

Remote Sensing for Humanitarian Action

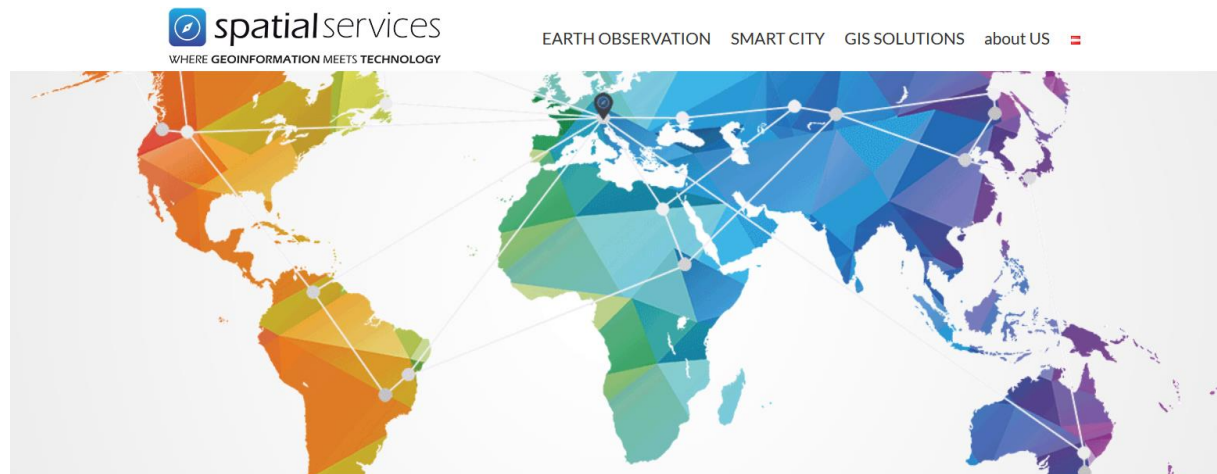
04.03.2024

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spatialservices
WHERE GEOINFORMATION MEETS TECHNOLOGY

Spatial Services GmbH



Drive Value by Harnessing the Power of Spatial Data

Geospatial data is a precious resource, and the key that can unlock powerful insights for communities and organisations alike.

Many processes at the heart of thriving communities and organisations rely on geospatial intelligence, extracted from the analysis and visualisation of various spatial data sources

We help you use Geospatial Intelligence to...

- ✓ Improve decision making
- ✓ Fuel innovation
- ✓ Optimise workflows
- ✓ Increase profitability
- ✓ Gain competitive edge

Backed by Innovation

We are backed by a large network of thinkers, innovators and developers from the extended network of the University of Salzburg.

Expert Data Analysis

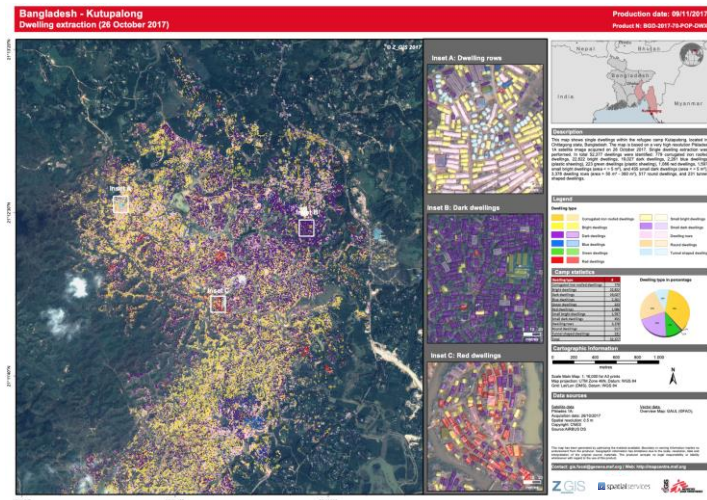
We combine high-level expertise, with smart processes and tools to bring you high-quality, customised GIS solutions.

Tailored to Your Needs

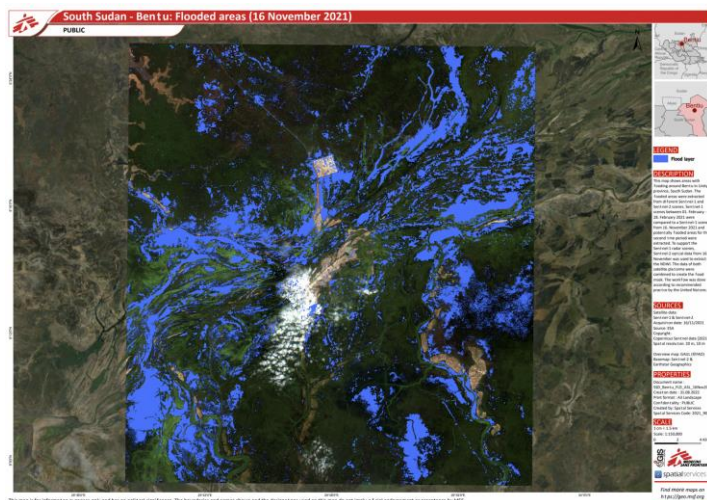
We work with you to determine and fulfil your individual geospatial needs, and don't follow a one size fits all approach.

- Founded in 2015; University spin-off
- 10 - 20 employees
 - EO team 4 - 8
- Development and implementation
 - Geoinformation products & services
- Operational EO service for humanitarian action
 - MSF
 - JRC
 - SOS Kinderdörfer
 - World Bank

Earth observation services for MSF



- **Population [VHR]**
 - population estimation
 - population change
 - medical campaign planning
 - ...



