
LATITUDO 40®
DATA CATALOGUE
See the past, monitor the present, design the future.

LATITUDO 40

GEOSPATIAL OPERATIVE SYSTEM

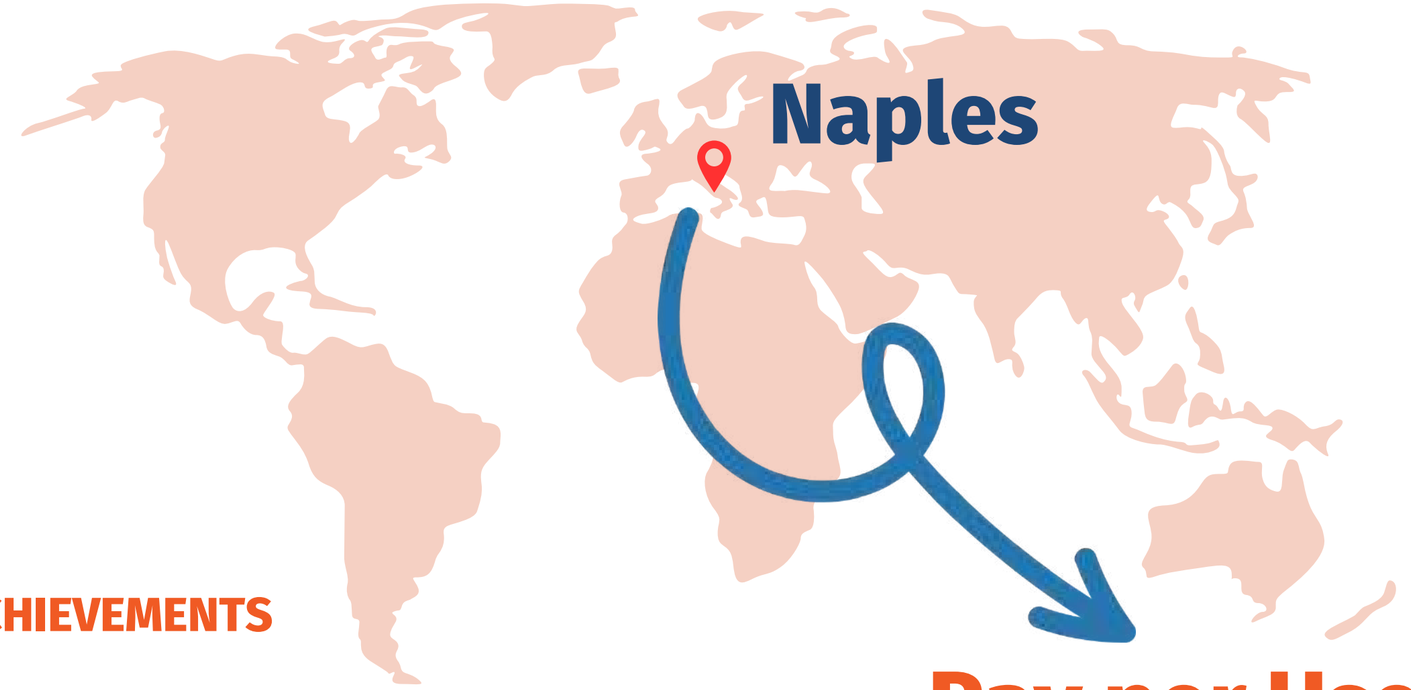
CITY OR AREA OF INTEREST

8 YEARS ENVIRONMENTAL AND CLIMATE TRENDS

IDENTIFY RISKS AND PROBLEMS (AI/ML ANALYSIS)

COMPARE SET KPI, CHECK ACHIEVEMENTS (WEEKLY, MONTHLY, ...)

