



Nighttime Light Dynamics during Syrian Civil War



Methodology

Consistent measurement of nighttime lights (NTL) across time and across cities

1. Summarize nighttime lights raster datasets based on urban center geometries
2. Match to UCDP database of violent events

Consistent nighttime lights dataset
for 1992-2018

DMSP (1992–2013) and VIIRS (2012–2018)

Source: Li, Zhou, Zhao, & Zhao (2020)

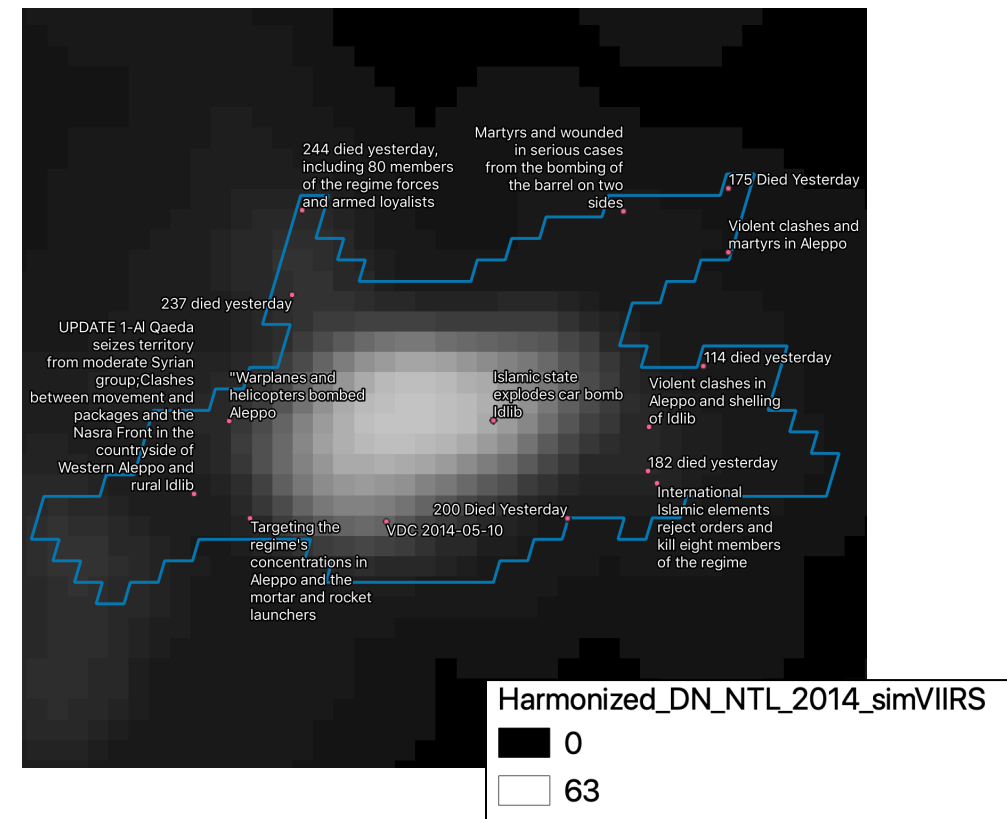
Urban areas in the Middle East

Source: GHS SMOD

Georeferenced violence data

Source: Uppsala Conflict Data Program

