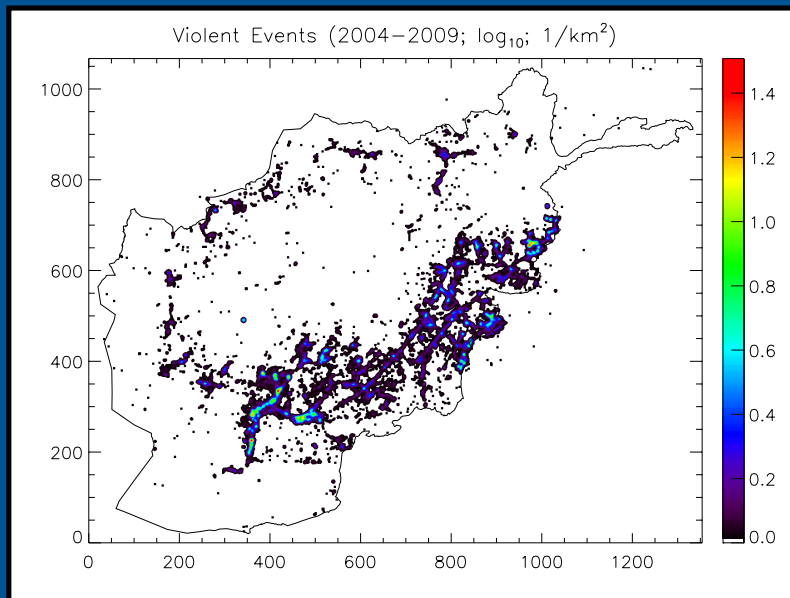# Space, Time, and Violence in Afghanistan's [Counter]insurgency

Simon DeDeo

Omidyar Fellow, Santa Fe Institute

Frontiers of Data Analysis: Foreign Policy as a Complex System

25 February 2011

Violent Events (2004−2009; $\log_{10}$; $1/km^2$)

"numbers exert a magic spell on human minds, particularly if they are presented with the help of computers."

Calculating Byzantium

Social Landscapes, Physical Landscapes

Fig. 19: Visualisation of the network of the *dynatoi* (the powerful), 1310-1341 (n = 187), with Emperor Andronikos II Palaiologos and Emperor Andronikos III Palaiologos as two centres of gravity
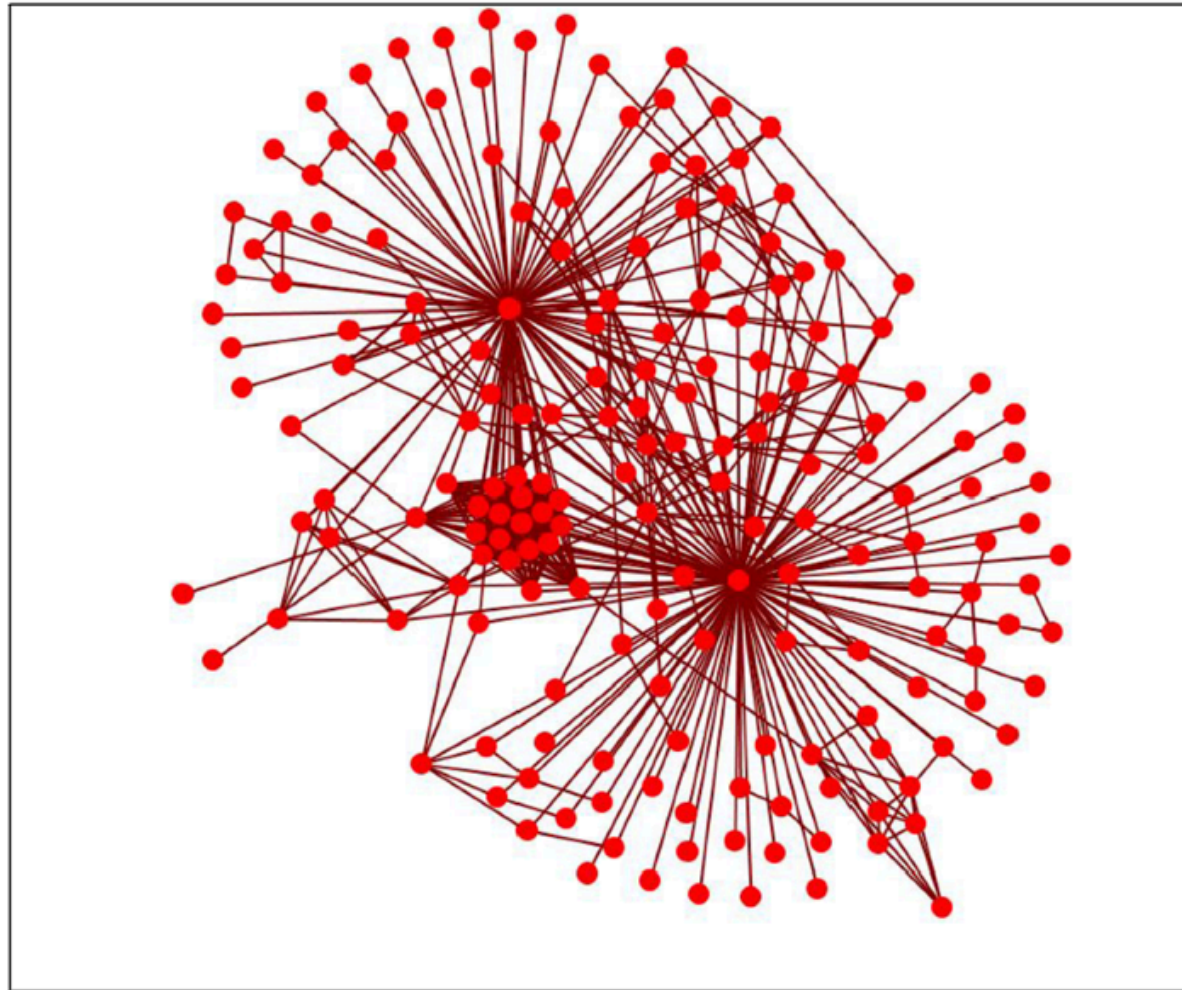
Calculating Byzantium, Preiser-Kapeller (2010)
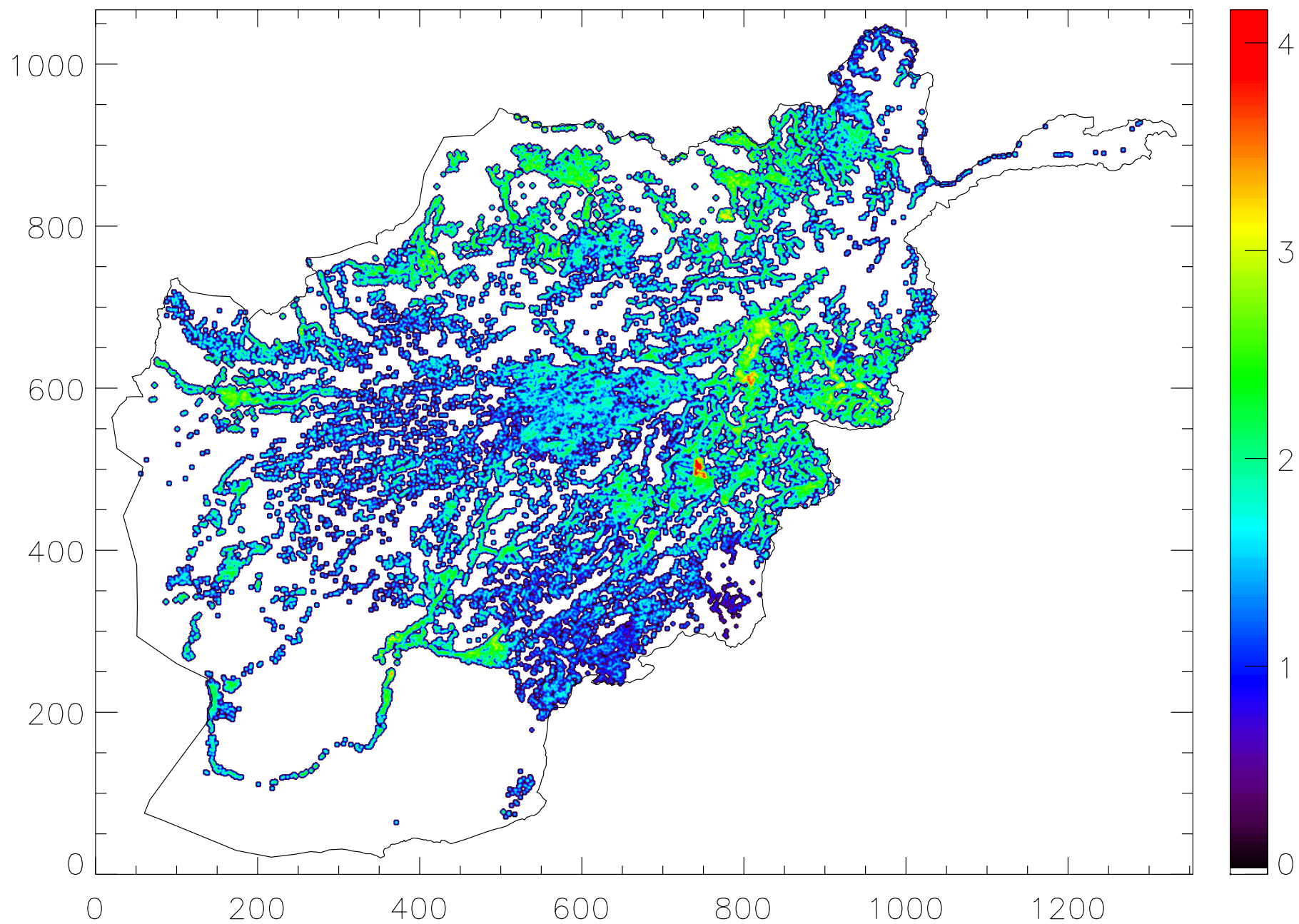
Social Landscapes, Physical Landscapes

