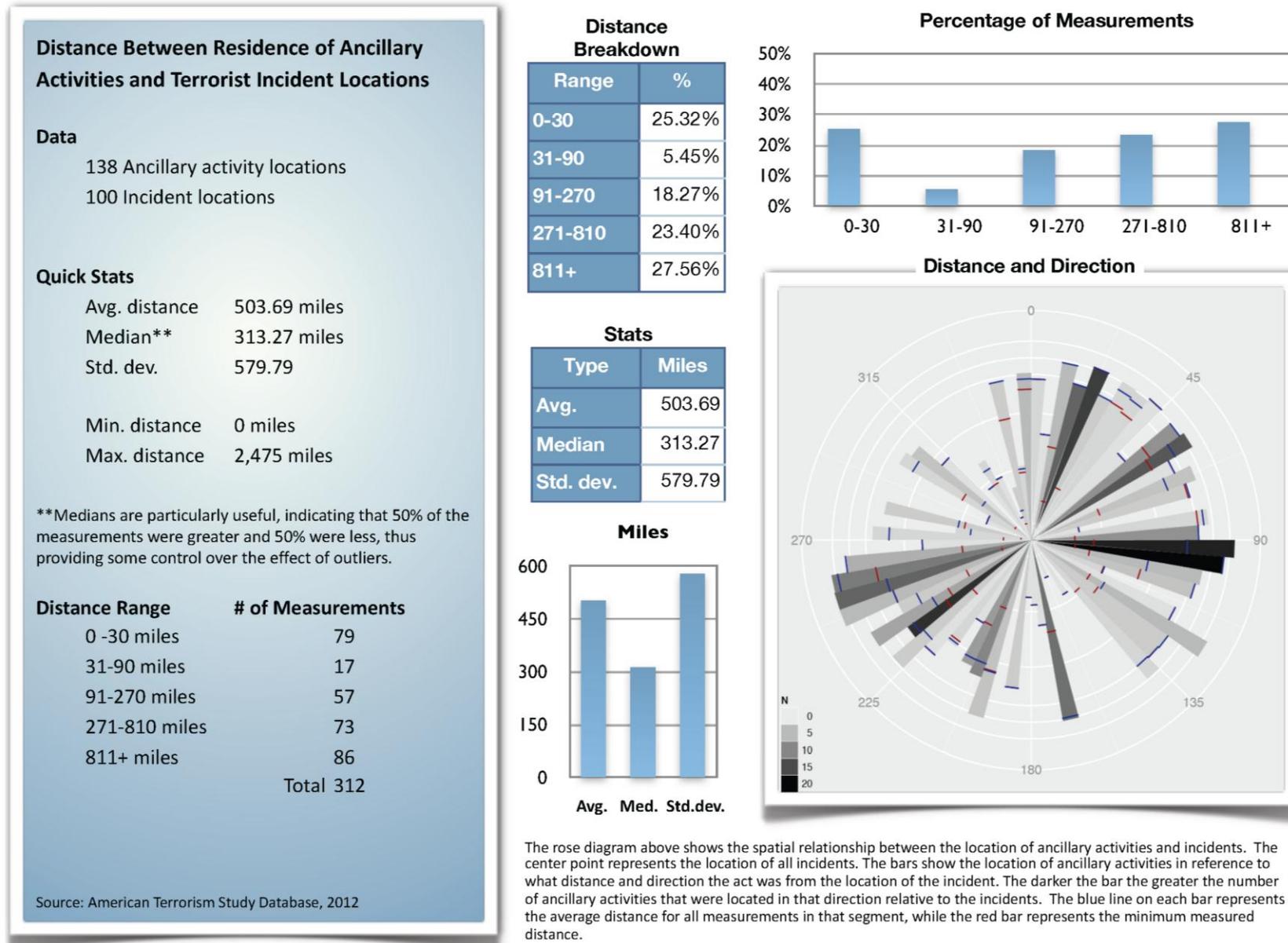


Figure 17. Comparison by category of terrorism for measurements from ancillary activities to incident locations.

	Al-Qa'ida related	Environmental	Far-right	Far-left	All Categories
0 - 30 miles	26%	71%	5%	25%	25%
31 - 90 miles	6%	0%	1%	10%	5%
91 - 270 miles	13%	0%	24%	23%	18%
271 - 810 miles	8%	0%	49%	26%	23%
811 + miles	47%	29%	21%	16%	28%
Minimum Distance	0	0	0	0	0
Maximum Distance	2,475	2,443	1,133	1,181	2,475
Mean	755	535	462	337	504
Median	532	8	394	166	313
Std. dev.	760	883	292	364	580
Unique Acts	32	13	51	34	138
Unique Incidents	25	26	16	32	100
Measurements	85	34	80	105	312

Note: The statistics for "All Categories" include Single Issue, Nationalist/Separatist, and Unknown categories but are not shown individually as there were not enough data for meaningful analysis. The numbers above may not add up to 100% because of rounding error.

Figure 18. Analysis of linear distance measurements from preparatory activities to incident locations.