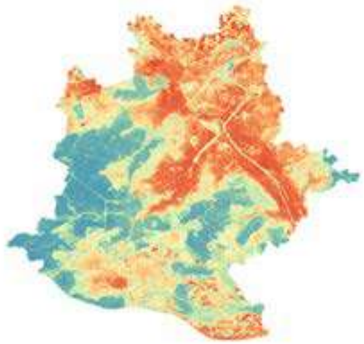
INTERVENTION PRIORITIZATION, SOLUTION MITIGATION AND SIMULATION OF THE IMPACT



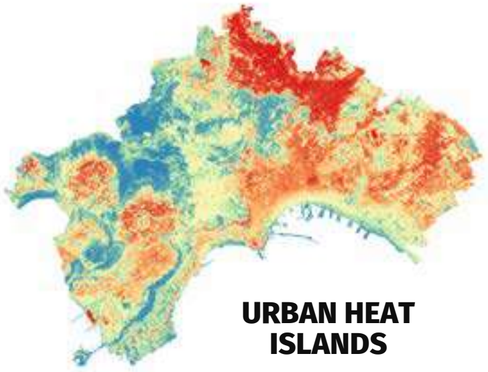
Pay per Use
€/SqKm

LATITUDO 40

EXAMPLE OF OUR DATA LAYERS

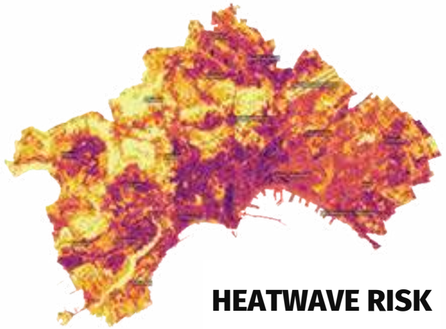


LAND SURFACE TEMPERATURE

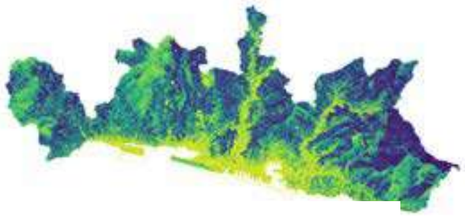


URBAN HEAT ISLANDS

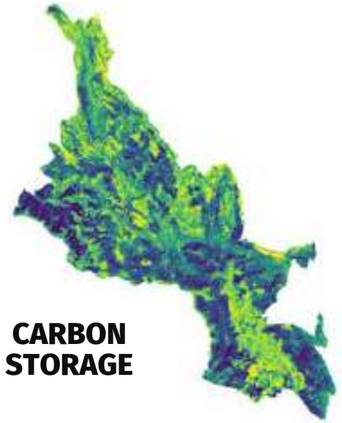
LAND COVER



HEATWAVE RISK



MULTISPECTRAL INDEXES



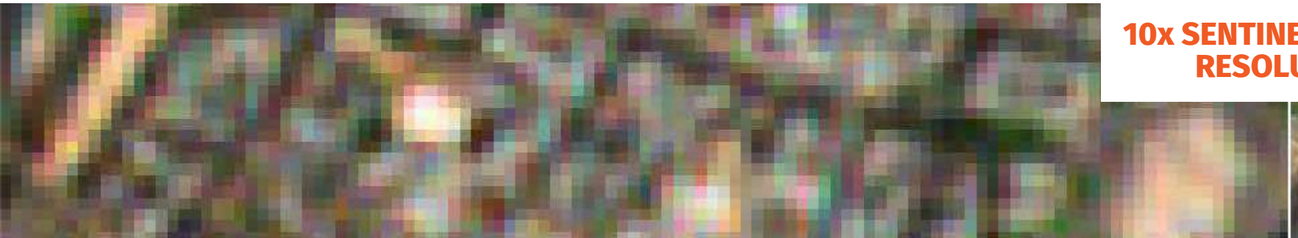
CARBON STORAGE

TREE COVER DENSITY

GREENERY HEALTH TREND

MICROCLIMATIC PERFORMANCE INDEX

PARK COOL ISLANDS



10x SENTINEL-2 SUPER RESOLUTION

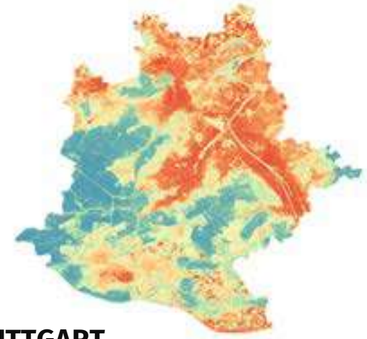
DATA SHEET

Land Surface Temperature

High Spatial Resolution Land Surface Temperature (LST) at 10m in Celsius Degrees (°C). The layer is obtained by applying Latitudo 40 proprietary Machine Learning algorithms to Copernicus Sentinel-2 to efficiently downscale the thermal information of Landsat 8-9 MSI.