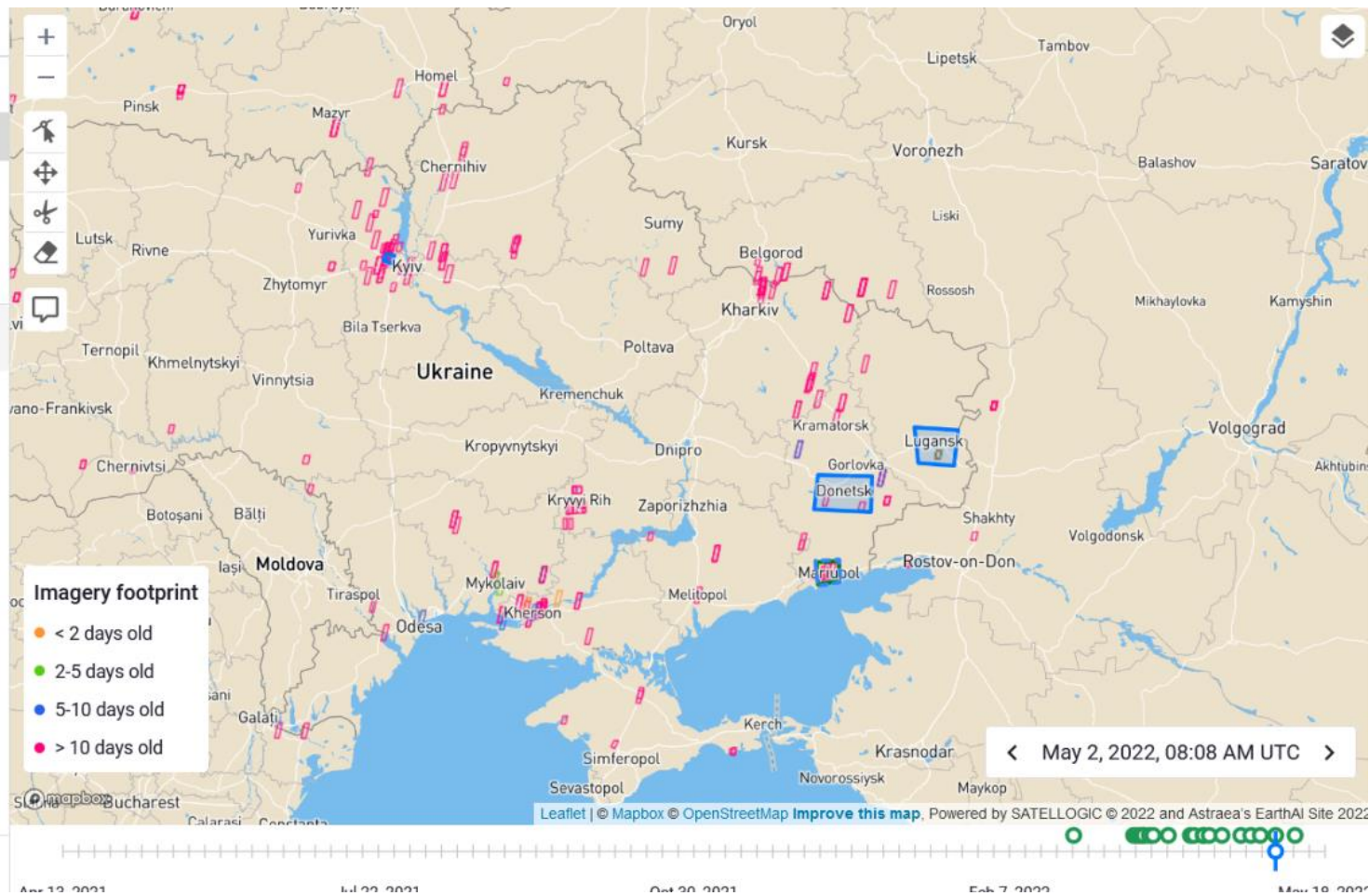
- **Environmental [HR, SAR, VHR]**
 - flood detection
 - water body extraction
 - crop detection
 - ...

MSF global activities



- Our activity
 - ~ 50 countries
 - ~ 200 places
 - multiple time steps

Ukraine



Satellite Imagery for Emergency Response in Ukraine

Access Satellog's full collection of high-resolution imagery over Ukraine for time-critical decisions.