(Facebook Banners, collected by Washington Post)
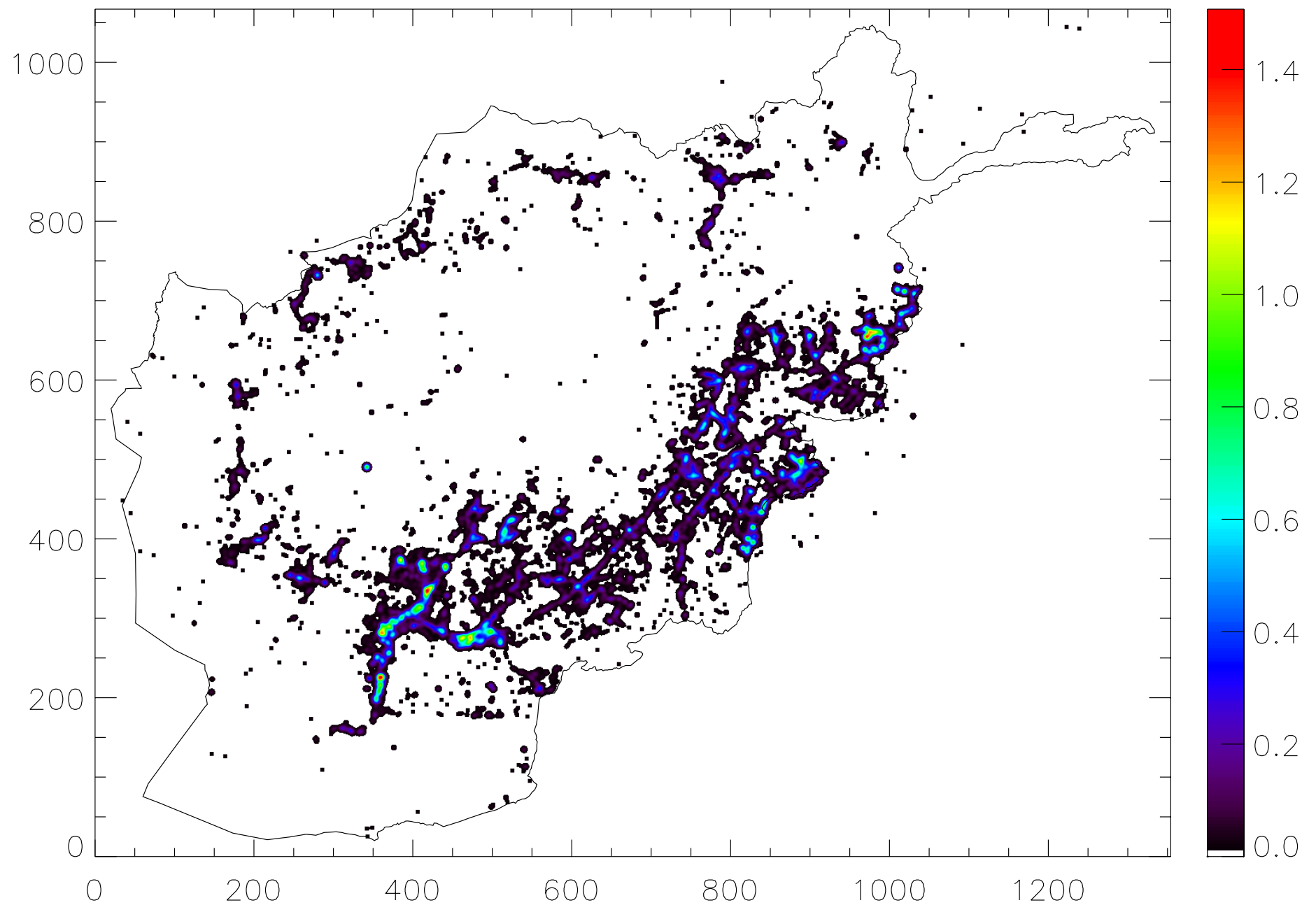
Social Landscapes, Physical Landscapes

(Tahrir Square, 2011; UPI agency)

Population (log_{10}; $1/km^2$)

Violent Events (2004−2009; $\log_{10}$; $1/km^2$)

Leaked Data (25 July 2010)

70,000 entries

{:reportkey=>"C72FA4BD-2DC3-41F5-84D0-87D2640D5088", :date=>"2004-02-11 00:00:00", :type=>:explosive_hazard, :category=>:ied_explosion, :trackingnumber=>"2007-033-005353-0637", :title=>"(EXPLOSIVE HAZARD) IED EXPLOSION RPT (UNK) OTHER : 0 INJ/DAM", :summary=>"(S//REL GCTF) CJSOTF-A REPORTS ODA CONVOY AMBUSHED IVO GERESK. AT 110740ZFEB04 CJSOTF-A REPORTED AN ODA CONVOY WAS AMBUSHED IVO GERESK; THE AMBUSH WAS INITIATED BY AN IED WHICH DETONATED BEHIND THE FIRST VEHICLE IN THE CONVOY (CONVOY CONSISTED OF THREE VEHICLES), THE CONVOY WAS HIT SIMULTANEOUSLY WITH SMALL ARMS FIRE. THE CONVOY RETURNED FIRE AND MOVED OUT OF THE KILL ZONE. CJSOTF-A REPORTED THERE WERE NO CASUALTIES AND NO DAMAGE TO EQUIPMENT.", :region=>:rc_south, :attackon=>:enemy, :complexattack=>false, :reportingunit=>:other, :unitname=>:other, :typeofunit=>:cf, :friendlywia=>0, :friendlykia=>0, :hostnationwia=>0, :hostnationkia=>0, :civilianwia=>0, :civiliankia=>0, :enemywia=>0, :enemykia=>0, :enemydetained=>0, :mgrs=>"41RPR4369320256",

:latitude=>31.80888939, :longitude=>64.51805878,

:originatorgroup=>:unknown, :updatedbygroup=>:j_orsa, :ccir=>:"", :sigact=>:"", :affiliation=>:enemy, :dcolor=>:red, :classification=>:secret, :start=>2004-02-11 07:40:00 UTC, :province=>:hilmand, :district=>:nahri_sarraj, :nearest_geocode=>"AF230220156", :nearest_name=>"Abdurrashid Karez", :number=>168}

70,000 entries

{:reportkey=>"C72FA4BD-2DC3-41F5-84D0-87D2640D5088", :date=>"2004-02-11 00:00:00", :type=>:explosive_hazard, :category=>:ied_explosion, :trackingnumber=>"2007-033-005353-0637", :title=>"(EXPLOSIVE HAZARD) IED EXPLOSION RPT (UNK) OTHER : 0 INJ/DAM", :summary=>"(S//REL GCTF) CJSOTF-A REPORTS ODA CONVOY AMBUSHED IVO GERESK. AT 110740ZFEB04 CJSOTF-A REPORTED AN ODA CONVOY WAS AMBUSHED IVO GERESK; THE AMBUSH WAS INITIATED BY AN IED WHICH DETONATED BEHIND THE FIRST VEHICLE IN THE CONVOY (CONVOY CONSISTED OF THREE VEHICLES), THE CONVOY WAS HIT SIMULTANEOUSLY WITH SMALL ARMS FIRE. THE CONVOY RETURNED FIRE AND MOVED OUT OF THE KILL ZONE. CJSOTF-A REPORTED THERE WERE NO CASUALTIES AND NO DAMAGE TO EQUIPMENT.", :region=>:rc_south, :attackon=>:enemy, :complexattack=>false, :reportingunit=>:other, :unitname=>:other, :typeofunit=>:cf, :friendlywia=>0, :friendlykia=>0, :hostnationwia=>0, :hostnationkia=>0, :civilianwia=>0, :civiliankia=>0, :enemywia=>0, :enemykia=>0, :enemydetained=>0, :mgrs=>"41RPR4369320256",

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Direct / Indirect Fire events : 25,762

IED (improvised explosive device) events : 15,329

70,000 entries

{:reportkey=>"C72FA4BD-2DC3-41F5-84D0-87D2640D5088", :date=>"2004-02-11 00:00:00", :type=>:explosive_hazard, :category=>:ied_explosion, :trackingnumber=>"2007-033-005353-0637", :title=>"(EXPLOSIVE HAZARD) IED EXPLOSION RPT (UNK) OTHER : 0 INJ/DAM", :summary=>"(S//REL GCTF) CJSOTF-A REPORTS ODA CONVOY AMBUSHED IVO GERESK. AT 110740ZFEB04 CJSOTF-A REPORTED AN ODA CONVOY WAS AMBUSHED IVO GERESK; THE AMBUSH WAS INITIATED BY AN IED WHICH DETONATED BEHIND THE FIRST VEHICLE IN THE CONVOY (CONVOY CONSISTED OF THREE VEHICLES), THE CONVOY WAS HIT SIMULTANEOUSLY WITH SMALL ARMS FIRE. THE CONVOY RETURNED FIRE AND MOVED OUT OF THE KILL ZONE. CJSOTF-A REPORTED THERE WERE NO CASUALTIES AND NO DAMAGE TO EQUIPMENT.", :region=>:rc_south, :attackon=>:enemy, :complexattack=>false, :reportingunit=>:other, :unitname=>:other, :typeofunit=>:cf, :friendlywia=>0, :friendlykia=>0, :hostnationwia=>0, :hostnationkia=>0, :civilianwia=>0, :civiliankia=>0, :enemywia=>0, :enemykia=>0, :enemydetained=>0, :mgrs=>"41RPR4369320256",