USE CASES

GRAZ



STUTTGART

- **Urban Planning**: LST is useful to monitor urbanization effects like heat islands. It's key for designing comfortable urban areas and optimizing green spaces and infrastructure.
- **Agriculture**: LST helps farmers understand crop stress and manage irrigation and nutrients, improving crop yield and resource efficiency. It also aids in managing water resources by monitoring evaporation and transpiration.
- **Climate**: LST tracks local climate changes and aids in climate modeling. It serves as a continuous and historical indicator for studying climate change impacts.
- **Smart Health and Disease Prevention**: High-scale temperature studies provide public health risk indicators. Temperature maps identify high-risk areas, guiding interventions to improve health and mitigate heatwave effects.
- **Natural Resource and Ecosystem Protection**: LST supports fire risk management and ecosystem protection. It aids in predictive modeling and monitors forest health and soil moisture.
- **Scientific Research** and **Climatology**: Researchers use LST for climate model studies and understanding Earth-atmosphere interactions.

PRODUCT SPECIFICATIONS

Input Data	Sentinel-2, Landsat-8/9
Algorithm	Machine Learning Methods Ensemble
Metrics	MAE: 0.98 °C | RMSE: 1.25 °C
Spatial Resolution	10 m
Temporal Resolution	5-7 days (in absence of clouds)
Possible Aggregations	Monthly, Seasonal, Annual
Format	GeoTiff
Units	Celsius Degree (°C)
Automation	Fully Automated
Scalability	Global
Production Time	15 min / 100 Sqkm

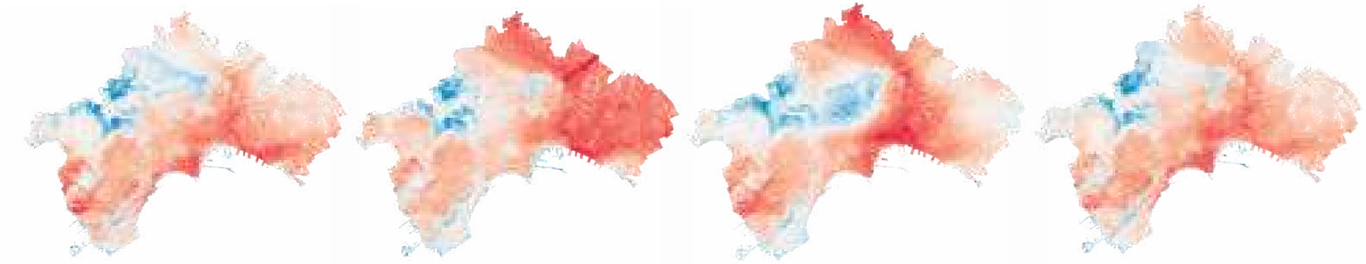
DATA SHEET

LST up to 4 times a day

The expansion of Latitudo 40's Land Surface Temperature (LST) layer now provides high spatial resolution temperature data at four critical times of day — 4:00 a.m., 12:00 p.m., 3:00 p.m., and 11:00 p.m. — in degrees Celsius. These specific time slots offer urban planners invaluable insights into the thermal dynamics of urban areas, helping to contribute to healthier, more sustainable cities.

- **Urban Heat Island Dynamics:** The LST 4 Times layer enables monitoring and analysis of temperature variations in urban areas at different times of the day and night to identify and understand urban heat island (UHI) dynamics.
- **Agriculture:** With temperature measurements at key times, the LST 4 Times layer helps farmers better understand diurnal thermal stress conditions on crops, manage irrigation schedules, and optimize nutrient application.
- **Urban Heat and Pollution Insights**: Combined with traffic data, users can leverage LST insights for targeted interventions to enhance air quality and reduce urban heat, optimize traffic flows, and design effective heat-mitigation strategies.
- **Public Health:** Utilizing high-resolution temperature data at various times enhances public health strategies by providing critical indicators for heat stress risk analysis.