Brought to you by SATELLOGIC and Astra

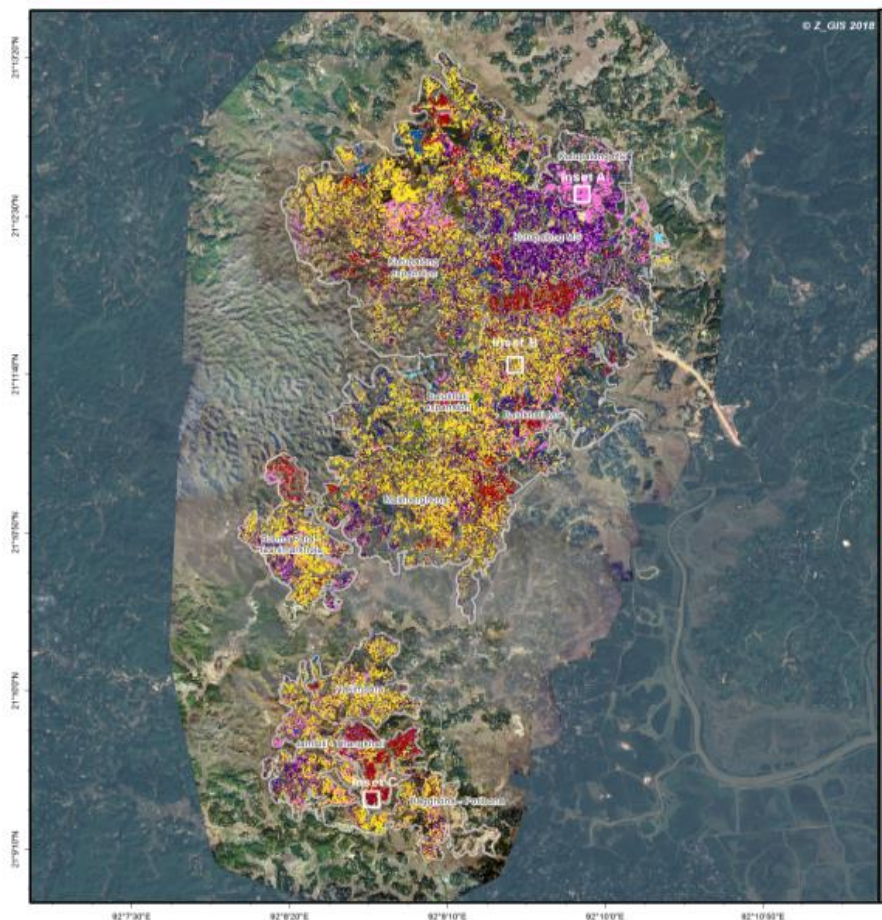


<https://www.theguardian.com/world/2023/jun/07/kakhovka-dam-flooding-ukraine-before-and-after-satellite-images-reservoir-kherson-oblust>

Dwelling extraction

Bangladesh - Kutupalong and surroundings
Dwelling extraction (24 December 2017)

Production date: 26/01/2018
Product N: BGD-2018-02-POP-DWX



Description
This map shows single dwellings within the refugee camps: Kutupalong, Balakhal, Manmangla, Burma Para, Tachinakhola, Bagpora-Polona, Javak, Traganhal and Habiganj. These camps are located in the Chittagong state, Bangladesh. Semi-automated dwelling extraction was performed based on a very high resolution mosaic of drone images captured on 24 December 2017. Dwellings were defined as structures with visible walls without roof. They can be in construction or in destruction process. The right numbers of clustered dwellings may exceed this rate because plastic sheeting dwellings may have been built up and removed between 24 October and 24 December 2017. Dwelling rows were defined the long structures with an area > of 80 m². Small dwellings are possibly, terraces, cooking places etc. Corrugated iron roofed dwellings and the square buildings inside the camp. Such structures outside the camp were not extracted. In total 100,989 urban dwellings were identified.

Legend

Dwelling type	Color
Corrugated iron roofed dwellings	Blue
Bright dwellings	Yellow
Brown dwellings	Green
Dark dwellings	Purple
Red dwellings	Red
Round dwellings	Pink
Tunnel shaped dwellings	Light Blue
Dwelling rows	Orange
Plastic	Light Green
Small long dwellings	Light Purple
Small dark dwellings	Light Blue
Overlapped long dwellings	Light Green
Dark corrugated iron roofed	Dark Blue
Market structures	Light Purple
Camp street	Light Green

Camp statistics

Dwelling type	Count	Area (m ²)
Corrugated iron roofed dwellings	45,232	1,120,000
Bright dwellings	1,575	10,000
Brown dwellings	1,172	10,000
Dark dwellings	1,172	10,000
Red dwellings	1,172	10,000
Round dwellings	1,172	10,000
Tunnel shaped dwellings	1,172	10,000
Dwelling rows	1,172	10,000
Plastic	1,172	10,000
Small long dwellings	1,172	10,000
Small dark dwellings	1,172	10,000
Overlapped long dwellings	1,172	10,000
Dark corrugated iron roofed	1,172	10,000
Market structures	1,172	10,000
Camp street	1,172	10,000

Cartographic Information
Scale: Main Map: 1:32,000 for A3 print
Map projection: UTM Zone 49N, Datum: WGS 84
Grid: UTM, Datum: WGS 84

Data sources
Drone data: Planet Labs, Acquisition date: 24/12/2017, Spatial resolution: 0.5 m, Copyright: Bentley, Source: ICGI
Satellite: Planet Labs, Acquisition date: 26/10/2017, Spatial resolution: 0.5 m, Copyright: CNES, Source: Airbus DS

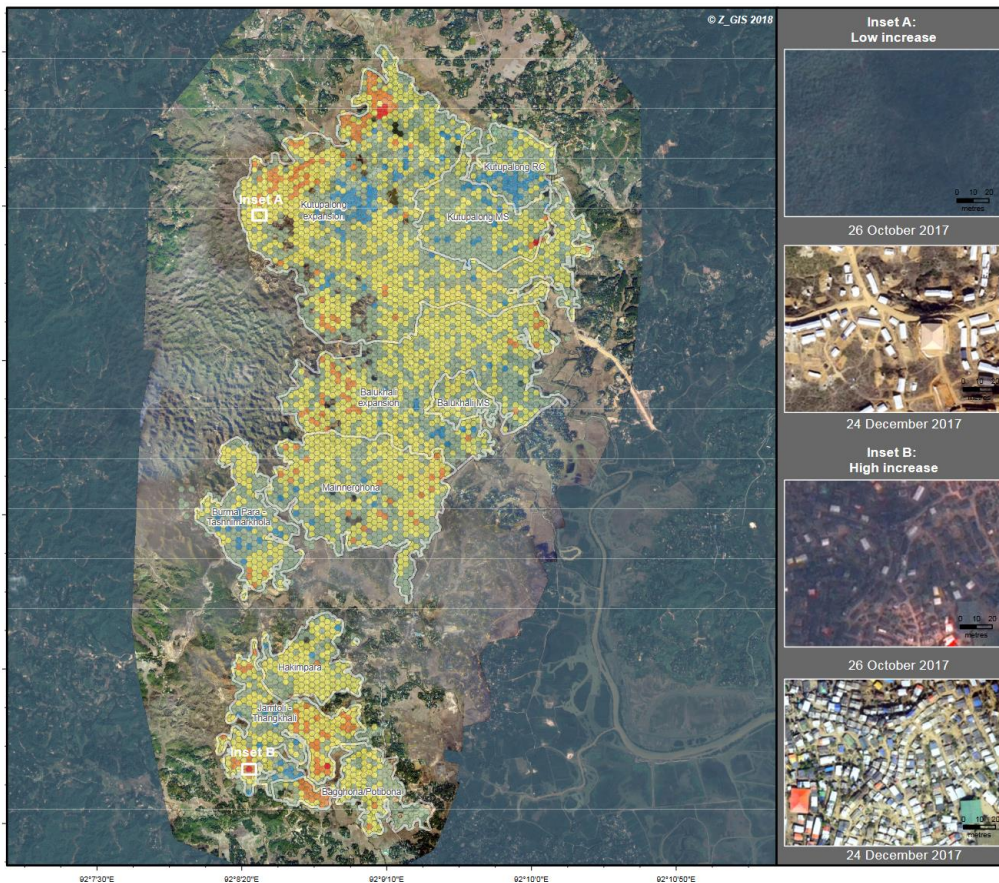
Contact: gis@zgis.com.bd | Web: http://zgis.com.bd
ZGIS, E4Hum, ICGI