:latitude=>31.80888939, :longitude=>64.51805878,

:originatorgroup=>:unknown, :updatedbygroup=>:j_orsa, :ccir=>:"", :sigact=>:"", :affiliation=>:enemy, :dcolor=>:red, :classification=>:secret, :start=>2004-02-11 07:40:00 UTC, :province=>:hilmand, :district=>:nahri_sarraj, :nearest_geocode=>"AF230220156", :nearest_name=>"Abdurrashid Karez", :number=>168}
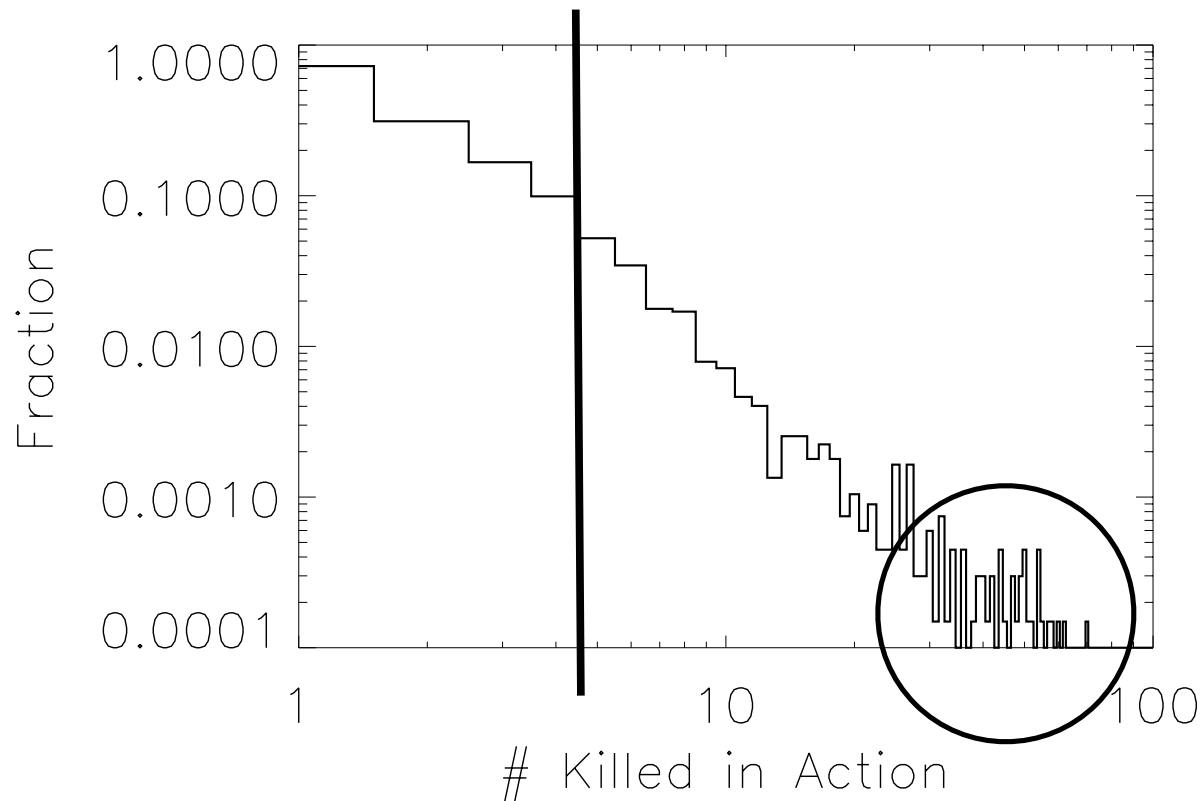
Direct / Indirect Fire events : 25,762
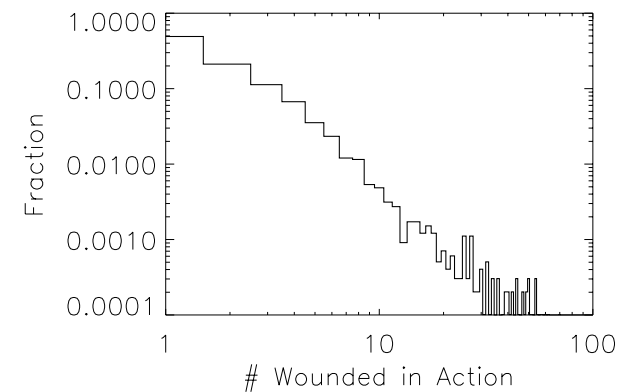IED (improvised explosive device) events : 15,329

Recorded wounded: 26,403 [NATO: 7257; all others: 19,146]
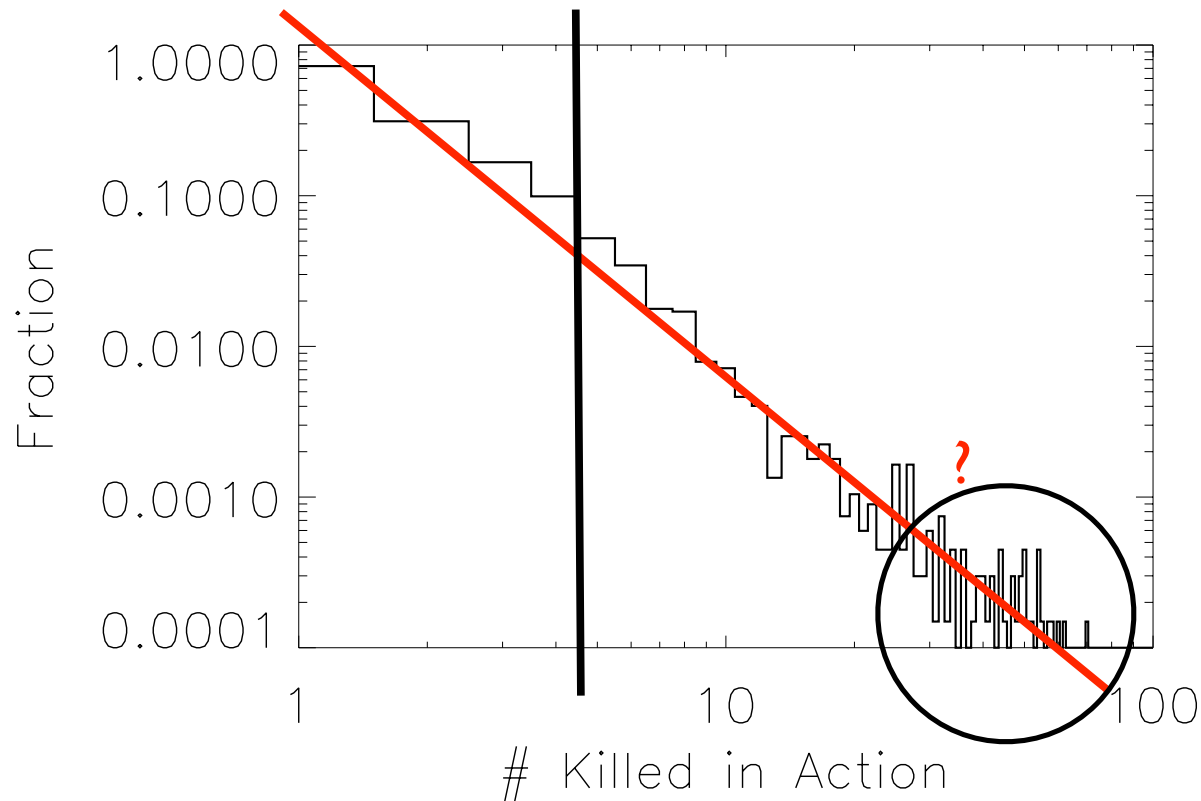Recorded died: 24,022 [NATO: 1143; all others: 22,879]
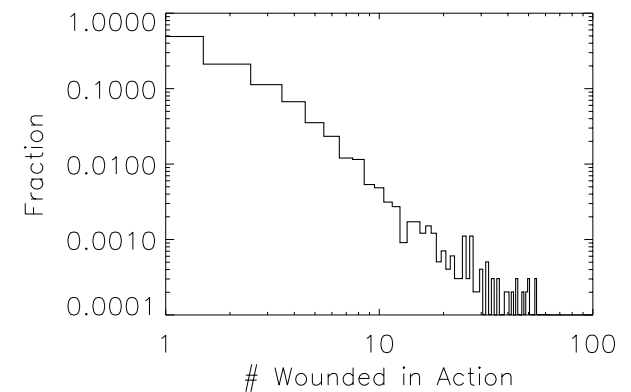
The Necessity of Statistics

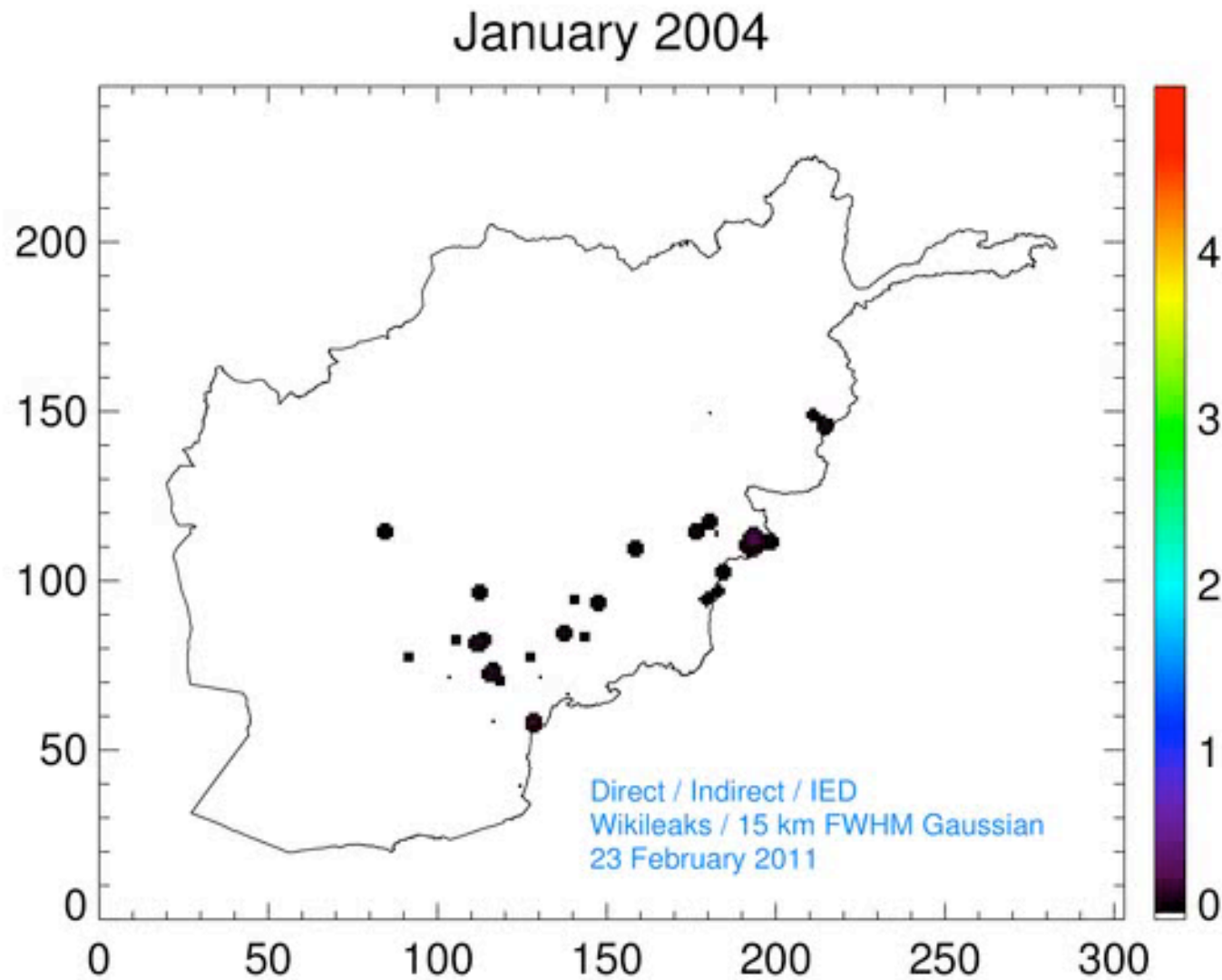Most events have "only" one or two deaths
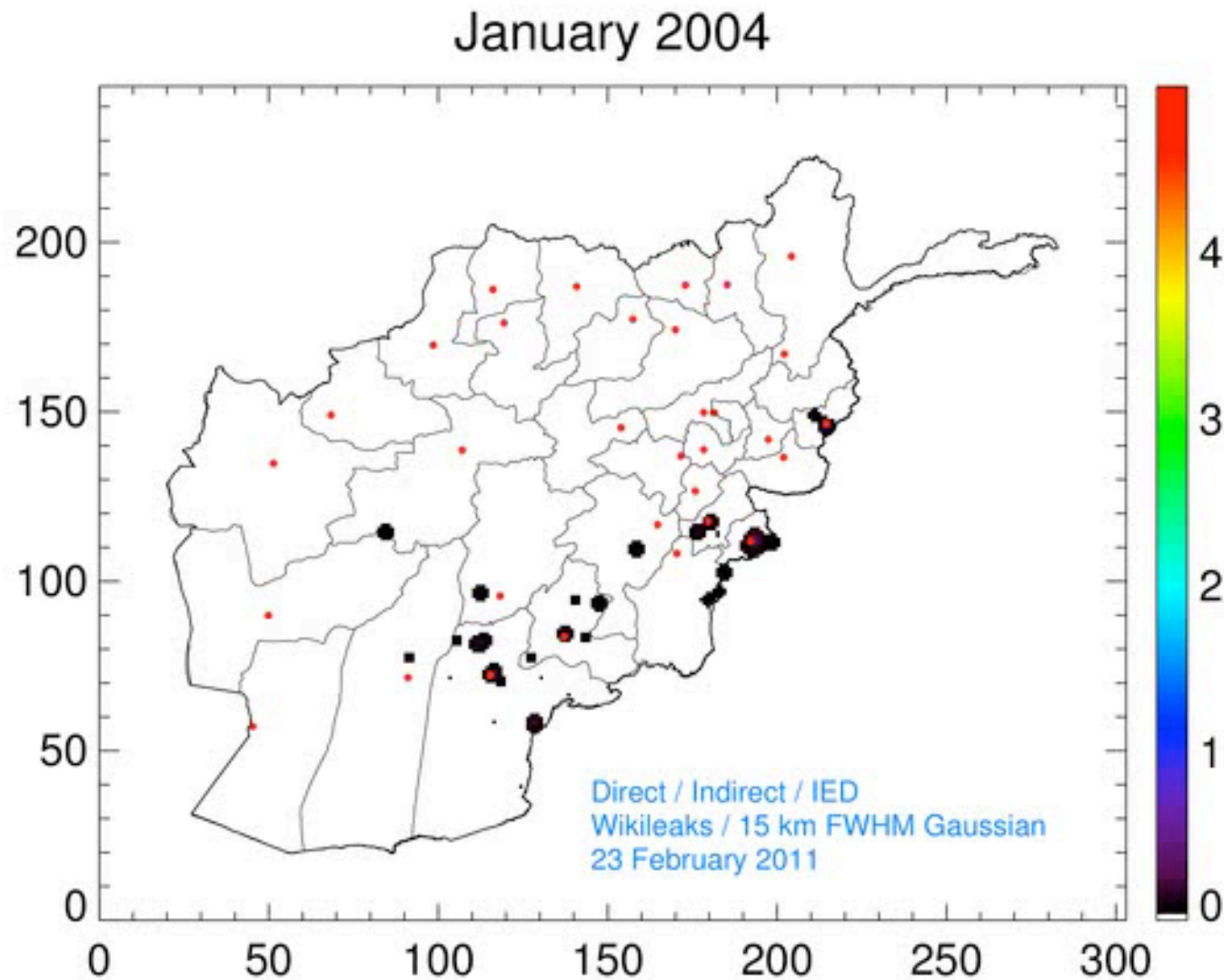Majority occur in events N≤4