4 a.m. **12 p.m.** **3 p.m.** **11 p.m.**



PRODUCT SPECIFICATIONS

Input Data	LST Latitudo40, MODIS LST 1km
Algorithm	Machine Learning Model
Metrics	Not Applicable
Spatial Resolution	10 m
Temporal Resolution	5-7 days (in absence of clouds)
Possible Aggregations	Monthly, seasonal, annual
Format	GeoTiff
Units	Celsius Degrees (°C)
Automation	Fully Automated
Scalability	Global
Production Time	15 min / 100 Sqkm

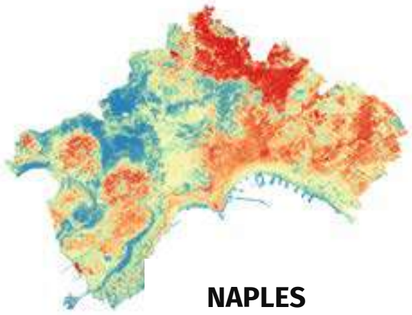
DATA SHEET

Urban Heat Islands

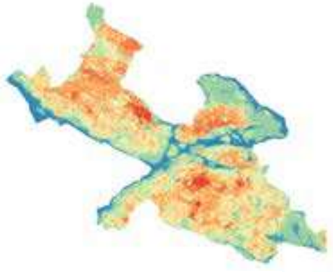
The SUHI layer assesses the UHI effect, highlighting areas that become warmer than surrounding rural areas due to human activities like urbanization and transportation. By analyzing ground temperature data, an index from 0 to 100 is generated, where higher values indicate greater UHI exposure, pinpointing critical zones.

USE CASES

- **Healthcare**: Use the layer to predict areas of potential heat-related health risks, guiding medical preparedness and public health campaigns.
- **Transportation**: Planning heat-resistant infrastructure, minimizing road and track degradation in heat-prone zones.
- **Energy**: Utilize the layer to forecast peak energy demands in heat-affected areas, ensuring grid stability and efficient distribution.
- **Retail & Commerce**: Integrate the layer to decide on optimal locations for businesses, considering foot traffic in relation to urban heat comfort.



NAPLES



STOCKHOLM

GRAZ

PRODUCT SPECIFICATIONS

Input Data	L40 LST | Landsat-8/9 | MODIS
Algorithm	Operational Procedure
Metrics	Not Applicable
Spatial Resolution	10 m | 30m | 1km
Temporal Resolution	5-7 days (in absence of clouds) | Daily
Possible Aggregations	Monthly, Seasonal, Annual
Format	GeoTiff
Units	Percentage
Automation	Fully Automated | Custom rural area
Scalability	Global
Production Time	20 min / 100 Sqkm

DATA SHEET

UHI Vulnerable Areas

Given the SUHI map calculated over the analysis period, UHI Vulnerable Areas are identified by statistical analysis, such as considering the distribution of data to highlight extreme values. In this way, vulnerability values are derived in [0, 1] whereby areas with values close to 0 are low vulnerable while areas with values close to 1 are highly vulnerable.

USE CASES

- **Insurance**: Assists in risk assessment for properties in heat-vulnerable zones, influencing premium pricing.
- **Healthcare and Public Health**: Identifies high-risk areas for targeted healthcare services and public health campaigns.
- **Environmental**: Aids in developing urban greening and sustainable architecture solutions.
- **Smart City**: Informs where to deploy climate resilience technologies.

MILAN
JUNE

MILAN
AUGUST

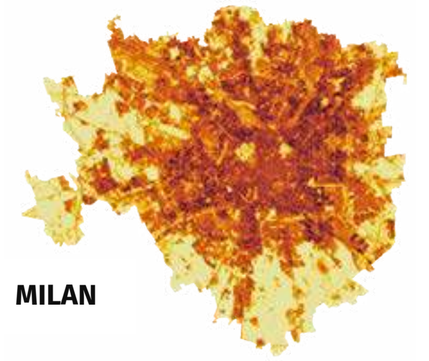
PRODUCT SPECIFICATIONS

Input Data	L40 Urban Heat Islands
Algorithm	Operational Procedure
Metrics	Not Applicable
Spatial Resolution	10 m | 30m | 1km
Temporal Resolution	5-7 days (in absence of clouds) | Daily
Possible Aggregations	Monthly, Seasonal, Annual
Format	GeoTiff
Units	Index
Automation	Fully Automated
Scalability	Global
Production Time	10 min / 100 Sqkm

DATA SHEET

Heatwave Risk

The Heatwave Risk map, by combining data on temperature (hazard), population by age group (exposure), and morphological characteristics of the area (vulnerability), allows to derive a risk index (between 0 and 100) where values close to zero are risk-free as opposed to values close to 100 that identify the most critical areas to be prioritized.