Example: Halab (Aleppo) [SYR] 2014



Zonal statistics: mean median min max count sum std cv

Nighttime Light Dynamics 2012 - 2018

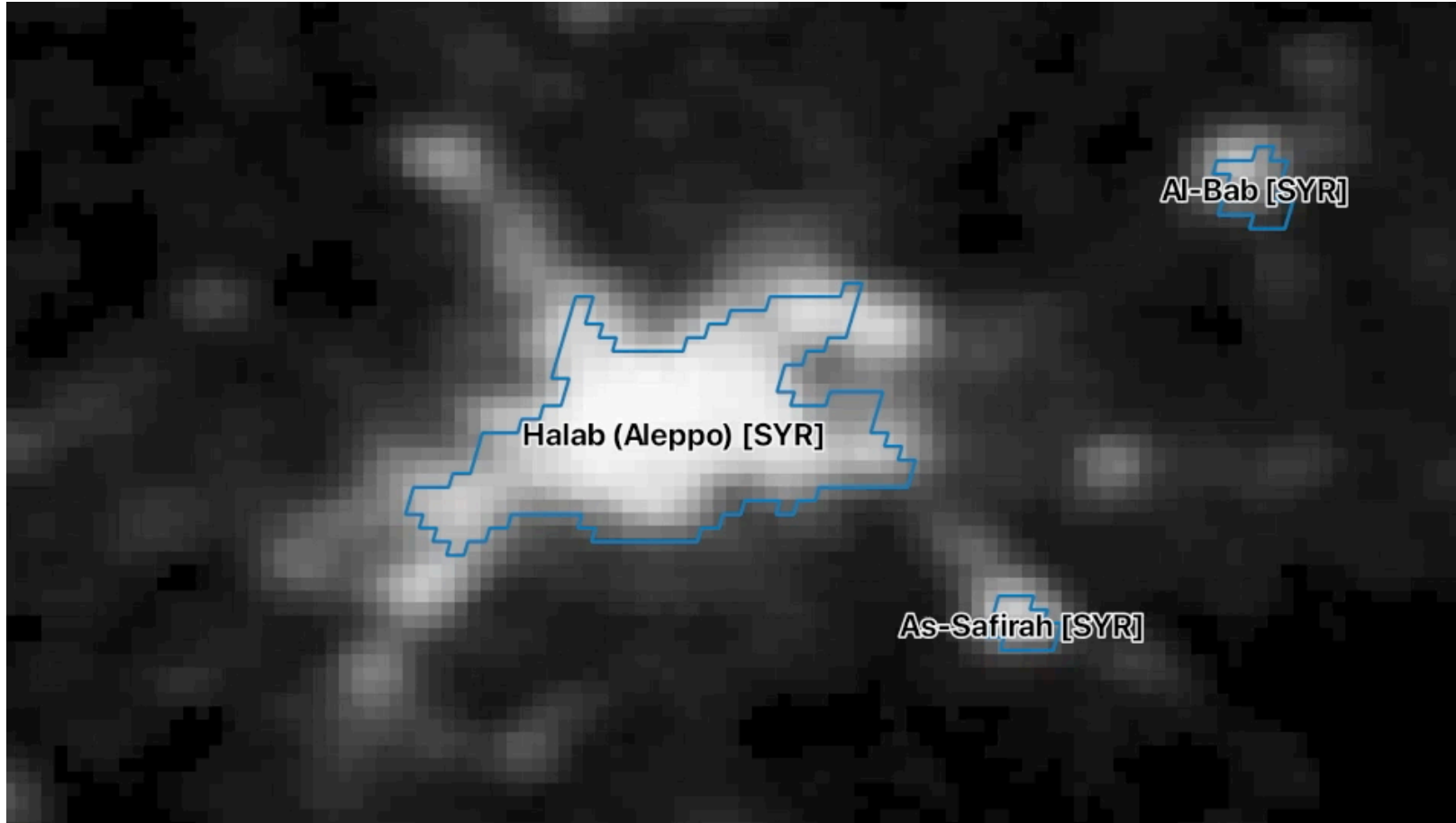
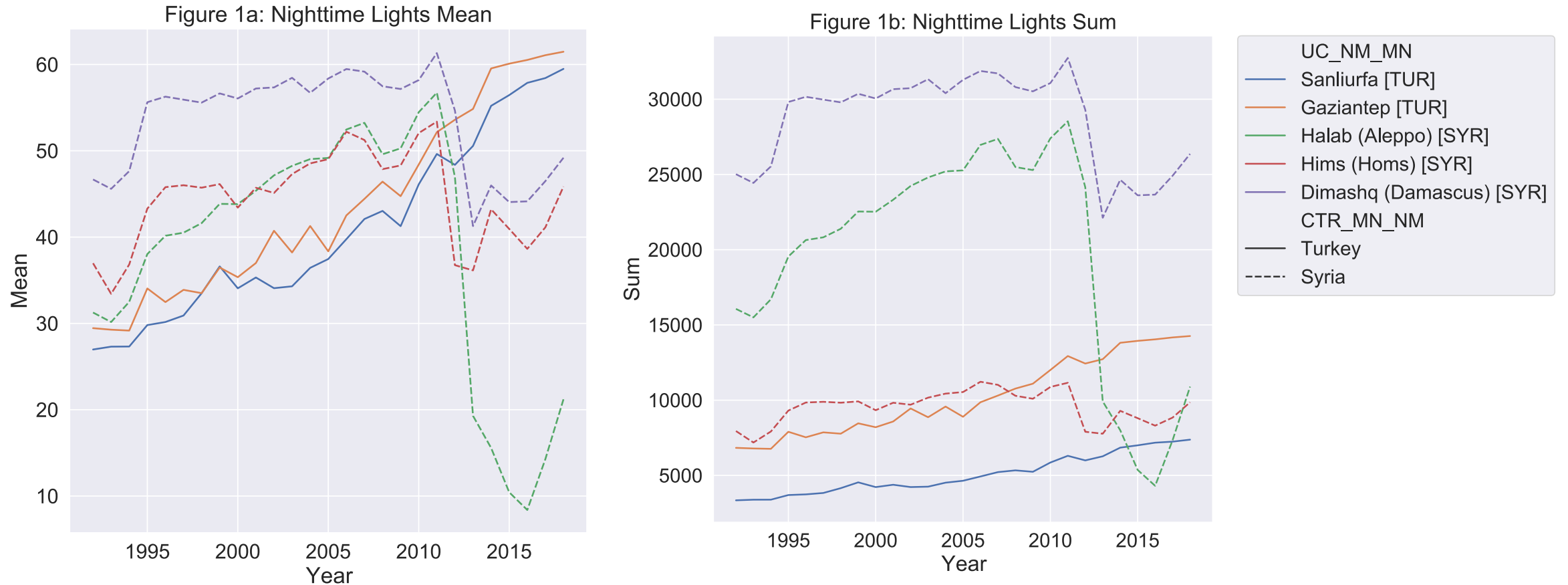
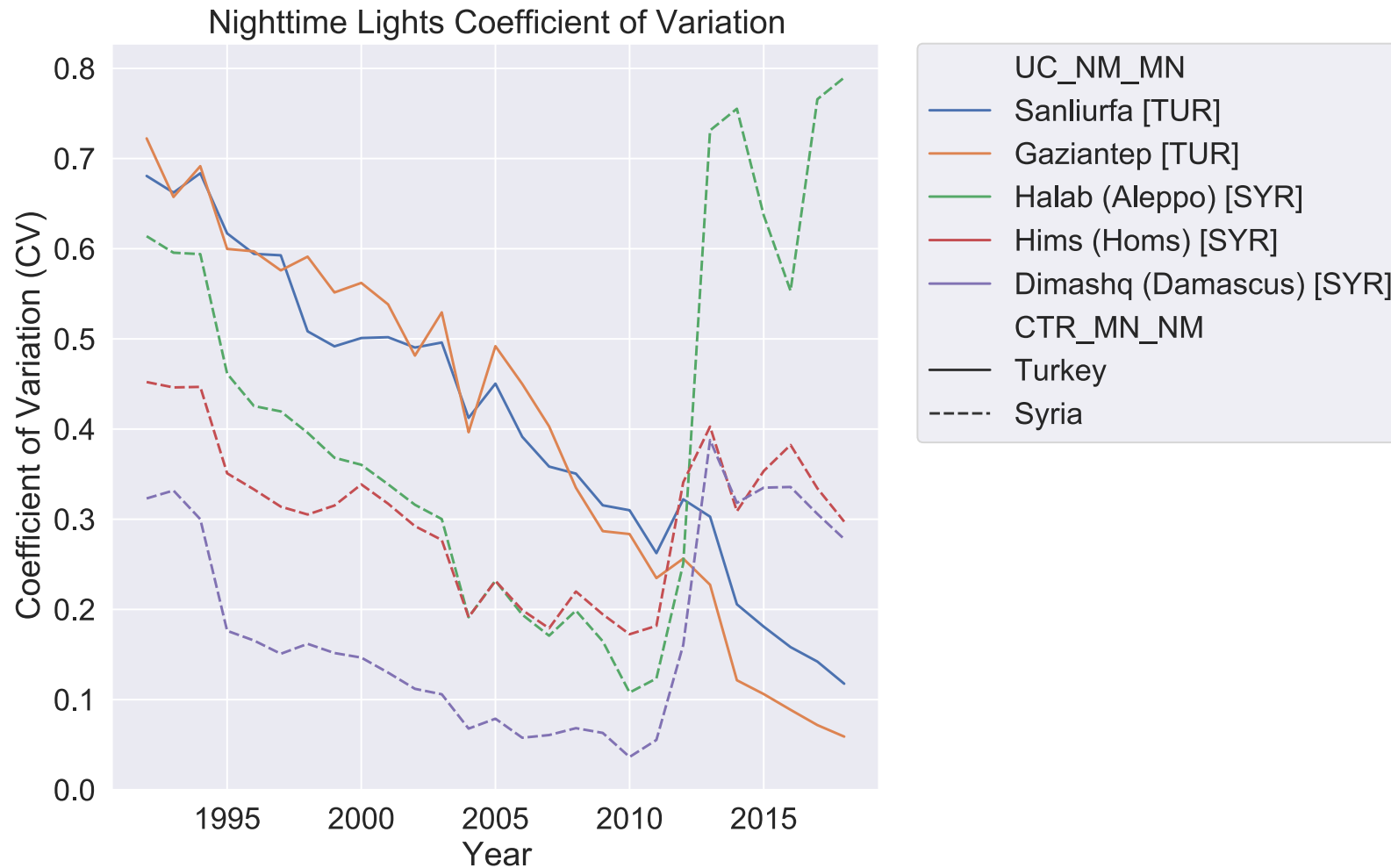