The Necessity of Statistics

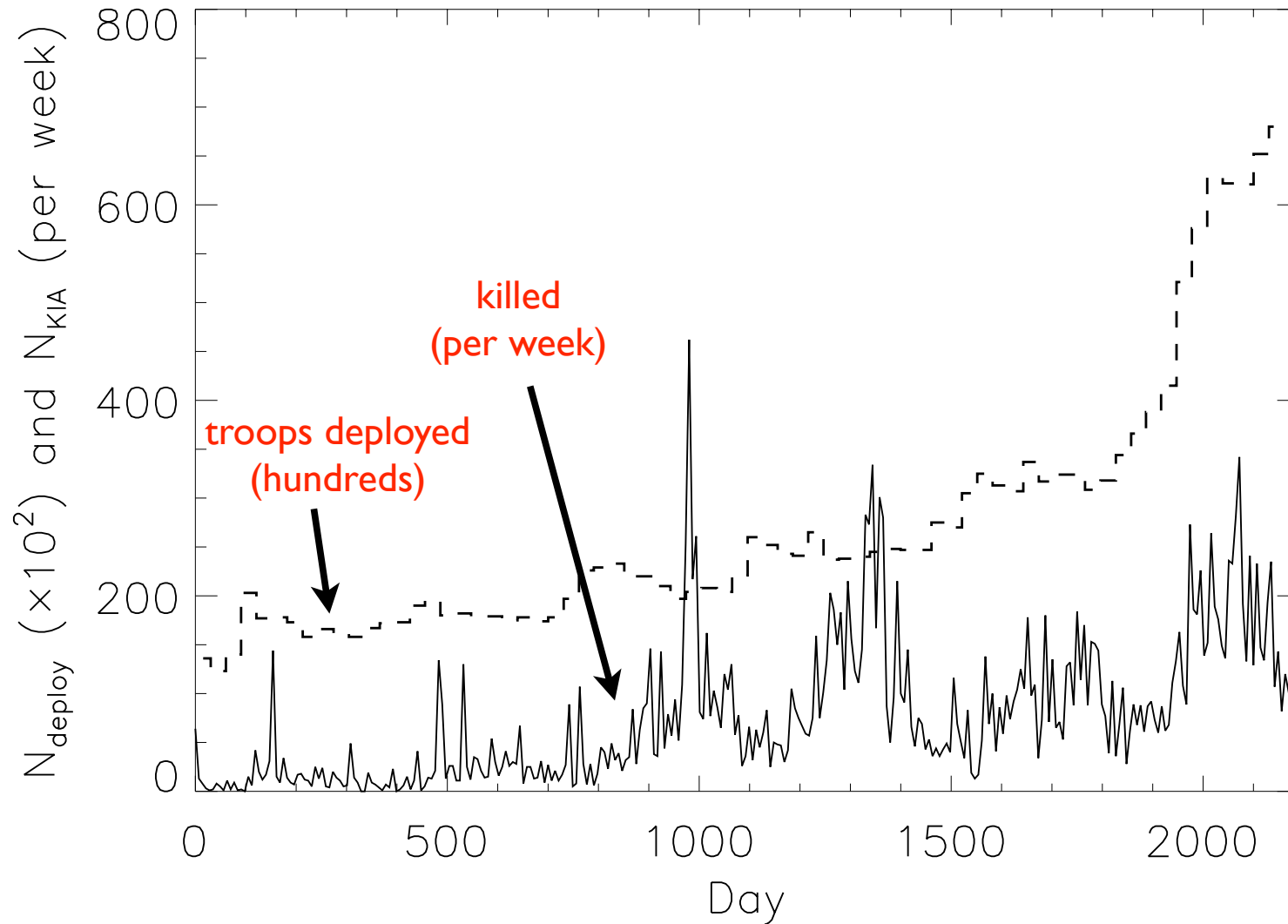Most events have "only" one or two deaths
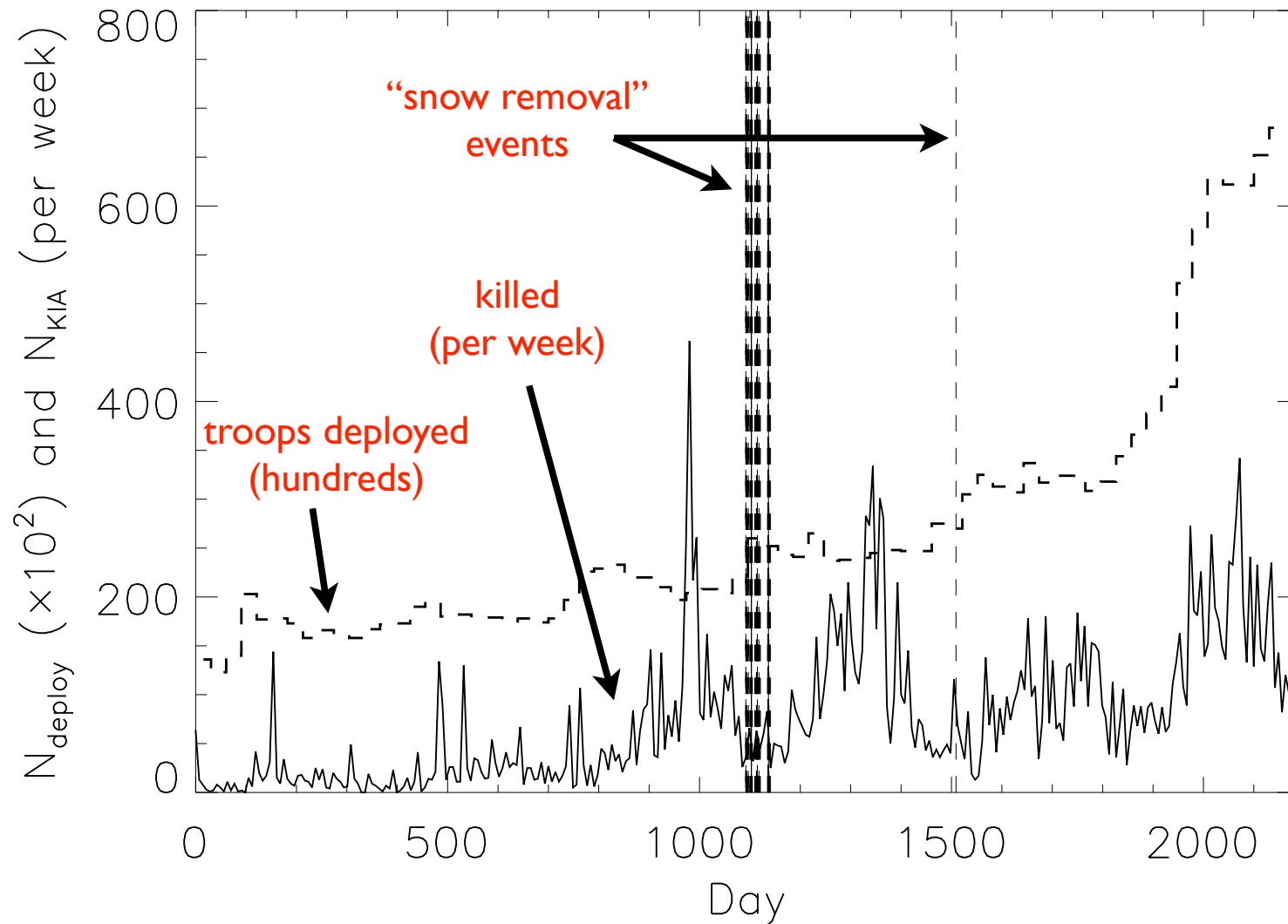Majority occur in events N≤4