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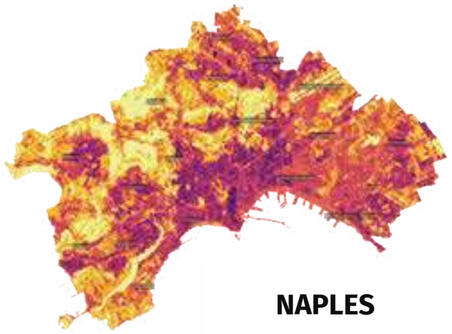


NAPLES

USE CASES

- **Healthcare**: Understand areas with vulnerable populations, such as children and the elderly, to better prepare for heatwave-related health issues.
- **Emergency Services**: Develop strategies and responses for regions more prone to heatwave events, ensuring swift reactions.
- **Insurance**: Incorporate comprehensive heatwave risk assessments to craft more informed policies.
- **Real-Estate**: Utilize heatwave risk data to determine suitable areas for development and ensure safety.

PRODUCT SPECIFICATIONS

Input Data	L40 LST, Population, DEM
Algorithm	Operational Procedure
Metrics	Not Applicable
Spatial Resolution	10 m
Temporal Resolution	Annual
Possible Aggregations	Multi-year
Format	GeoTiff
Units	Percentage
Automation	Fully Automated | Premium Data
Scalability	Global
Production Time	45 min / 100 Sqkm

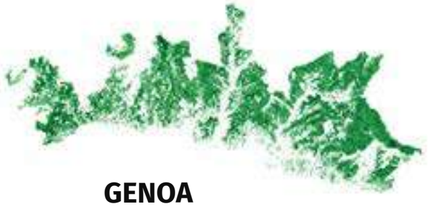
DATA SHEET

Tree Cover Density

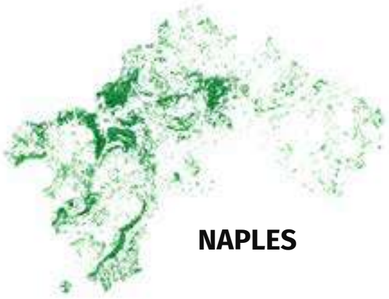
The Tree Cover Density (TCD) layer depicts the percentage of tree canopy cover across a range of 0-100%. It can be used to identify regions exhibiting varying levels of tree canopy cover and thus aid in evaluating deforestation or reforestation patterns in rural areas. The product has a spatial resolution of 10 meters, and it's generated via Machine Learning and Sentinel-2 MSI.

USE CASES

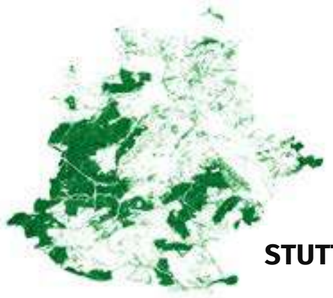
- **Urban Planning**: Evaluate tree canopy's density and distribution to guide city development and green infrastructure monitoring.
- **Real-Estate**: Analyze areas with significant tree cover to assess land value and potential for premium property developments.
- **Agriculture**: Monitor tree density in agricultural zones to understand the balance between open farmland and tree-covered areas.
- **Climate**: Understand tree distribution patterns related to local climate variations and adaptations.