Figure 1: Drop in NTL in Syrian cities



Data source: Harmonization of DMSP and VIIRS nighttime light data from 1992-2018 at the global scale
Urban Areas defined by GHS SMOD

Figure 2: Higher variation in NTL in Syrian cities

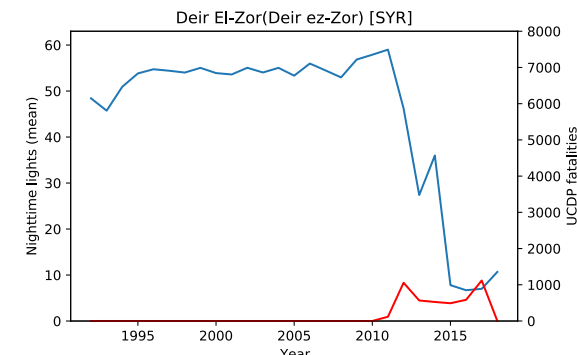
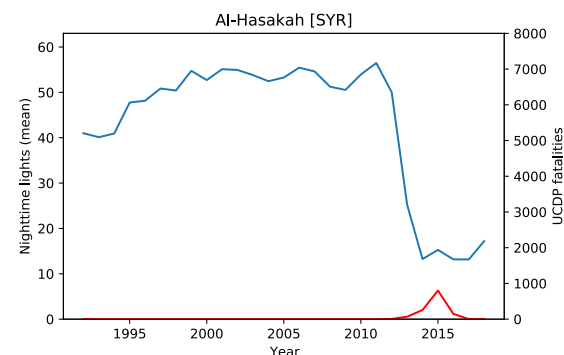
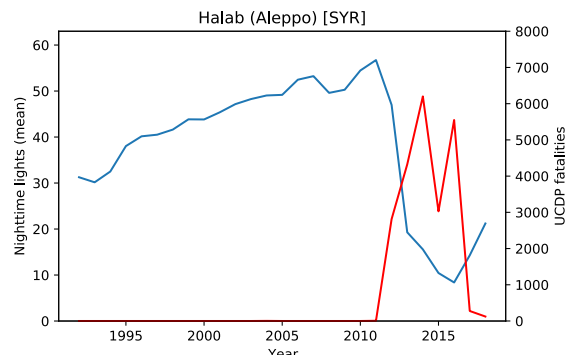
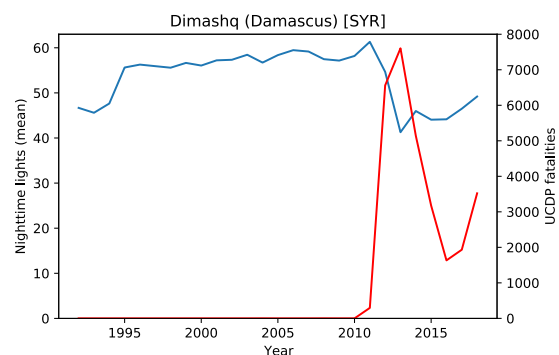


Data source: Harmonization of DMSP and VIIRS nighttime light data from 1992-2018 at the global scale
Urban Areas defined by GHS SMOD

