



United Nations/United Arab Emirates High Level Forum: “Space as a driver for socio-economic sustainable development”

Remote Sensing Applications in Support of Public Sector in Lebanon

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National Center for Remote Sensing - Lebanon

United Arab Emirates 6 – 9 November 2017

Foreword

- ▶ NCRS is a Public Institution (1995)
- ▶ Development of research activities related to remote sensing
- ▶ Secure a national information system from satellite imageries to the public and private sectors
- ▶ Assist public institutions in designing and implementing projects
- ▶ Organize scientific events to spread knowledge and awareness



Selected Success stories with public sector

- ▶ Wheat Survey (Ministry of Economy)
- ▶ SUNAR/EWS (Forest fires, Flood) – Disaster Risk Management Unit, Prime Minister office
- ▶ Solar Energy (Ministry of Energy)

Wheat Surveying

Lebanese Government subsidizes the production of domestic wheat

Ministry of Economy/ Directorate General of Cereals and Beetroot (DGCB)

Average Budget allocated per year : 29 billion\$

(between 2001 and 2011)

National Audit Bureau : Decline to approve the payment for the farmers and the government decide to mandate the Remote Sensing Center in 2015

Wheat survey using satellite imageries

- ▶ Survey the wheat or barely planted parcels in Lebanon for the Ministry of Economy for season 2017. The survey included 8,243 parcels covering the Lebanese territory.
- ▶ Satellite Images : SPOT 6 (1.5 m) and Sentinel 2 (10 m)
- ▶ Parcel Information System



Interpretation of Spot6 satellite imageries

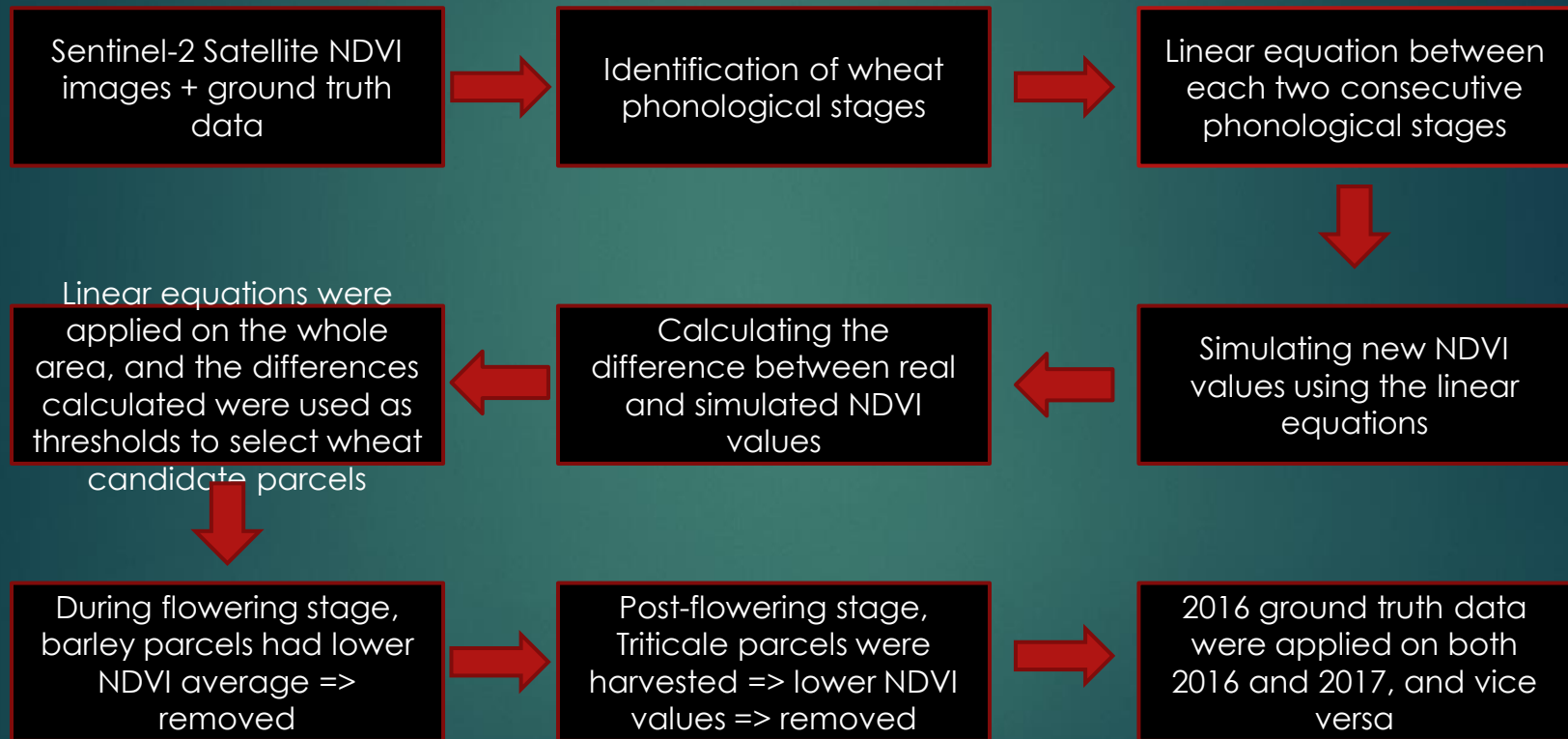
Link field collected data to satellite images