GENOA



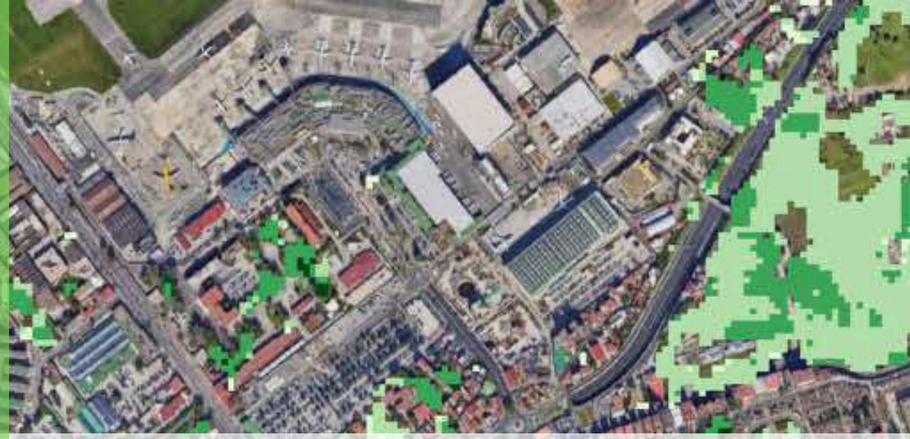
NAPLES



STUTTGART

PRODUCT SPECIFICATIONS

Input Data	Sentinel-2
Algorithm	Machine Learning Model
Metrics	MAE: 9.97 | RMSE: 14.86
Spatial Resolution	10 m
Temporal Resolution	Annual
Possible Aggregations	Multi-year
Format	GeoTiff
Units	Percentage
Automation	Fully Automated
Scalability	Global
Production Time	25 min / 100 Sqkm



DATA SHEET

Tree Heights Classification

The Tree Height layer provides a detailed estimation of the heights of trees in a specific area. This metric is fundamental in forestry and environmental science, as it allows for a better understanding of the vertical structure of vegetation and the identification of variations and anomalies in the distribution of heights. This layer provides a classification of tree height into 4 ranges, specifically, between 5 and 10 meters, 10-15, 15-20, and greater than 20. Using advanced machine learning algorithms applied to multispectral data, this layer is produced with a spatial resolution of 10 meters, ensuring high accuracy and reliability.

USE CASES

- **Ecological restoration**: When combined with datasets on local fauna and flora, this layer enables detailed assessment of ecosystem structures and biodiversity indices. This data supports the identification of diverse habitats, facilitates biodiversity monitoring, and guides ecosystem recovery efforts, ensuring targeted actions for sustainable environmental management.
- **Roadside safety and maintenance:** By classifying tree heights along roads, municipalities can identify tall trees near critical infrastructure (e.g., power lines, traffic lights, roadways) and prioritize maintenance to prevent risks such as branch falls or storm damage.
- **Air quality improvement**: By understanding tree heights and their distribution, cities can better position greenery as a buffer against noise and air pollution along major roads or industrial zones, maximizing pollution capture and noise absorption, creating healthier urban environments..
- **Mapping Forests**: Understanding ecological dynamics and recovery processes after disturbances, including natural events (e.g., fire) or human activities. Therefore, also useful in risk factors evaluation.

PRODUCT SPECIFICATIONS

Input Data	Sentinel-2
Algorithm	Machine Learning Model
Metrics	MAE: 9.97 | RMSE: 14.86
Spatial Resolution	10 m
Temporal Resolution	Annual
Possible Aggregations	Multi-year
Format	GeoTiff
Units	Categorical, 4 Categories
Automation	Fully Automated
Scalability	Global
Production Time	35 min / 100 Sqkm