Spatiality of Conflict in Afghanistan

animations: contact
simon@santafe.edu

Spatiality of Conflict in Afghanistan

January 2004

animations: contact
simon@santafe.edu

Direct / Indirect / IED
Wikileaks / 15 km FWHM Gaussian
23 February 2011

Cycles

Cycles

Spatial Scales of Insurgency

{:reportkey=>"A4D7DA8D-0354-4CCB-BA3B-04DD9BDAE420", :date=>"2006-11-07 07:00:00", :type=>:explosive_hazard, :category=>:ied_found_cleared, :trackingnumber=>"2007-033-005854-0105", :title=>"IED FOUND/CLEARED Khowst City",

:summary=>"At 070700ZNOV06 TF WOLFPACK reported that the PCC reported the ANP discovered 2 IEDs in Choghay Village 3km Southeast of Salerno. Unit reported the ANP had discovered the IEDs at 0430Z and had disposed of 1 IED. 0748Z PCC reported the 2 IEDs were found along a walkway route vic an ANP CP. ANP found what they believe are recoilless rifle rounds used for the IEDs. No RC devices were found. All pieces were brought back to the ANP CP. Event closed at 0750Z. ISAF tracking #11-101",

:region=>:rc_east, :attackon=>:enemy, :complexattack=>false, :reportingunit=>:tf, :unitname=>:tf, :typeofunit=>:none_selected, :friendlywia=>0, :friendlykia=>0, :hostnationwia=>0, :hostnationkia=>0, :civilianwia=>0, :civiliankia=>0, :enemywia=>0, :enemykia=>0, :enemydetained=>0, :mgrs=>"42SWB8800091000",

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nation, region, province, district, or village?
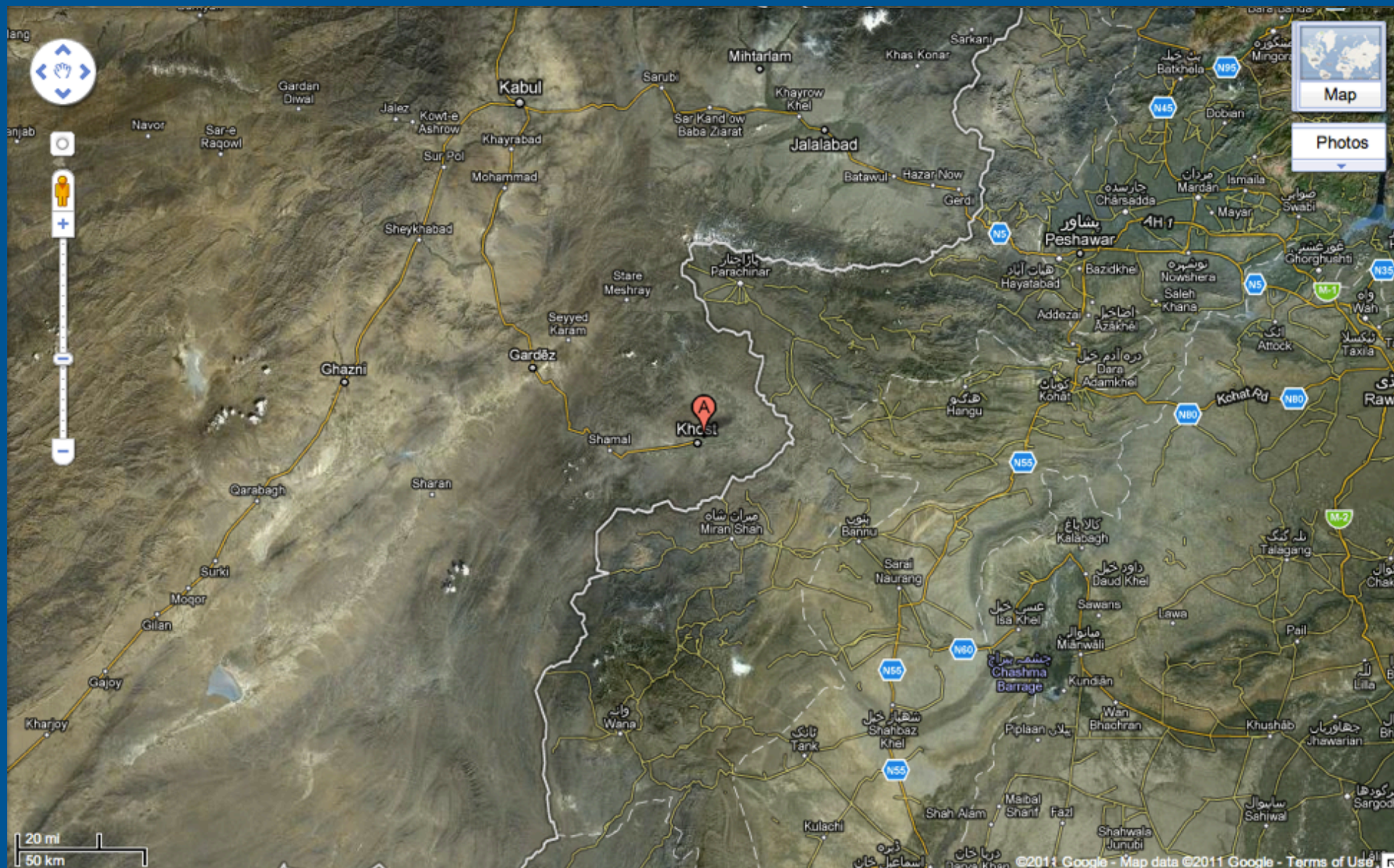
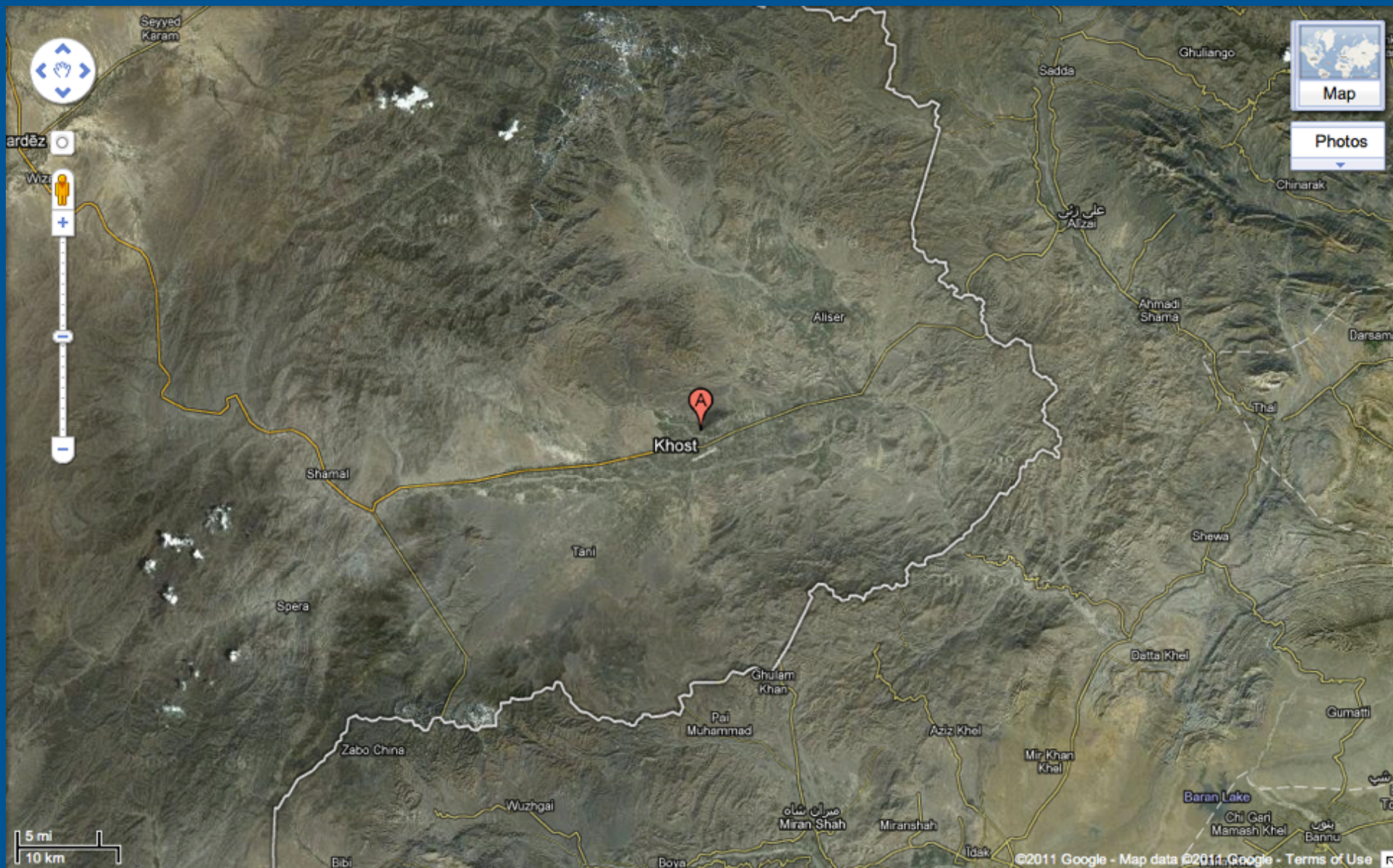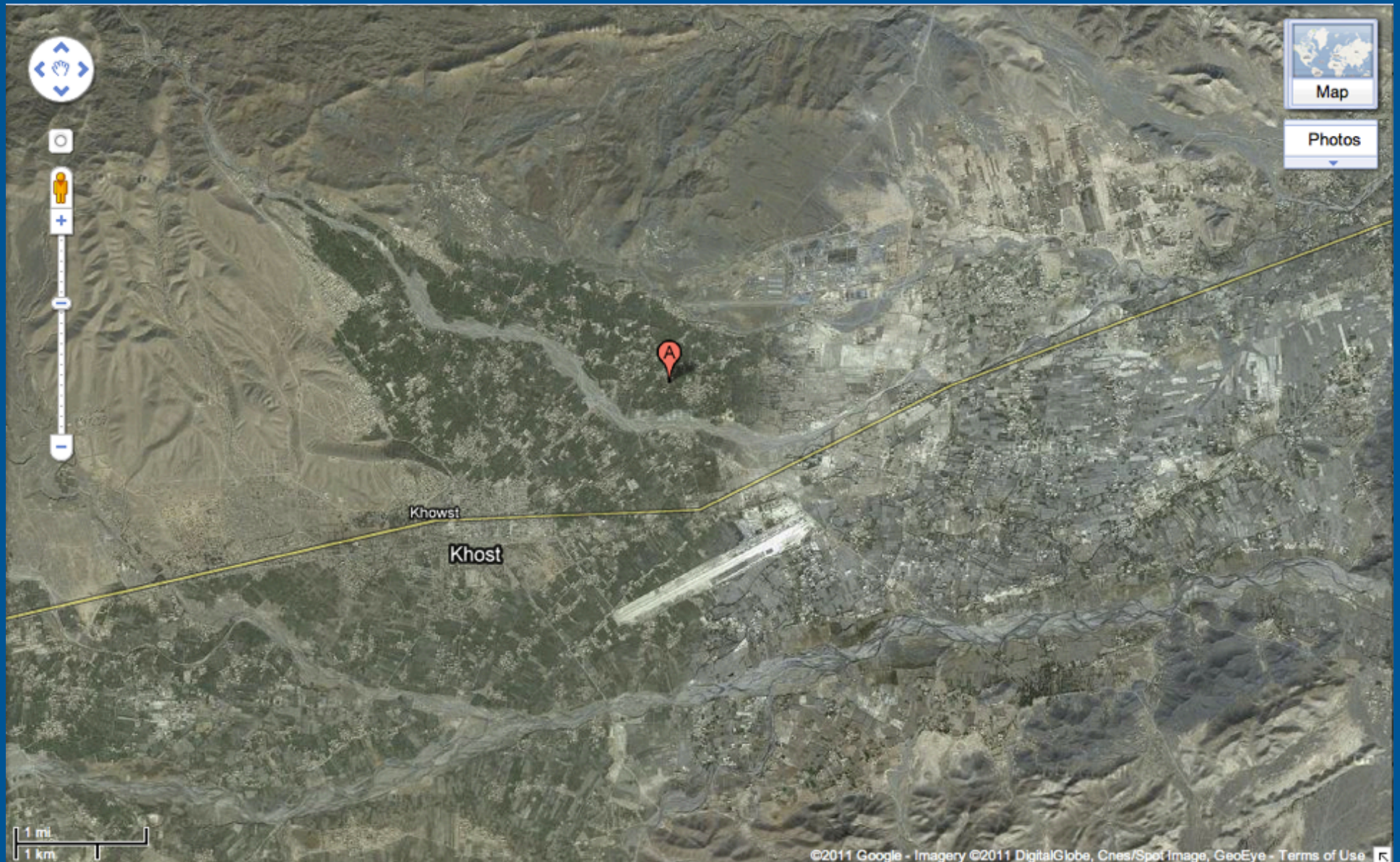## days, weeks, months, years?