Taking field photos



Classification Wheat / Barley / Tritical



Strengths of the proposed method

- ▶ Executing high accuracy early classification output (4 to 6 weeks before harvest)
- ▶ Distinguishing among similar cereal crops, which might create a confusion (i.e. Barley and Triticale)
- ▶ Applying the model on different years with no need to collect ground data (only validation data would be enough) → budget saving
- ▶ Utilizing the new high resolution free of charge satellite (Sentinel-2) → helpful in heterogeneous areas

Results

- ▶ The final results showed that the total area of wheat/barley is 105,385,471 m² distributed on 8,243 parcels.
- ▶ Budget allocated by government is reduced to 18 million \$ (benefit 11 million\$)

Statistics per Mohafaza

Mohafaza	Number of parcels	Total Area of parcels (m ²)	Total planted area as requested (m ²)	Total planted area as surveyed (m ²)	Percentage
Akkar	429	17,127,000	13,140,951	7,169,956	55
Bekaa	5,364	145,553,976	100,662,591	62,261,206	62
Baalbak- Hermel	2,397	107,914,034	63,920,373	34,617,132	51
South and Nabatieh	53	2,893,577	2,236,507	1,229,439	55
Total	8,243	273,488,587	179,960,422	105,385,471	58

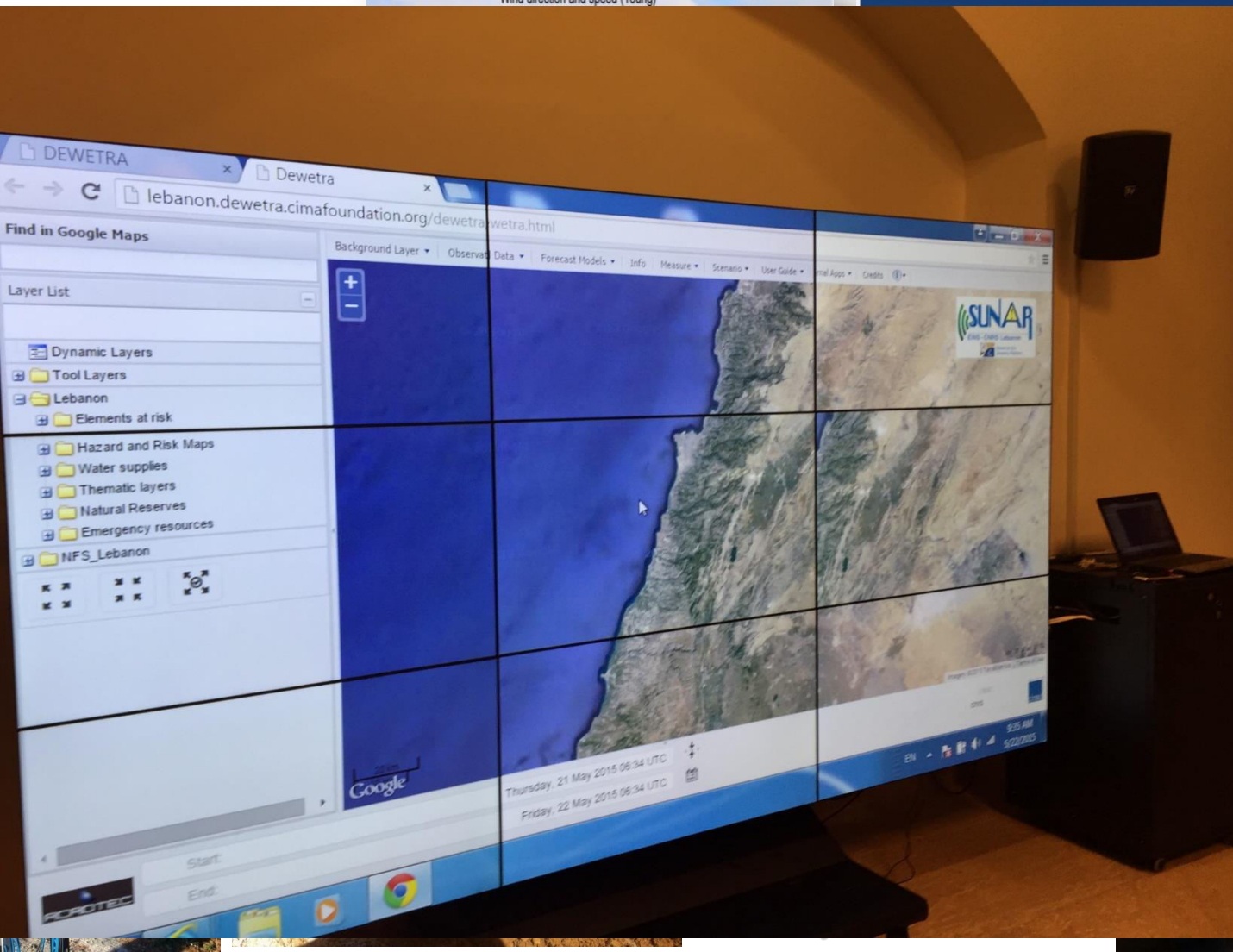
Sustainable Natural Resources Management Platform