DATA SHEET

3/30/300 Greenery rule

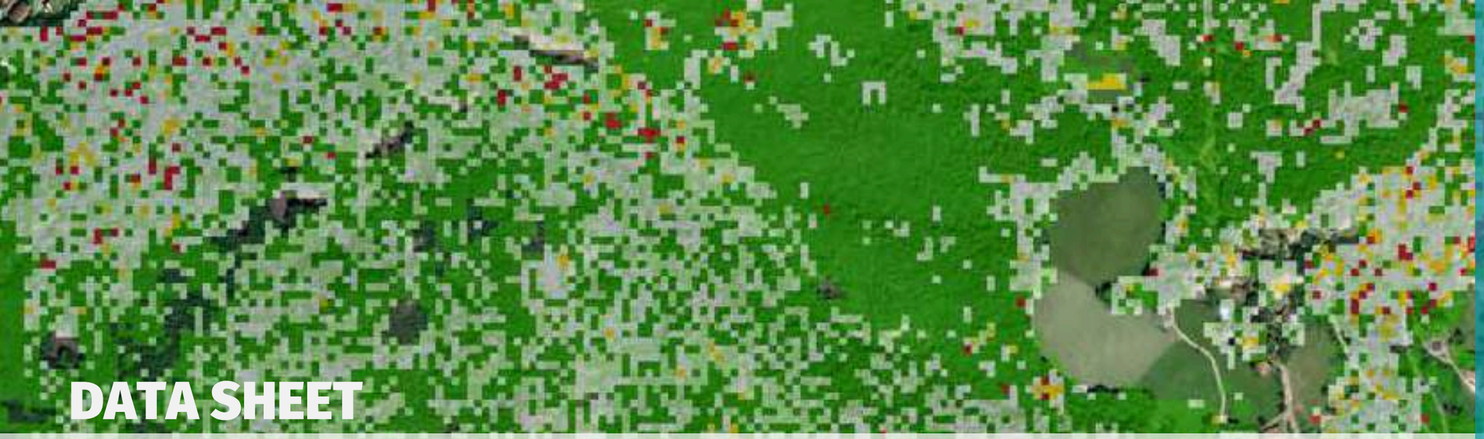
The 3-30-300 Greenery Analysis Layer offers a comprehensive assessment of urban green spaces, specifically designed to support sustainable urban planning and environmental health studies. The dataset provides insights into three critical aspects: proximity to greenery (3 meters), percentage of green space within 30 meters, and accessibility to large public parks within 300 meters of residential buildings.

USE CASES

- **Urban Planning**: This tool allows planners to identify areas where green space is lacking and prioritise interventions that enhance urban liveability.
- **Real-Estate**: This Layer can be used for assessing and scoring each property based on its compliance with the 3/30/300 rule.
- **Public Health**: Public health researchers and environmental scientists can use the 3-30-300 Greenery Analysis Layer to study the relationship between green space accessibility and health outcomes in urban populations.
- **Community**: Community organizations focused on environmental justice and urban equity can use the 3-30-300 Greenery Analysis Layer to identify the neighborhoods that lack adequate green space.

PRODUCT SPECIFICATIONS

Input Data	Tree Cover Density, Premium Land Cover Map, Overture Maps
Algorithm	Operational procedure, Math formulas
Metrics	Not Applicable
Spatial Resolution	10 m
Temporal Resolution	Annual
Possible Aggregations	Multi-year
Format	GeoTiff & GeoJson
Units	Index
Automation	Fully Automated
Scalability	Global
Production Time	40 min / 100 Sqkm



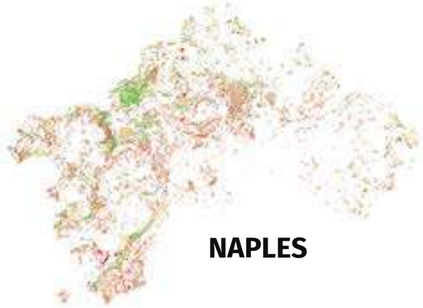
DATA SHEET

Greenery Health Trend

The Greenery Health Trend layer allows vegetation to be categorized into 5 classes: Critical Decay, Decay, Unchanged, Improved, and Evident Improvement. Using Sentinel-2, it's possible to derive information about the health status of the vegetation and then analyze its trend over time.

USE CASES

- **Urban**: Prioritize areas with "Critical Decay" or "Decay" for inspection, ensuring tree safety in populated zones.
- **Emergency**: Anticipate tree fall incidents in zones marked by "Critical Decay" and "Decay."
- **Insurance**: Determine potential claims in regions with declining tree health or offer incentives for areas showing improvement.
- **Public Awareness**: Advocate for the importance of healthy forests, both for safety and economic reasons, among local communities and landowners.