Dwelling density/change

Bangladesh - Kutupalong and surroundings
Dwelling change (24 December 2017)

Production date: 26/01/2018
Product N: BGD-2018-02-POP-DWC



Description
This map shows the dwelling change detection within the refugee camps: Kutupalong, Balukhali, Mainkangola, Burma Para-Tahminarhola, Baggonia, Polbona, Jamoli-Thangkhal and Hakimpura. These camps are located in the Chittagong state, Bangladesh. The analysis was based on two images: (i) a Pleiades 1A satellite image, acquired on 20 October 2017 and (ii) a very high resolution inset of drone images, acquired on 24 December 2017.

The total number of dwellings from October and December were aggregated to a hexagon cell of 0.3 ha. Changes are expressed in 5 categories: (i) high decrease of dwellings from -34 to -6 dwellings, (ii) comparatively stable from -5 to 5 dwellings, (iii) low increase from 6 to 25 dwellings, (iv) medium increase from 26 to 50 dwellings and (v) high increase from 51 to 100 dwellings.

Legend

High decrease	-34 to -6 dwellings	Camp extent
Comparatively stable	-5 to 5 dwellings	
Low increase	6 to 25 dwellings	
Medium increase	26 to 50 dwellings	
High increase	51 to 100 dwellings	

Camp statistics

Camp	26 Oct 2017	24 Dec 2017	Camp extent (ha)
Kutupalong MS	2714	2754	109.96
Balukhali MS	1512	6213	114.62
Polbona MS	2720	24200	114.62
Balukhali expansion	1494	2213	114.62
Mainkangola	1210	1210	114.62
Hakimpura	1410	1410	114.62
Burma Para-Tahminarhola	420	420	114.62
Baggonia	1410	1410	114.62
Jamoli-Thangkhal	420	420	114.62
Polbona-Falbona	1410	1410	114.62
Total dwellings	12610	38810	114.62

Cartographic Information

Scale Main Map: 1:32,000 for A3 prints
Map projection: UTM Zone 46N, Datum: WGS 84
Grid: Lat/Lon (GMS), Datum: WGS 84

Data sources

Drone data
Platform: ebee with SOCA camera
Acquisition date: 24/12/2017
Spatial resolution: 0.5 m
Copyright: Sensafly
Source: OSM

Basemap
Pleiades 1A
Acquisition date: 20/10/2017
Spatial resolution: 0.5 m
Copyright: CNES
Source: Airbus DS

Vector data
Overview Map: GAUL (BFAO)

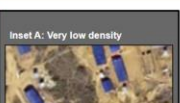
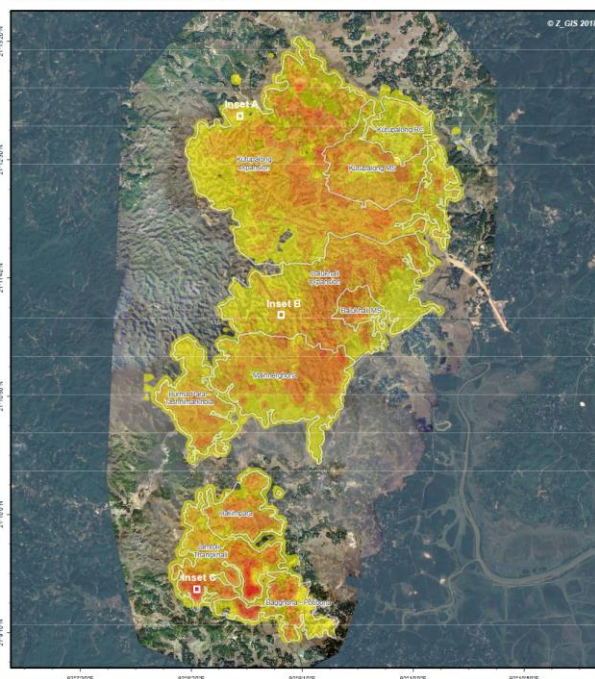
This map has been generated by combining the material available. Boundary or naming information implies no endorsement from the provider. Geographical information has been taken as the source. Accuracy, date and interpretation of the original source materials. The provider accepts no legal responsibility or liability whatsoever with regard to the use of this product.

Contact: gis.focal@geneva.msf.org | Web: http://mapcentre.msf.org



Bangladesh - Kutupalong and surroundings
Dwelling density (24 December 2017)

Production date: 26/01/2018
Product N: BGD-2018-02-POP-DWD



Description
This map shows the dwelling density within the refugee camps: Kutupalong, Balukhali, Mainkangola, Burma Para-Tahminarhola, Baggonia, Polbona, Jamoli-Thangkhal and Hakimpura. These camps are located in the Chittagong state, Bangladesh. The analysis was performed based on a very high resolution mosaic of drone images acquired on 24 December 2017. In total 126,010 small dwellings were identified. Dwelling density is categorized into five density classes with very low density (Inset A), Medium density (Inset B) and very high density (Inset C).