SUNAR

Early Warning System

DRM Unit & Civil Defense

Wind direction and speed (Young)



Assets:

Hospitals

Impact: 17.2413793103448 %

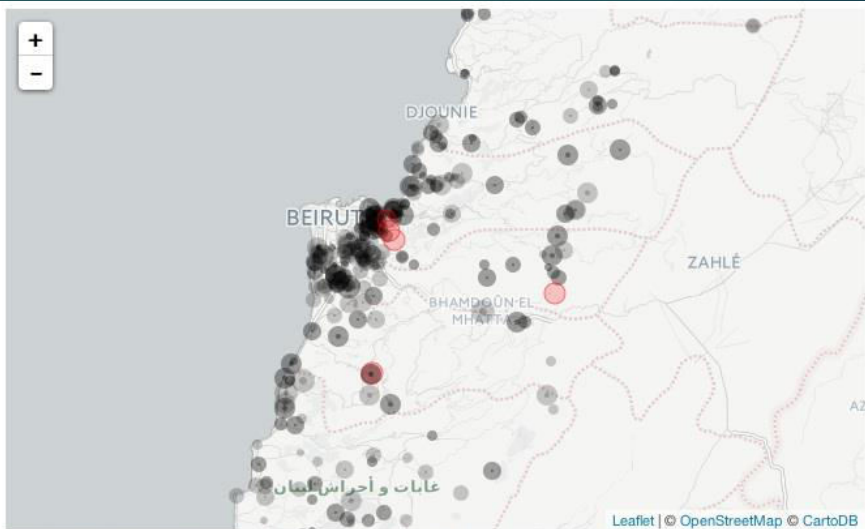
Longitude	Latitude
35.7372671115311	33.8237241943716
35.544679573511	33.7534853970749
35.5606227337166	33.8889864190991
35.5631766056001	33.8786901825586
35.5681740270997	33.8704996768644