Spatial Scales of Insurgency

At 070700ZNOV06 TF WOLFPACK reported that the PCC reported the ANP discovered 2 IEDs in Choghay Village 3km Southeast of Salerno. Unit reported the ANP had discovered the IEDs at 0430Z and had disposed of 1 IED. 0748Z PCC reported the 2 IEDs were found along a walkway route vic an ANP CP. ANP found what they believe are recoilless rifle rounds used for the IEDs. No RC devices were found.
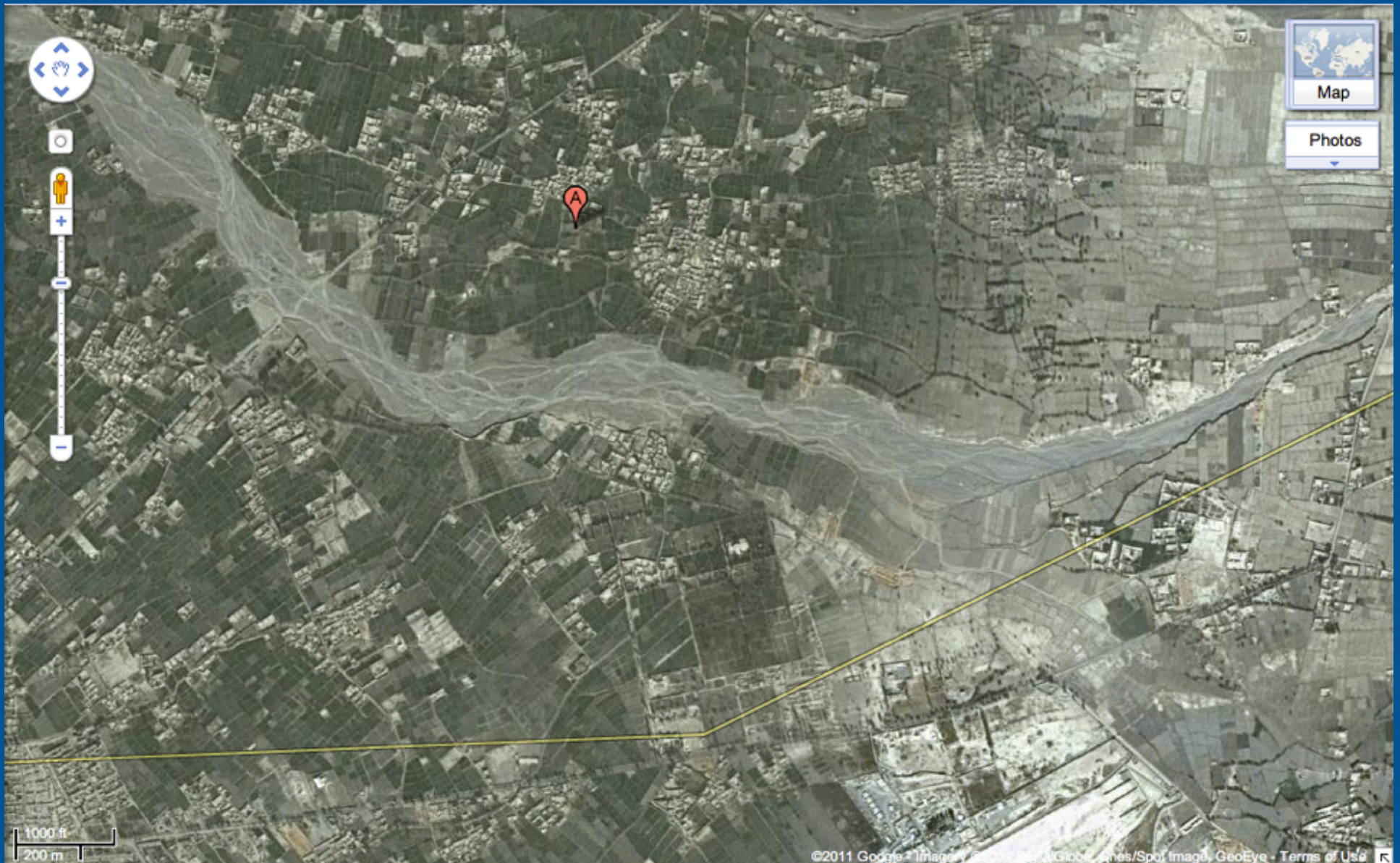
Spatial Scales of Insurgency

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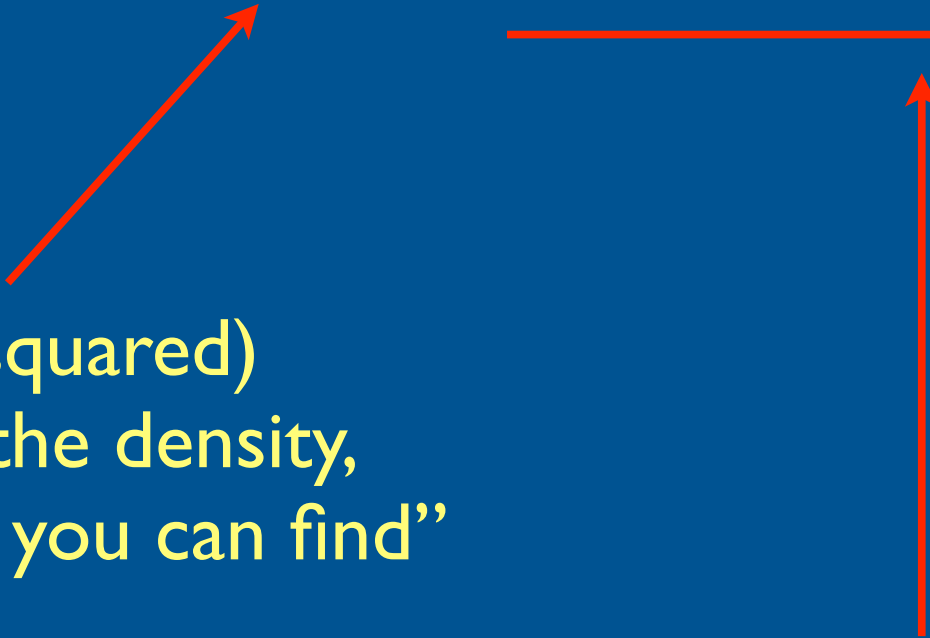
Spatial Scales of Insurgency

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Spatial Scales of Insurgency

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The Spatial Correlation Function

"The probability of finding two things
[events, people, villages...]
a distance R apart."

$$P(R) = \bar{n}^2[1 + \xi(R)]$$

$$P(R) = \bar{n}^2[1 + \xi(R)]$$

density (squared)
"the higher the density,
the more pairs you can find"