The total number of dwellings from October and December were aggregated to a hexagon cell of 0.3 ha. Changes are expressed in 5 categories: (i) high decrease of dwellings from -34 to -6 dwellings, (ii) comparatively stable from -5 to 5 dwellings, (iii) low increase from 6 to 25 dwellings, (iv) medium increase from 26 to 50 dwellings and (v) high increase from 51 to 100 dwellings.

Legend

Very low	1-10 dwellings	Camp extent
Low	11-100 dwellings	
Medium	101-1000 dwellings	
High	1001-2400 dwellings	
Very high	2401-3360 dwellings	

Camp statistics

Camp	26 Oct 2017	24 Dec 2017	Camp extent (ha)
Kutupalong MS	2714	2754	109.96
Balukhali MS	1512	6213	114.62
Polbona MS	2720	24200	114.62
Balukhali expansion	1494	2213	114.62
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Hakimpura	1410	1410	114.62
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Jamoli-Thangkhal	420	420	114.62
Polbona-Falbona	1410	1410	114.62
Total dwellings	12610	38810	114.62

Cartographic Information

Scale Main Map: 1:32,000 for A3 prints
Map projection: UTM Zone 46N, Datum: WGS 84
Grid: Lat/Lon (GMS), Datum: WGS 84

Data sources

Drone data
Platform: ebee with SOCA camera
Acquisition date: 24/12/2017
Spatial resolution: 0.5 m
Copyright: Sensafly
Source: OSM

Basemap
Pleiades 1A
Acquisition date: 20/10/2017
Spatial resolution: 0.5 m
Copyright: CNES
Source: Airbus DS

Vector data
Overview Map: GAUL (BFAO)