Showing 1 to 5 of 5 entries

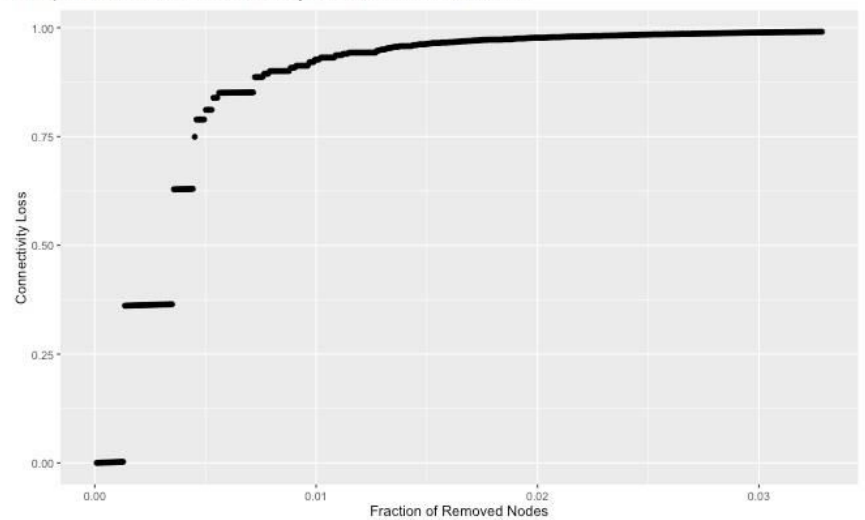
Cascading Attack on Roads

1 386 538

1 56 111 166 221 276 331 386 441 496 538

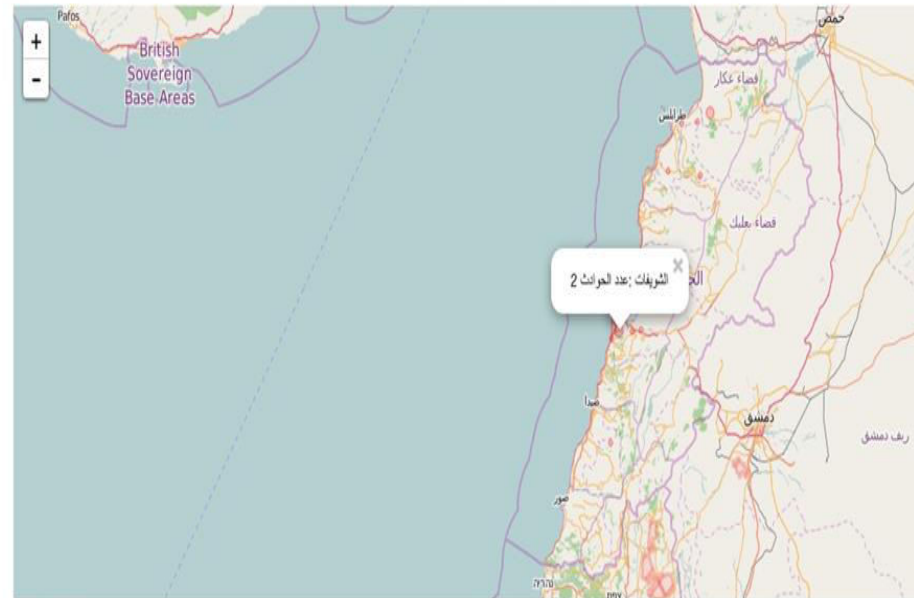
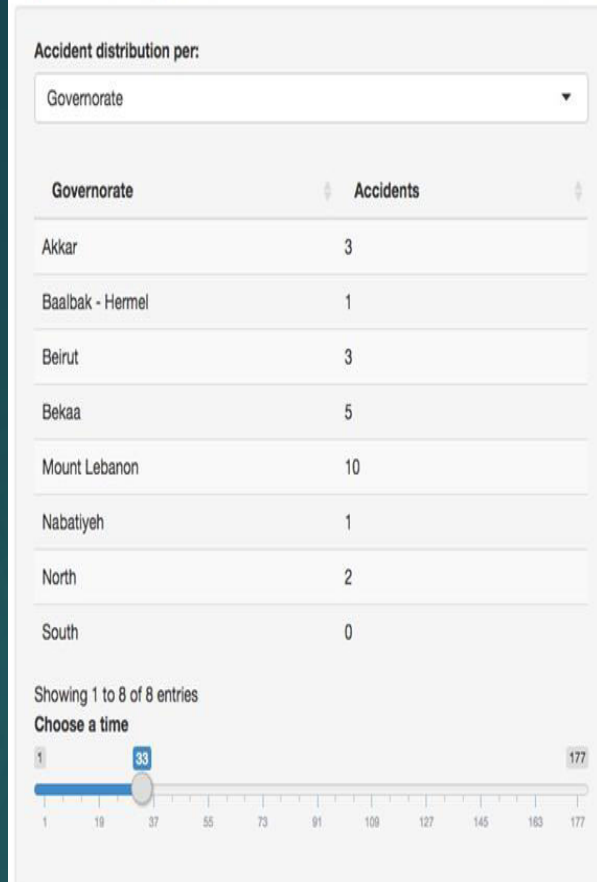