Figure 3: Correlation with geo-referenced violence data in Syrian cities

Blue = NTL Mean

Red = Conflict data



Blue = NTL CV

Red = Conflict data

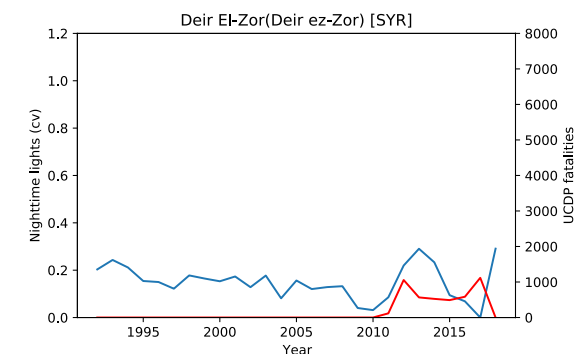
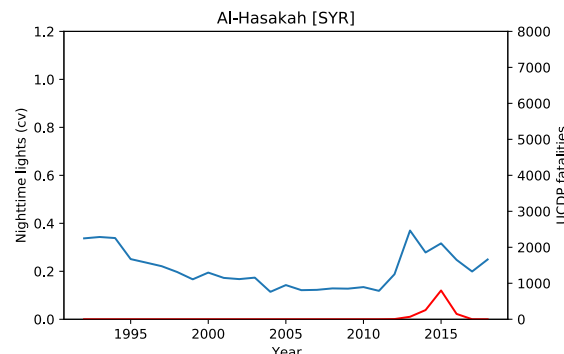
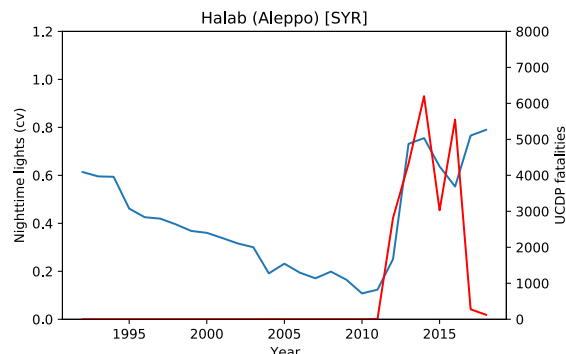
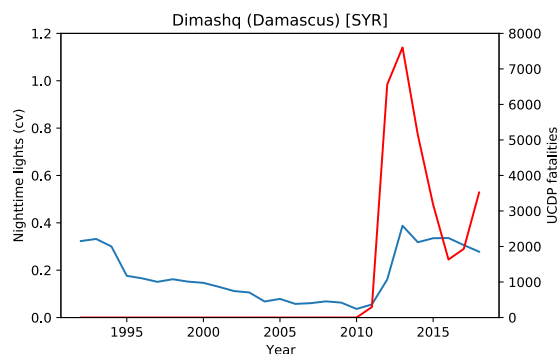
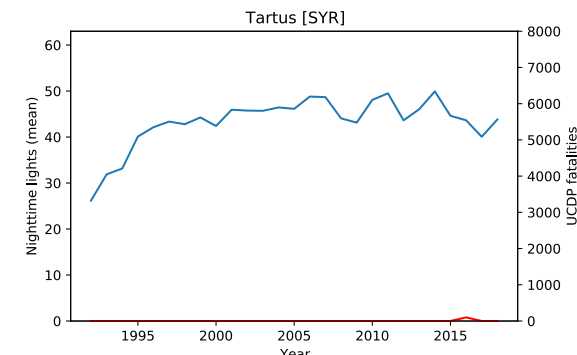
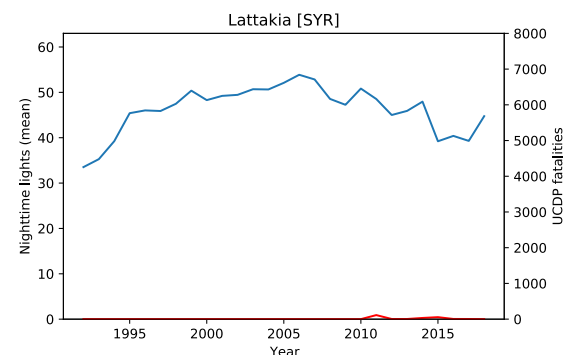
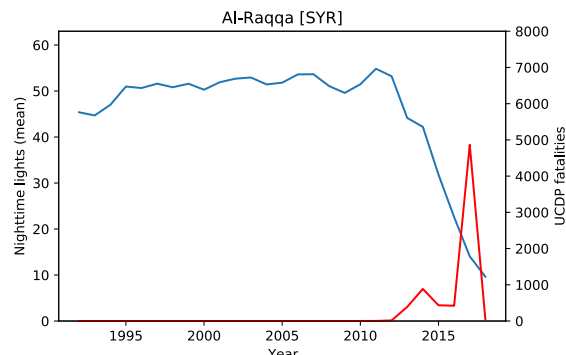
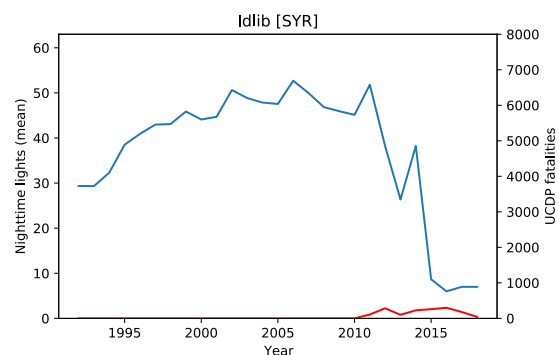