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Building detection



Building boundaries hard to recognize by naked eye



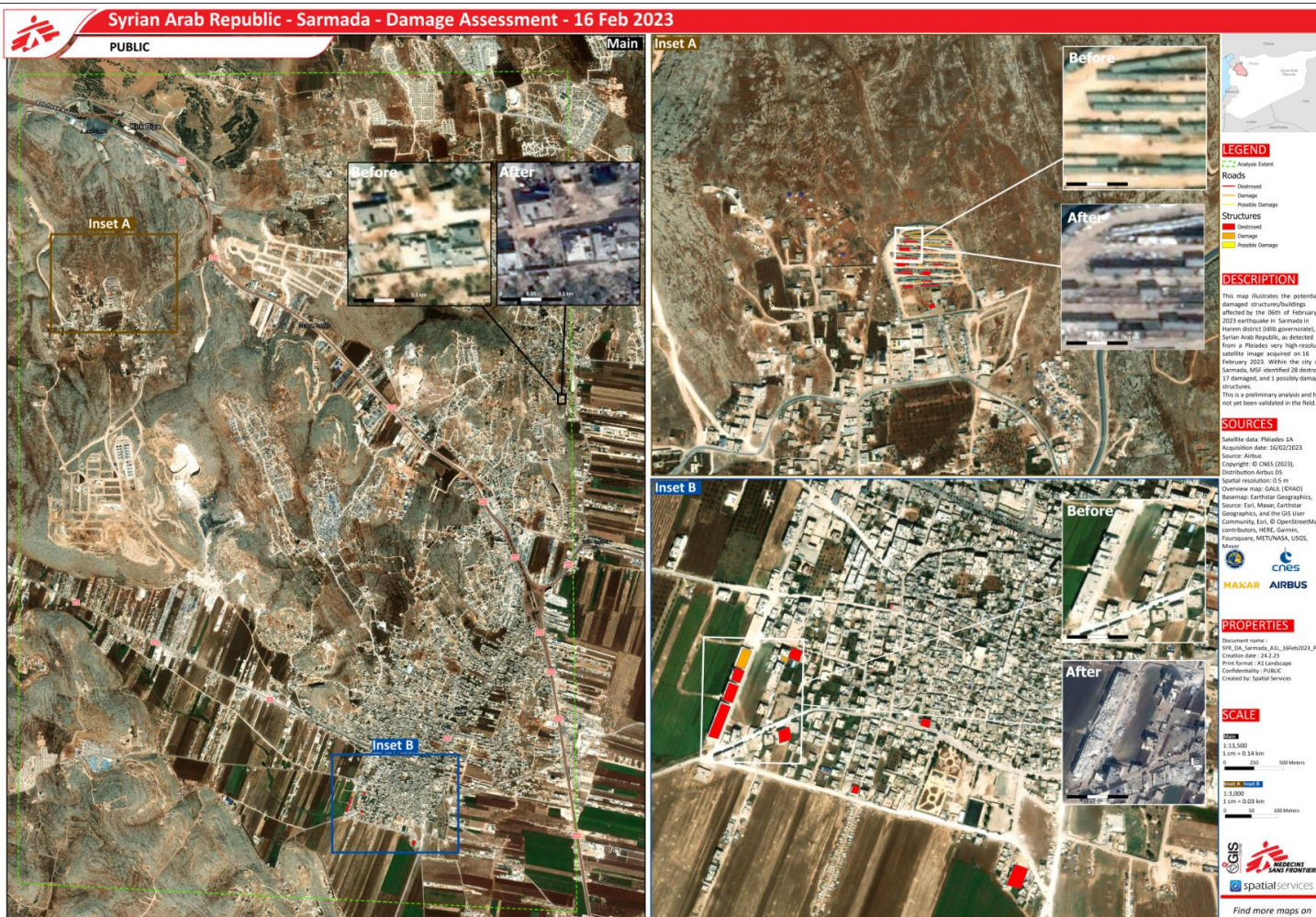
After post-processing



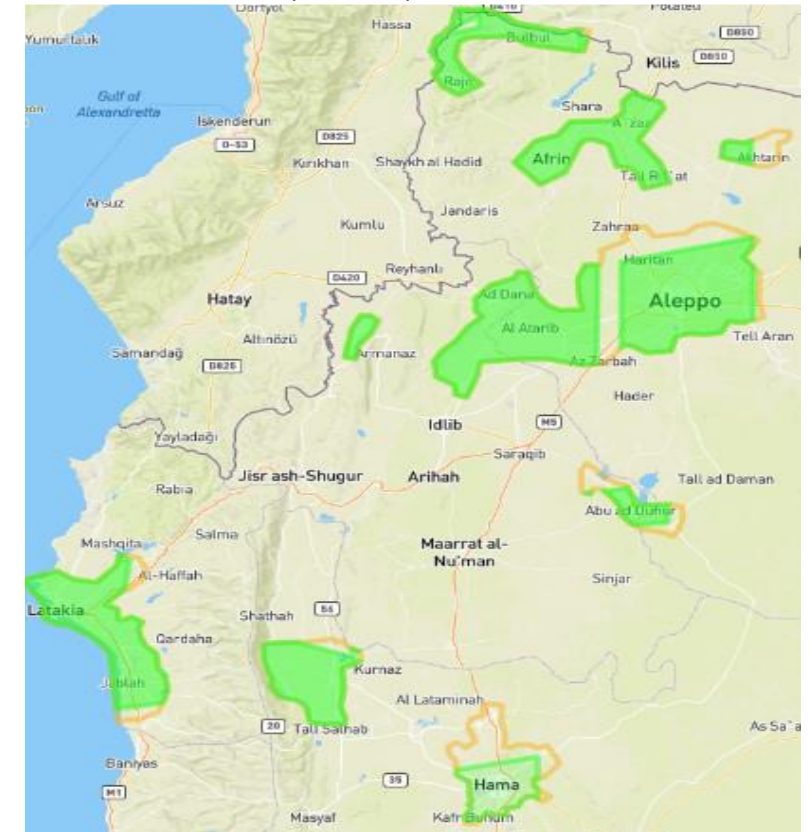
Deep learning approach detected around 85% of objects. The objects' shapefile needs post-processing.

Earthquake Turkey/Syrian Arab Republic

Response to the MSF Syria-Turkey Earthquake activation



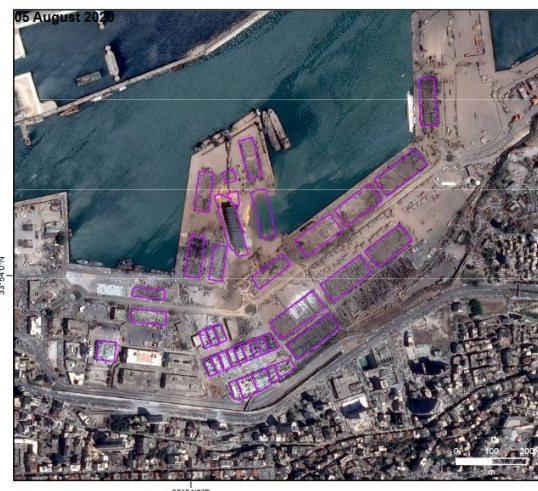
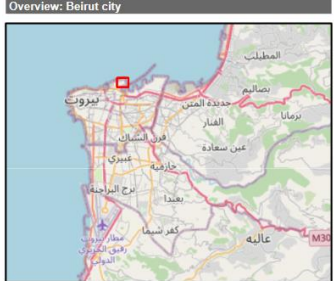
JRC - Damage assessment and recovery support after the 2023 earthquake in Syrian-affected areas



Damage assessment

Lebanon - Beirut
Destroyed buildings (02 July 2020 - 05 August 2020)

Production date: 06/08/2020
Product N: LBN-2020-61-POP-DSD



Description

Maps show before and after situation in Port 5 in Beirut city, Beirut Governorate, Lebanon after an explosion on the 04 August 2020. The maps on the right are based on a Pleiades-1B acquired on 02 July 2020 and the maps on the left are based on a Pleiades-1B, acquired on 05 August 2020.

Legend

- Destroyed and partially destroyed buildings

Cartographic Information

Scale Main Maps: 1:5,000 and 1:10,000 for A3 prints
Map projection: UTM Zone 36N, Datum: WGS 84
Grid: Lat/Lon (DMS), Datum: WGS 84

Data sources

Satellite image: Pleiades-1B
Acquisition date: 02/07/2020
Acquisition state: 05/08/2020
Spatial resolution: 0.5 m
Copyright: CNES
Source: AIRBUS DS