Transportation Network Connectivity Loss: 0.990814569768477



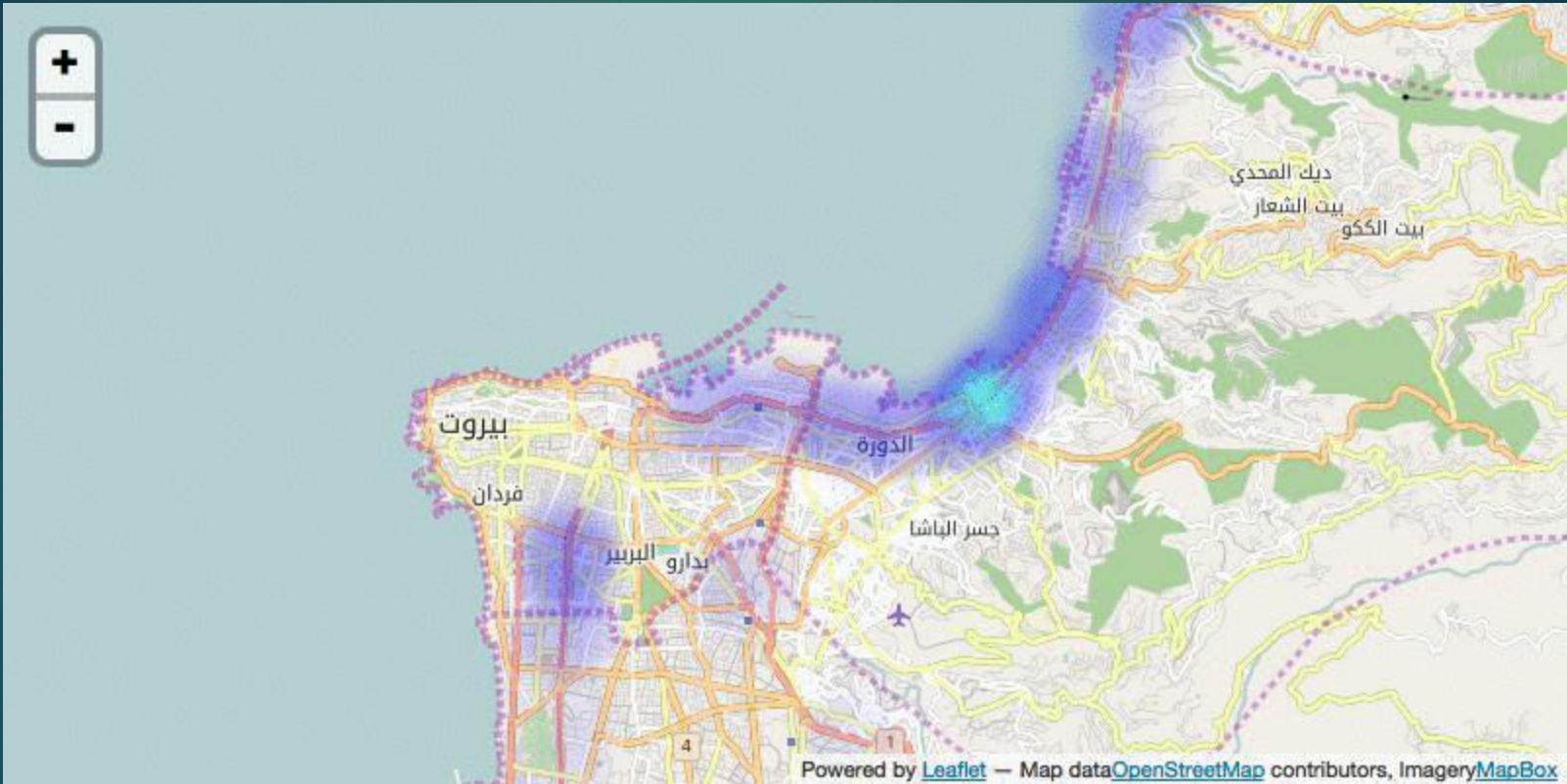
We developed a network analysis tool which enabled us to assess the critical infrastructure vulnerable roads and bridges with assets that lie in the war hazard zone.