Figure 3: Correlation with geo-referenced violence data in Syrian cities

Blue = NTL Mean

Red = Conflict data



Blue = NTL CV

Red = Conflict data

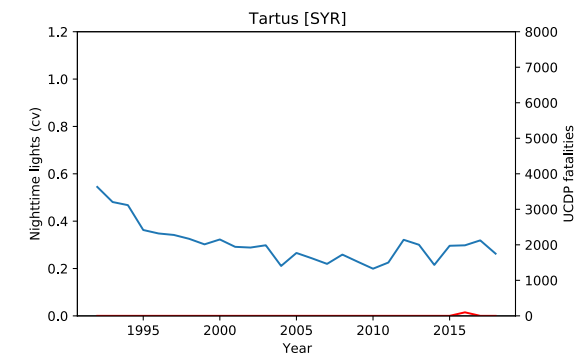
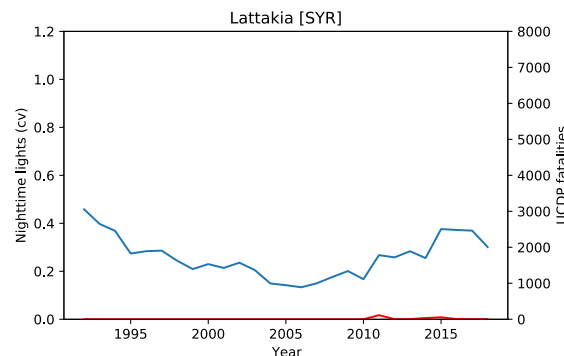
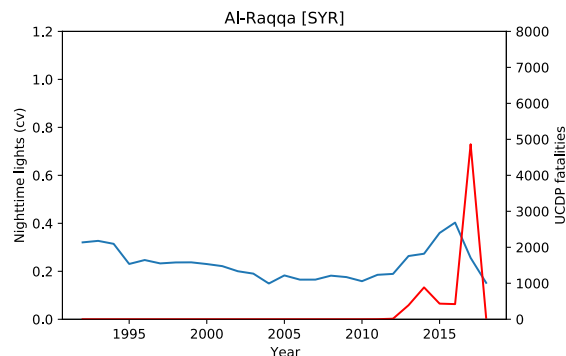
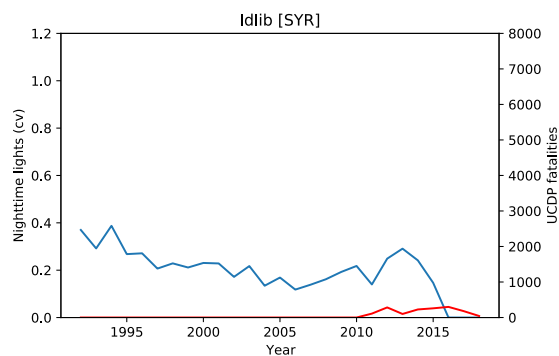


Figure 4: Correlation with geo-referenced violence data in southeastern Turkish cities