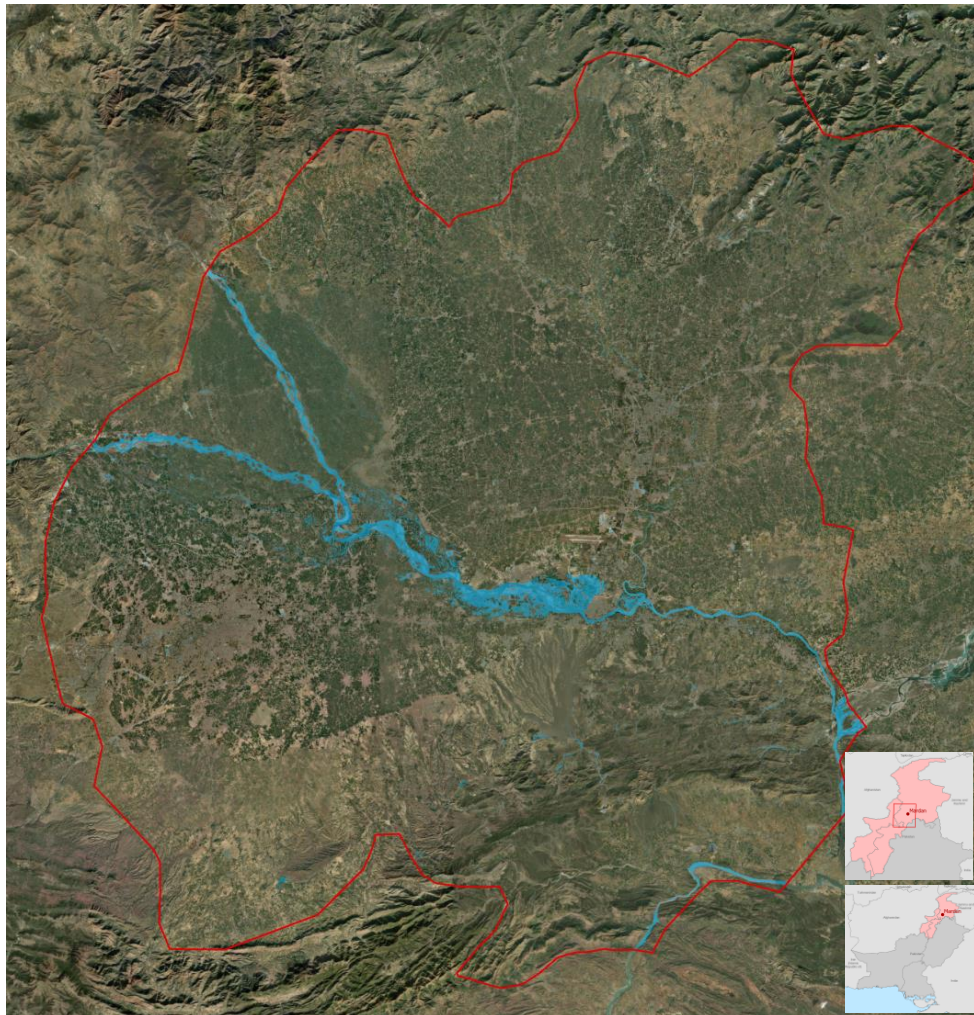
Vector data: Overview Map: GAUL, (SFAO)

This map has been generated by optimizing the metadata database. Sourcing of naming information implies no endorsement from the producer. Geographical information has limitations due to the scale, resolution, date and interpretation of the digital source materials. The producer accepts no legal responsibility of liability whatsoever with regard to the use of this product.

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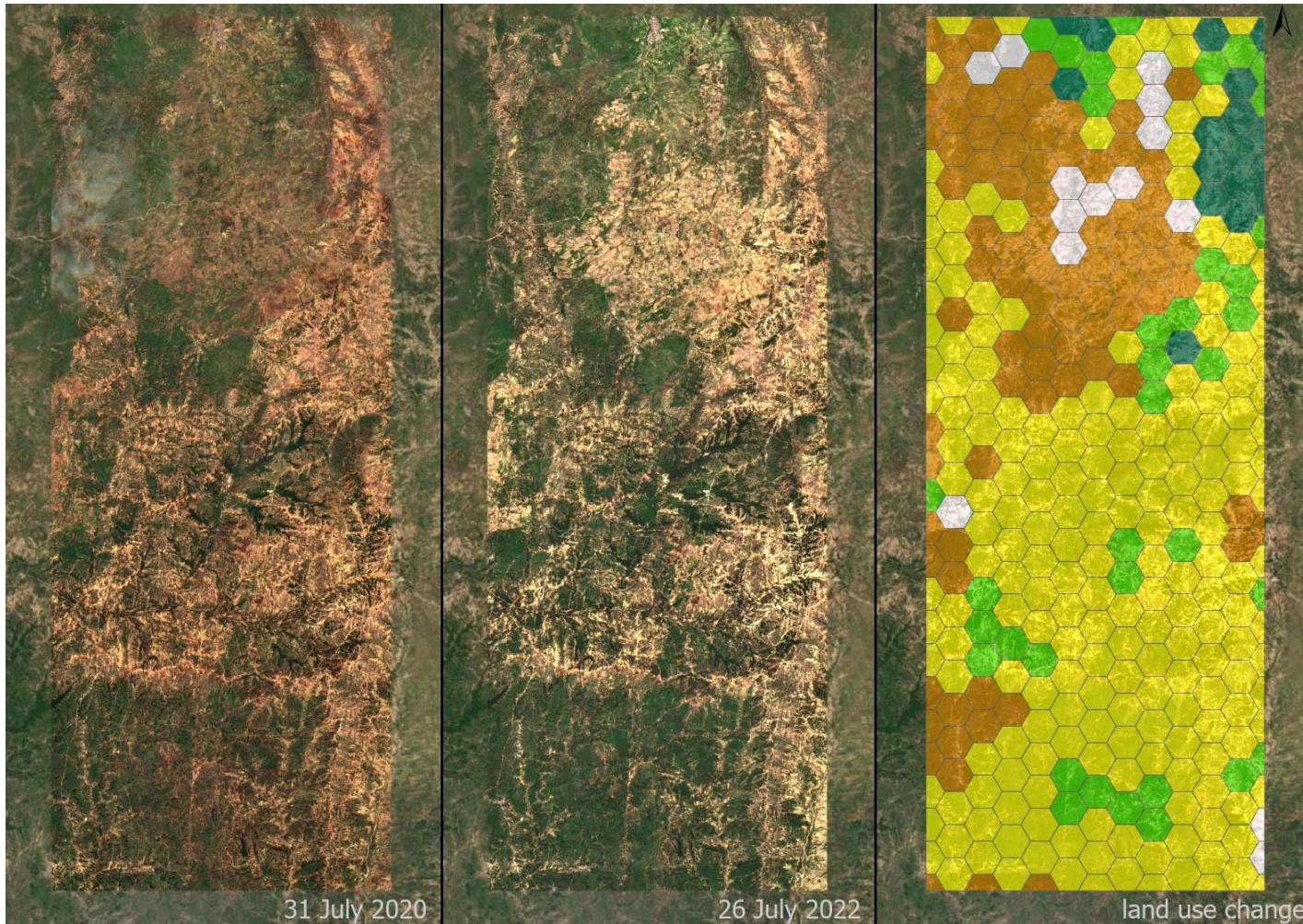
Flood monitoring in Pakistan