Spatiotemporal Distribution of Accidents Collected from the Lebanese Red Cross Tweets



2015-08-18

Scraped the accidents tweets off the red cross twitter account to follow the spatiotemporal patterns in accidents occurrence





Surface area of failure = 700 m²



ASSESSING SOLAR PV'S POTENTIAL IN LEBANON

(Ministry of Energy)

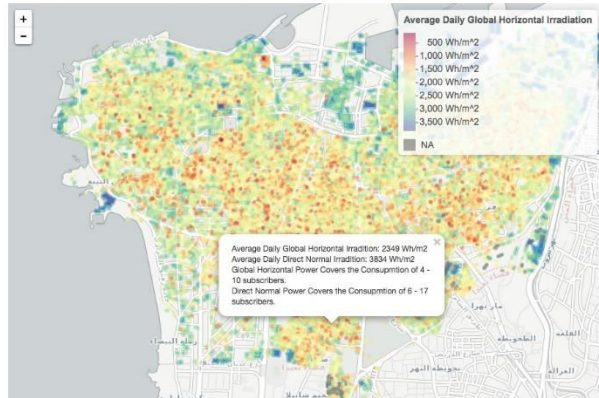
Beirut Solar Map

الخريطة العربية

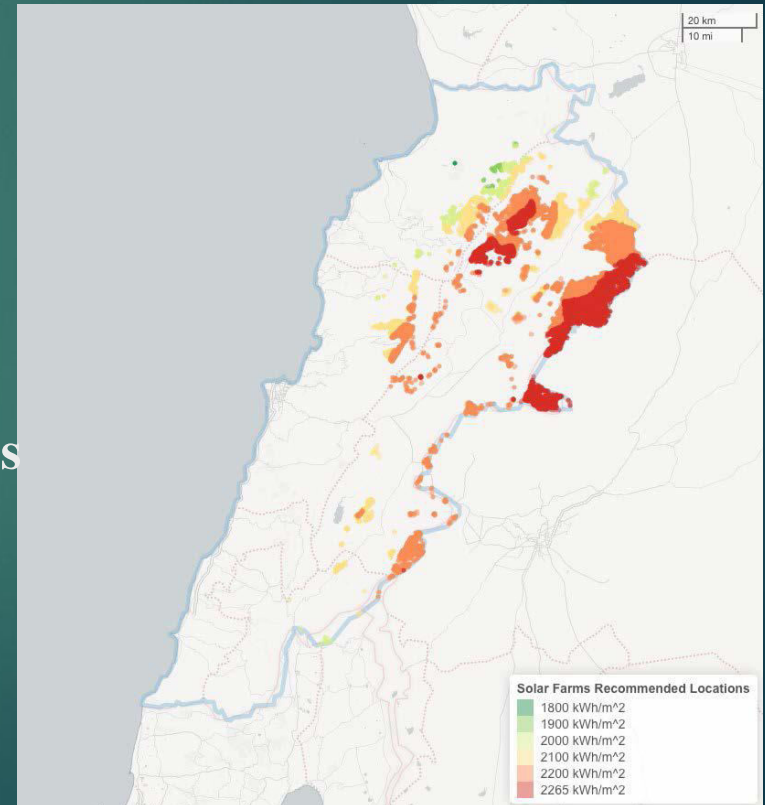
Solar irradiation data in Lebanon are currently available in the form of town or city averages, which do not reflect the spatial variability across buildings even within the same area due to factors like topography and building overshadowing as illustrated in the Beirut Buildings Shadow Dance: <http://s-majem.github.io/Beirut-Solar-Map/#15/33.8913/35.4947>. For this purpose, we produced this fine-grained map for Beirut with which the user can interface and inquire about the Average Daily Global Horizontal and Direct Normal Irradiations together with the expected number of subscribers benefiting from solar power, by simply clicking on the desired building in the map below.

In order to evaluate the solar energy gains from the installation of the photovoltaic panels (PVP), we first multiply the PVP's efficiency, which is taken to be 15%, by the available rooftop area of the building under scrutiny, which ranges from 30% to 80%, times either the Average Daily Global Horizontal or Direct Normal Irradiations (depending on whether the PVP are to be installed horizontally or at a tilt). Then, this value is divided by Beirut's average energy consumption per subscriber to estimate the building's potential number of subscribers benefiting from solar energy.

The solar power produced from the installation of direct normal PVP covers 18-50% of Beirut's total energy consumption, which corresponds to an available rooftop area range of 30-80% per building, while that produced from horizontally installed PVP covers 13-34%.



Prediction of the total solar power at the buildings level at Beirut



Potential land areas for solar PV farms in Lebanon

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