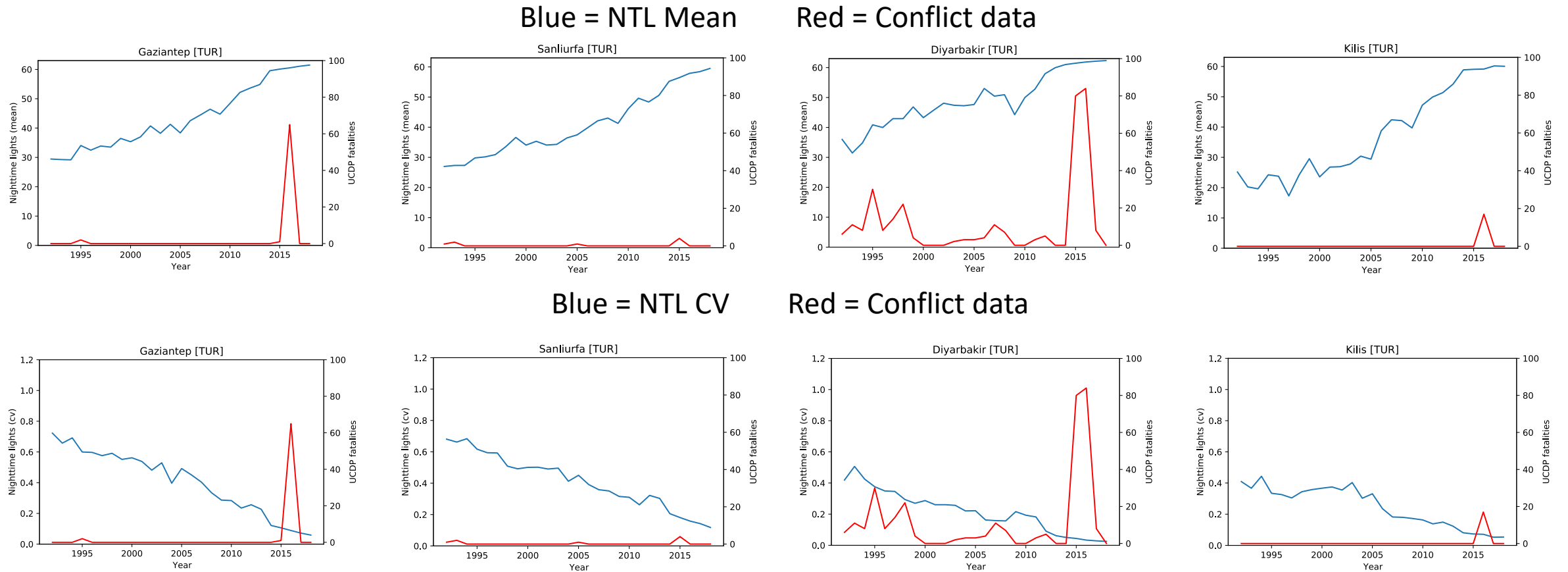
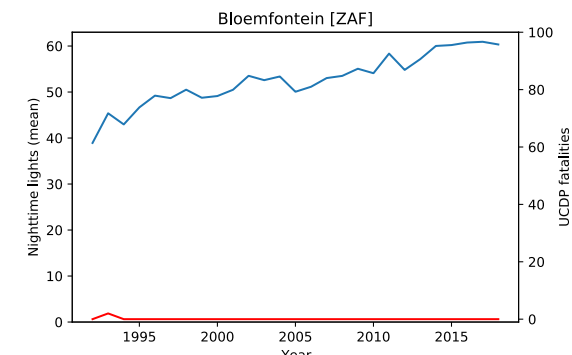
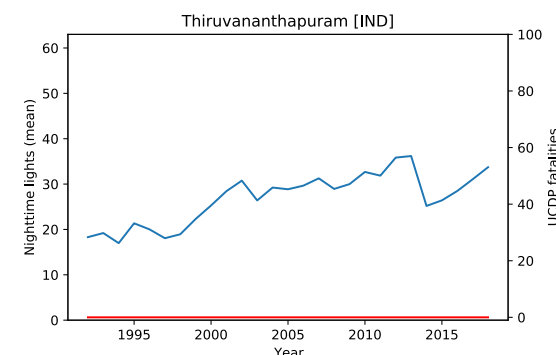
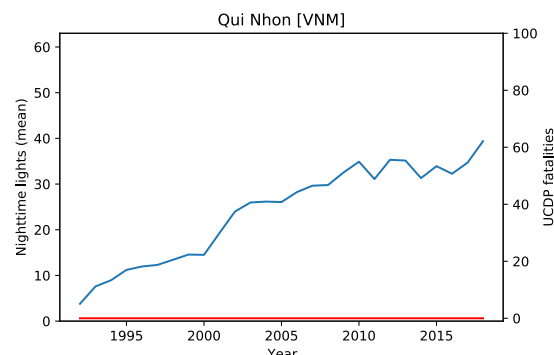
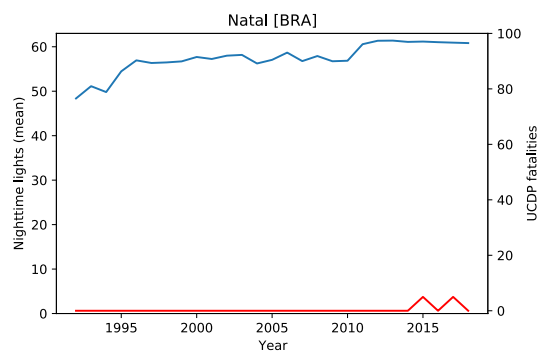