- Combination of S1 & S2



Land use change in Nigeria

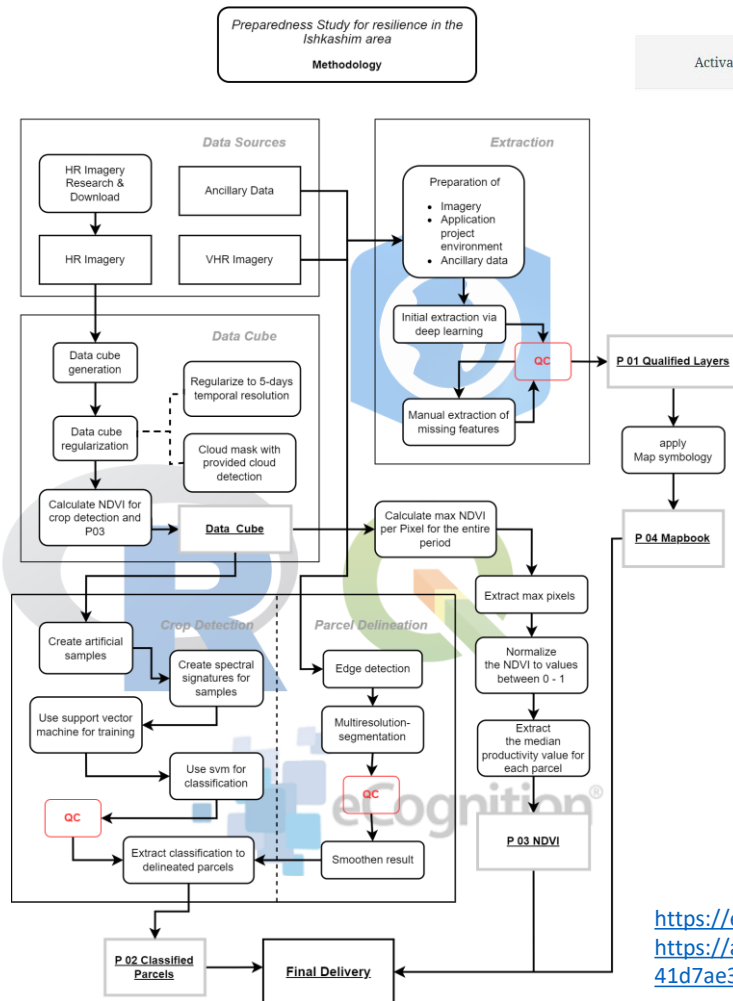


- Sentinel-2



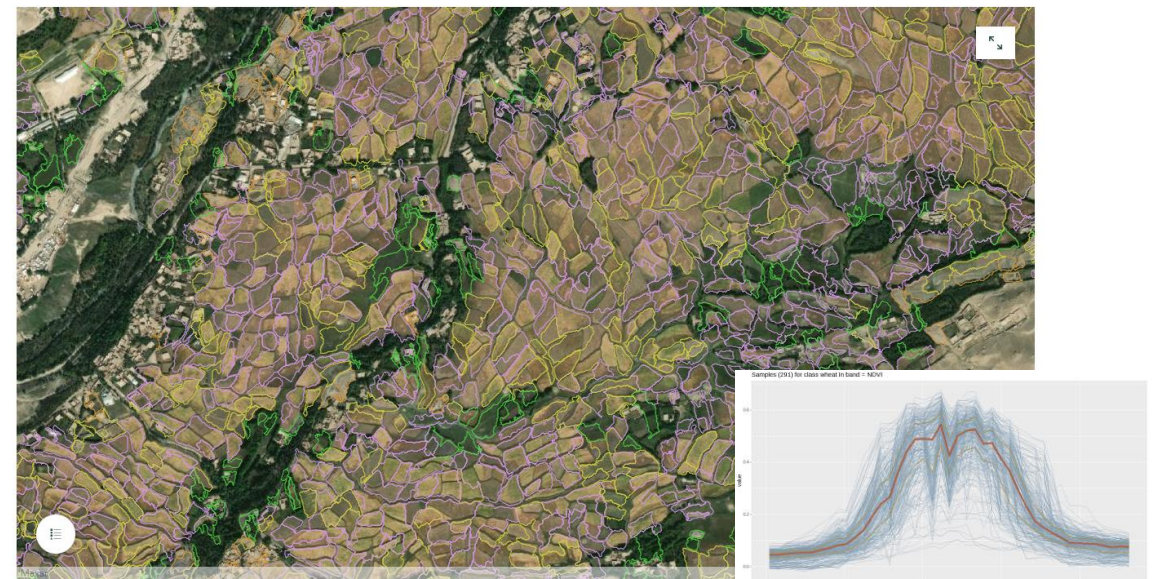
EMSN181 activation: Afghanistan/Tajikistan

- Infrastructure
 - Buildings
 - Roads
- Agriculture
 - Parcel delineation
 - Crop detection
 - Productivity estimation



Results

The following map includes the extracted **agricultural plots** for each AOI with the corresponding **crop type** for each parcel. In total **50,571 plots** were extracted for the 17 AOIs, covering an area of **6,509.9 ha**. Additionally, the **productivity** for each parcel (NDVI) is included as an attribute.



Agricultural Plots and Crop Types

<https://emergency.copernicus.eu/mapping/list-of-components/EMSN181>
<https://arcgis.jrc.ec.europa.eu/portal/apps/storymaps/stories/abbc5b932f9a41d7ae37c25984c46ede>

A wide-angle photograph of a space station in orbit above Earth. The station's complex structure, including a large cylindrical module and various external components, is visible on the right side. The Earth's surface below is covered in a dense layer of white clouds, with some darker landmasses and a large body of water visible on the left. The horizon of the planet curves across the top of the frame. In the top-left and bottom-right corners, there are decorative geometric patterns consisting of interconnected lines and polygons in various colors like orange, green, blue, and purple.

THANK YOU!



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