Deviations from random
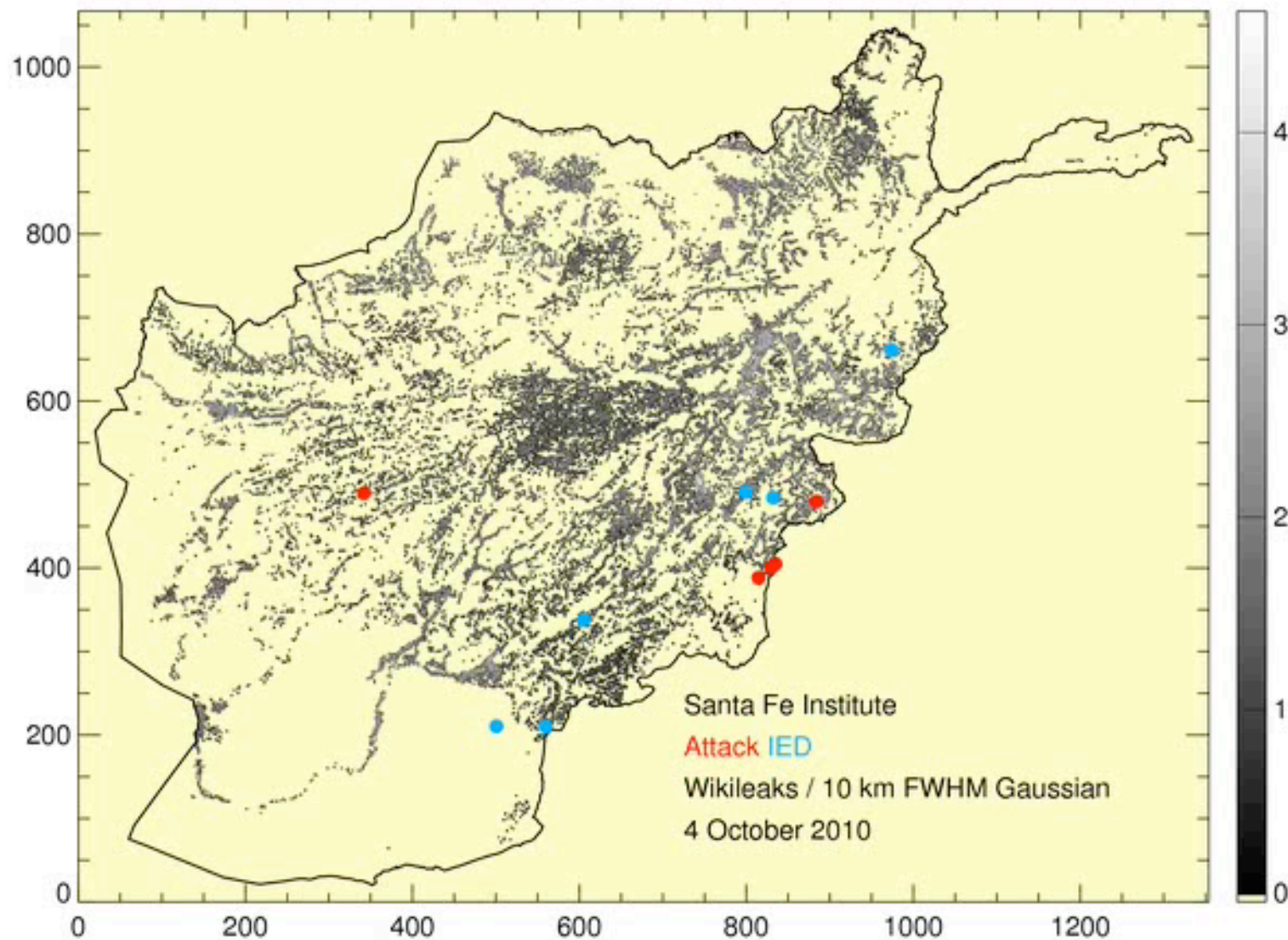$\xi > 0$: clustered
$\xi < 0$: self-avoiding