Figure 5: Correlation with geo-referenced violence data in any other region

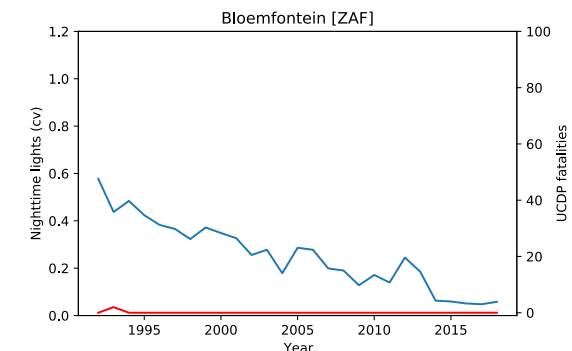
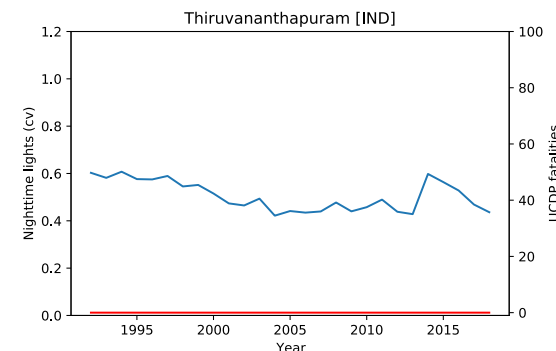
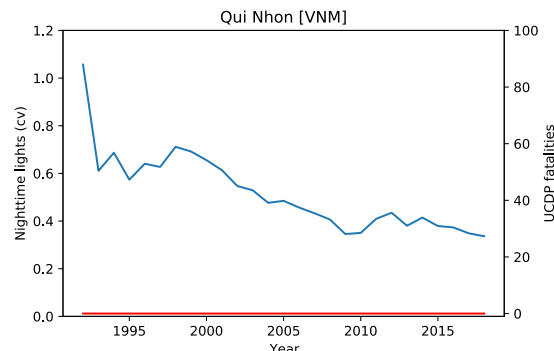
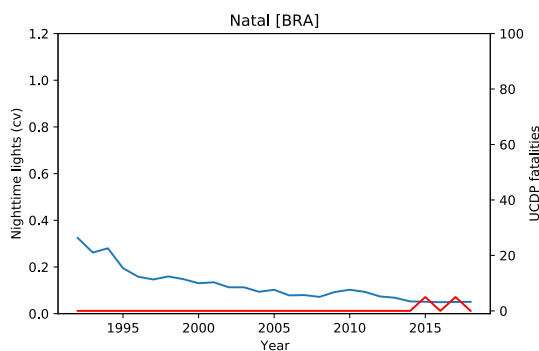
Blue = NTL Mean

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Blue = NTL CV

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Population = 884,122

Population = 457,400

Population = 752,490

Population = 556,000

Next steps

Geography of NTL changes

- Proximity of city to violent events
- Proximity of neighborhoods to violent events
- How conflict changed urban morphology and expansion trends
- Temporal vs. permanent changes

Measure of economic impact through NTL changes

- Proxy for local GDP
- Correlation with refugees flows