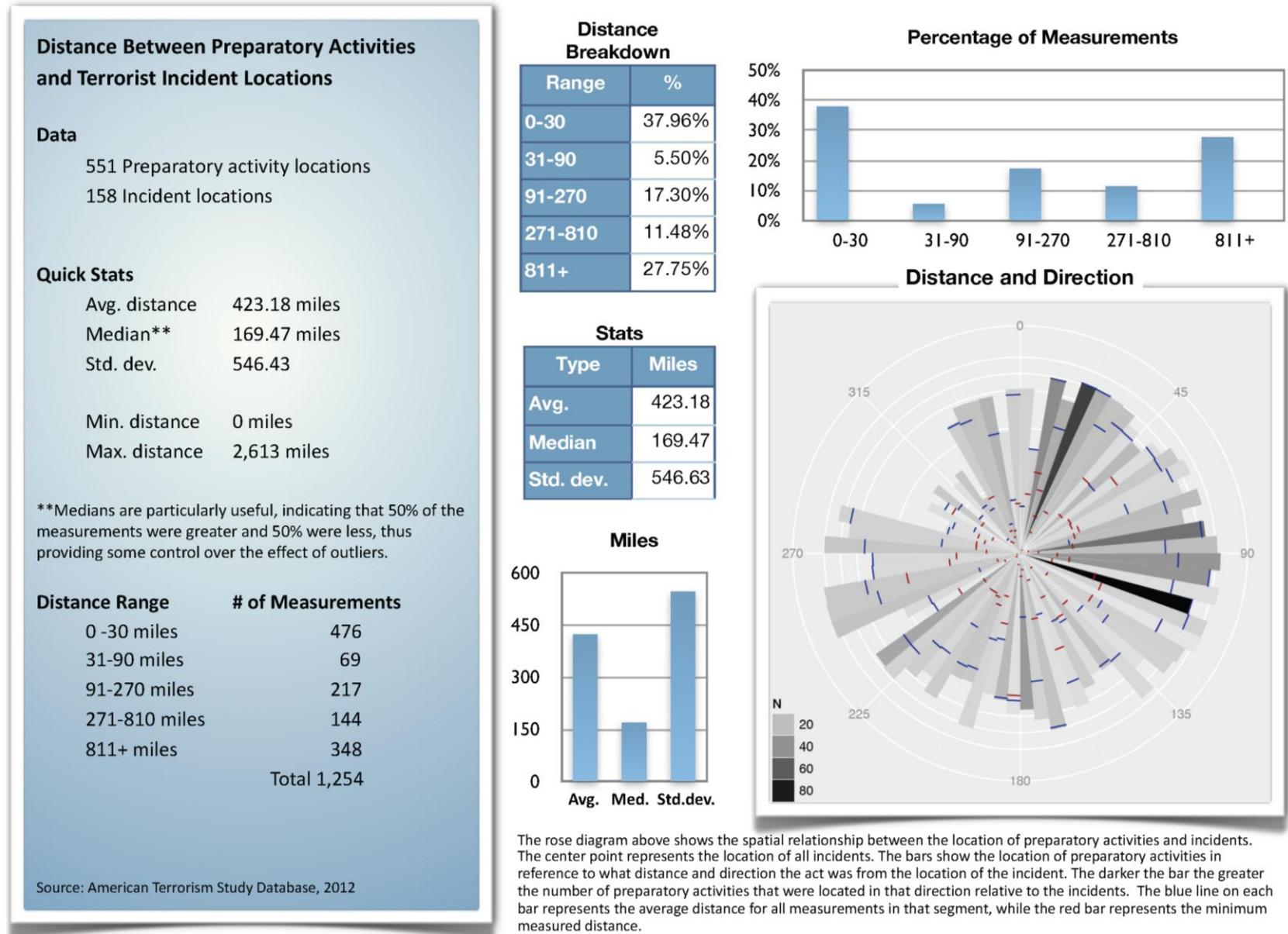


Figure 19. Comparison by category of terrorism for measurements from preparatory activities to incident locations.

	Al-Qa'ida related	Environmental	Far-right	Far-left	All Categories
0 - 30 miles	34%	62%	34%	40%	38%
31 - 90 miles	3%	12%	5%	11%	6%
91 - 270 miles	7%	10%	24%	32%	17%
271 - 810 miles	9%	9%	25%	9%	11%
811 + miles	47%	7%	12%	9%	28%
Minimum Distance	0	0	0	0	0
Maximum Distance	2,613	2,443	1,619	1,191	2,613
Mean	628	173	288	201	423
Median	495	21	228	89	169
Std. dev.	642	428	326	301	546
Unique Acts	173	76	161	93	551
Unique Incidents	30	40	42	45	158
Measurements	618	101	240	247	1,254

Note: The statistics for "All Categories" include Single Issue, Nationalist/Separatist, and Unknown categories but are not shown individually as there were not enough data for meaningful analysis. The numbers above may not add up to 100% because of rounding error.

Figure 20. Comparison by category of terrorism for measurements less than 30 miles.

Percentage of measurements that were less than 30 miles	Residence - Incident	Residence - Antecedent	Residence - Ancillary	Residence - Preparatory	Antecedent - Incident	Ancillary - Incident	Preparatory - Incident
Al-Qa'ida related	44%	68%	85%	59%	32%	26%	34%
Environmental	43%	27%	36%	25%	64%	71%	62%
Far-right	32%	34%	32%	34%	27%	5%	34%
Far-left	28%	44%	58%	37%	35%	25%	40%
Average for All Categories	35%	46%	57%	40%	35%	25%	38%