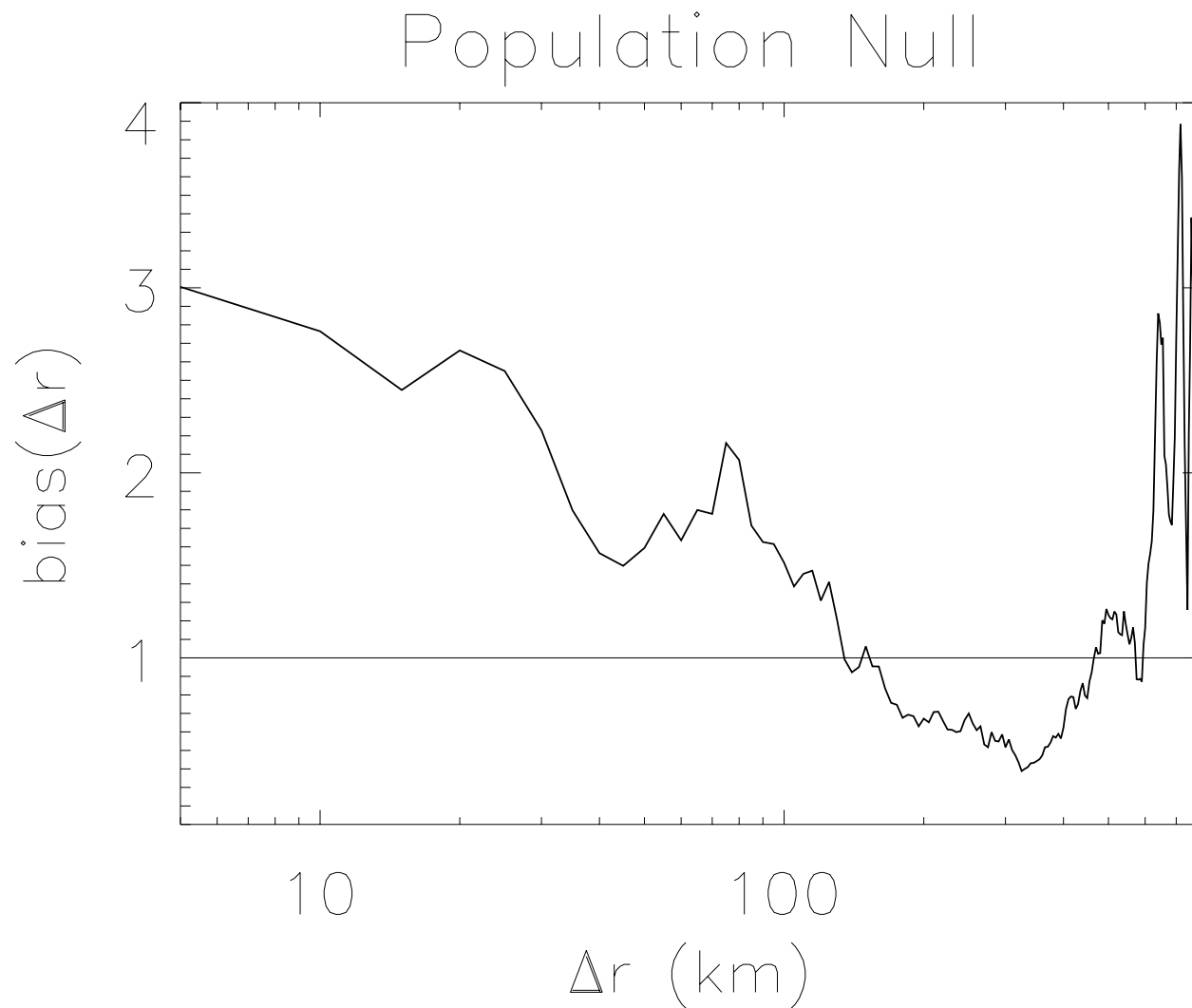# The Spatial Structure of Conflict

Spatial Conflict Structure

Direct Attacks

IED

Population Distribution

$1+\xi(\Delta r)$

Δr (km)
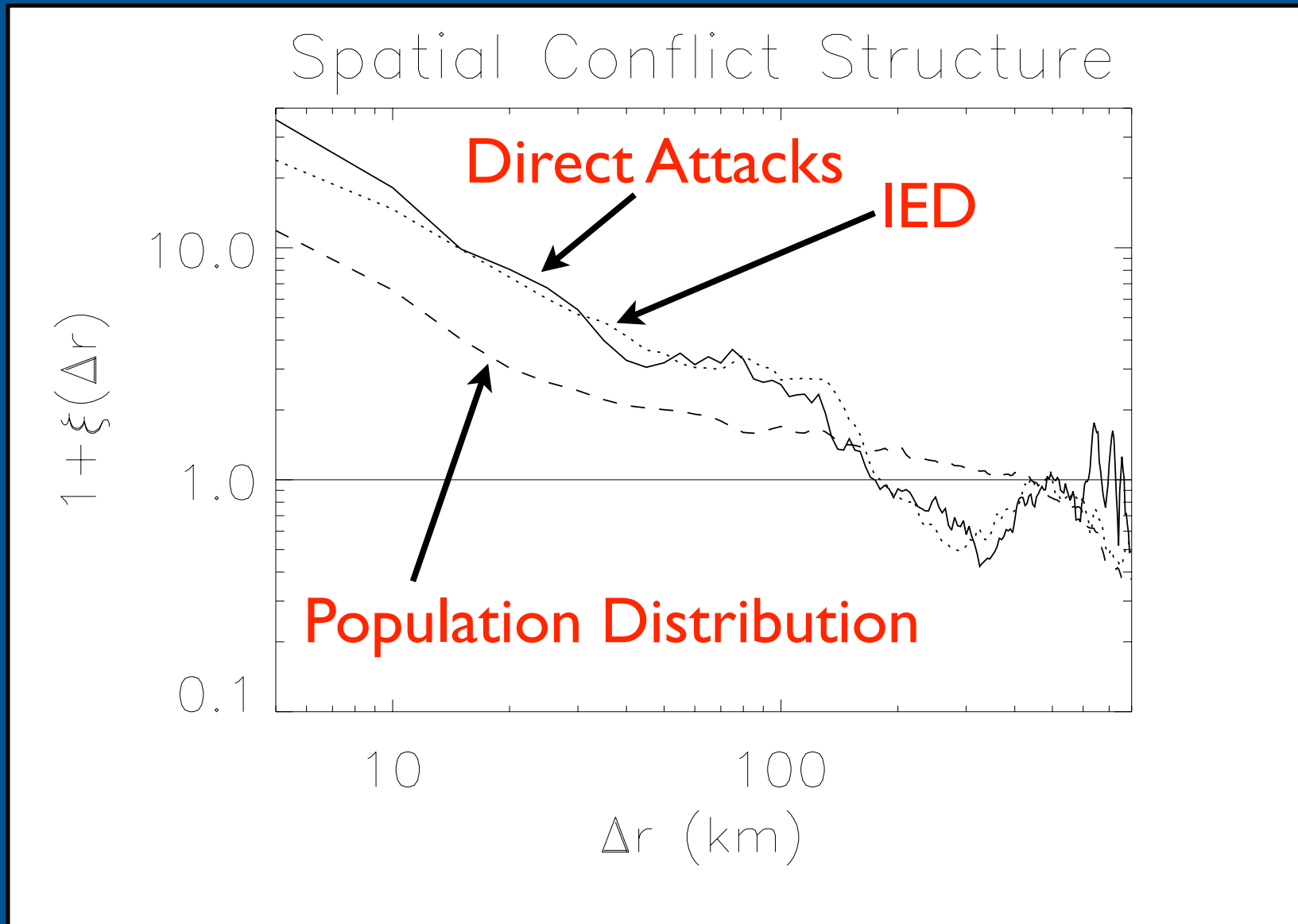
Population and Violence

Clustering "over and above" Population

Clustering "over and above" Population
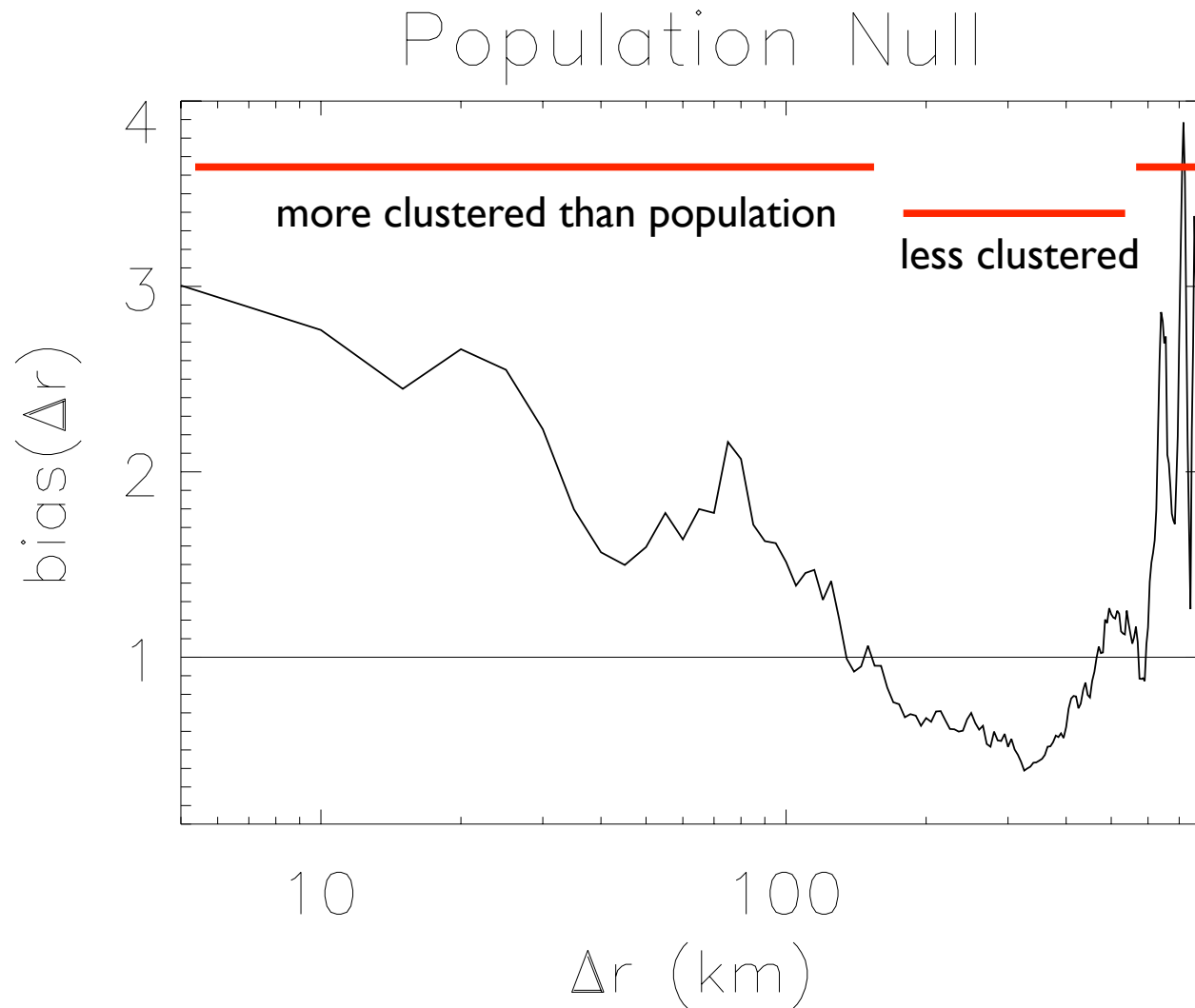
Spatio-temporal

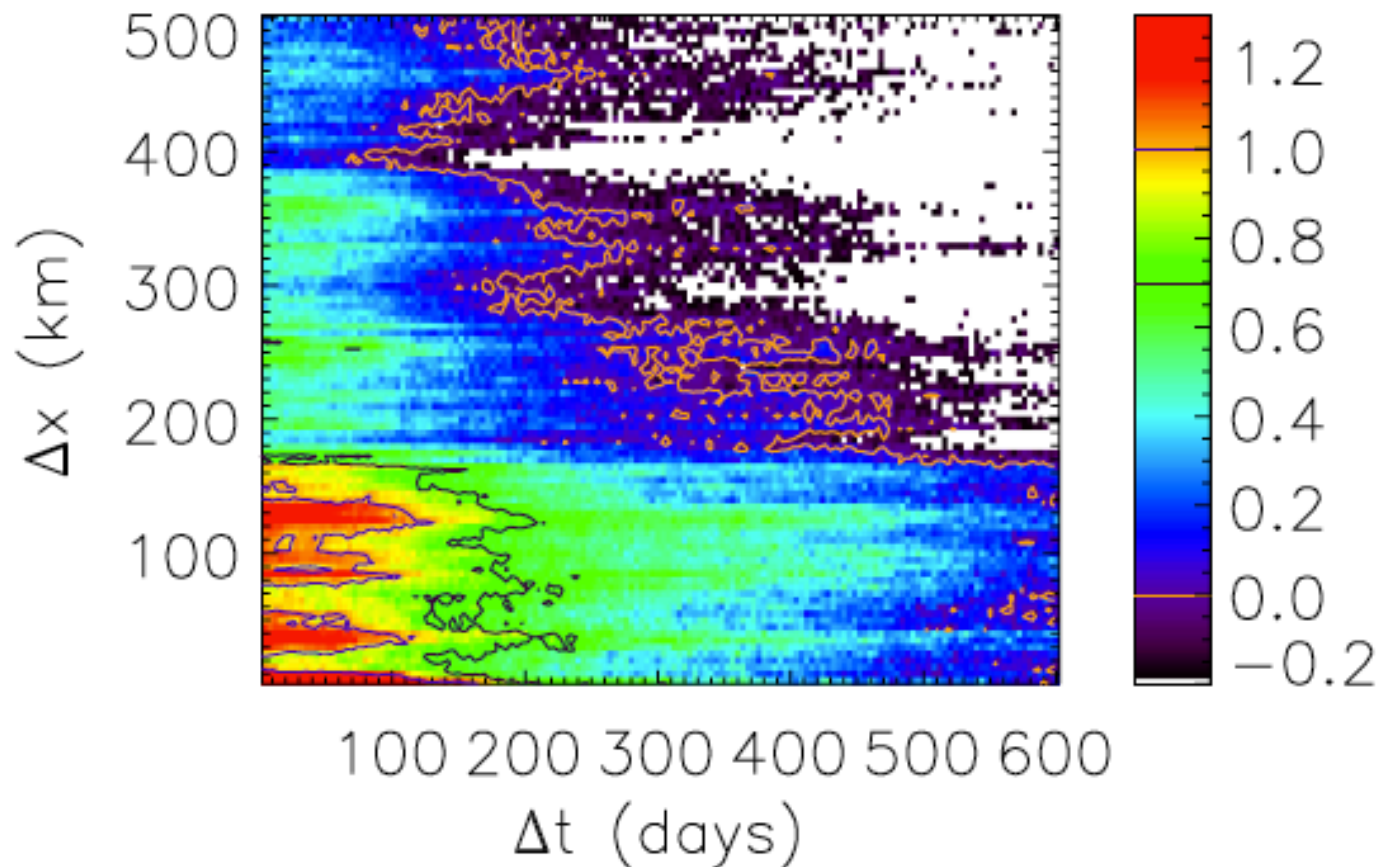"How do events cluster in *time* as well as *space*?"
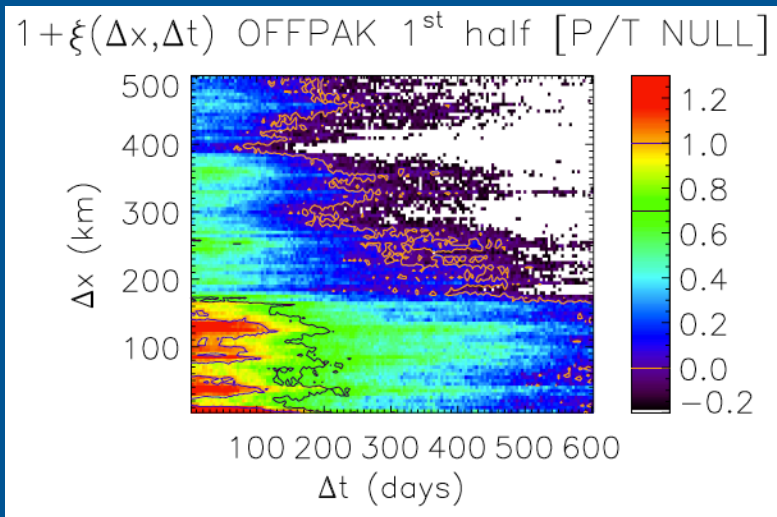
$$P(R) = \bar{n}^2[1 + \xi(R)]$$

$$P(R,T) = \bar{n}^2[1 + \xi(R,T)]$$

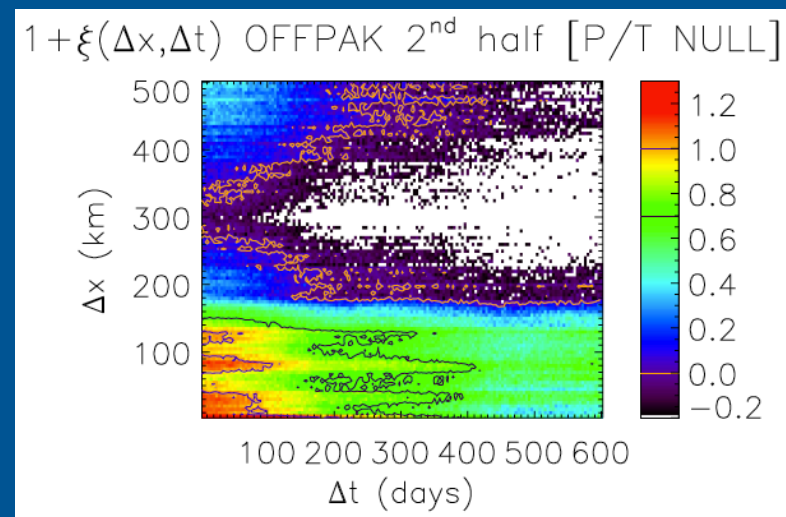# Space and Time Correlations in Afghanistan [Counter]insurgency

Adaptive Insurgencies

Early: geographically dispersed,
short-term correlations

Late: concentrated
and persistent in time

What Analysis Can't Do

1. Predict specific events

2. Predict generalities in new and shifting contexts

What Analysis Can Do

1. Test the narratives that humans use to explain

2. Enrich the vocabulary of those narratives