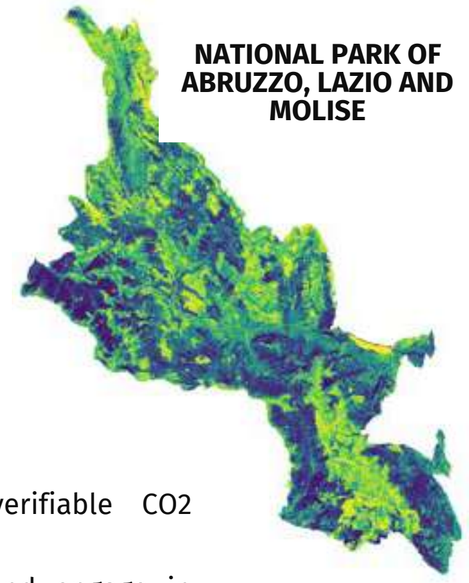
PRODUCT SPECIFICATIONS

Input Data	Sentinel-2
Algorithm	Operational Procedure
Metrics	Not Applicable
Spatial Resolution	10 m
Temporal Resolution	Annual
Possible Aggregations	Sequential year differences, Multi-year
Format	GeoTiff
Units	Categorical
Automation	Fully Automated
Scalability	Global
Production Time	20 min / 100 Sqkm

DATA SHEET

Carbon Storage

The Carbon Storage layer quantifies the CO2 captured by greenery, offering a precise measure of nature's role in mitigating atmospheric carbon levels. Leveraging Sentinel-2 MSI, sophisticated machine learning techniques process a range of vegetation and soil indices to estimate CO2 sequestration reliably. The outcome, with a 10-meter spatial resolution, reveals the tons (t) of sequestered carbon, directly correlating with the density and health of the underlying vegetation. This layer provides an invaluable tool for understanding and optimizing our planet's natural carbon sinks.



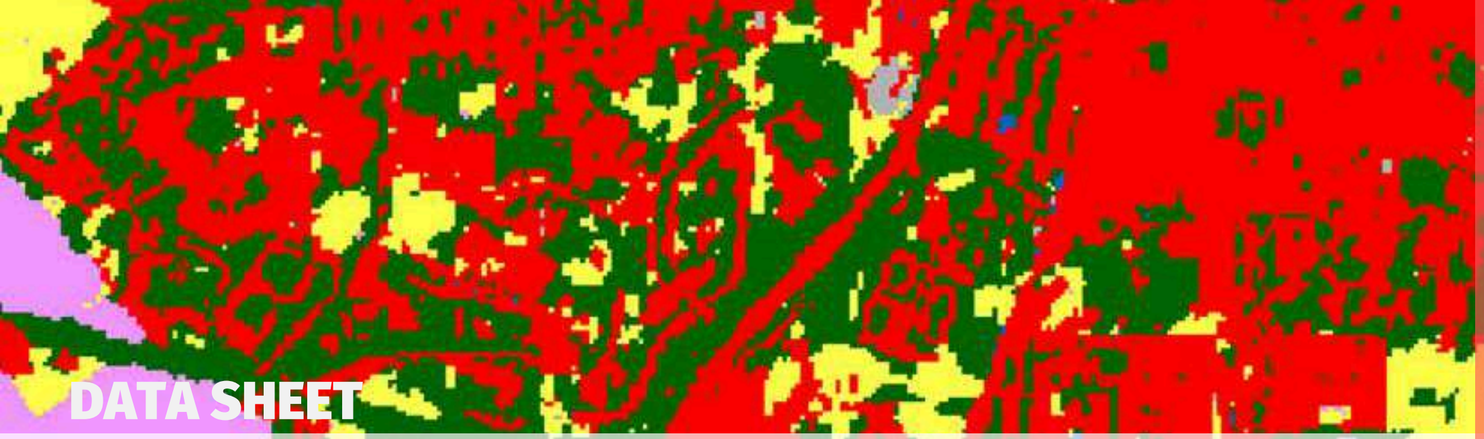
NATIONAL PARK OF ABRUZZO, LAZIO AND MOLISE

USE CASES

- **Carbon Markets**: Determine carbon credit values with verifiable CO2 sequestration data, boosting market transparency.
- **Forestry Management**: Optimize forests for carbon storage and engage in sustainable carbon credit trading.
- **Real-Estate:** Assess property value considering carbon storage potential, offering landowners credit incentives for green spaces.
- **Research:** Investigate ecosystem carbon dynamics to refine carbon credit methodologies.
- **Corporate Social Responsibility (CSR) Initiatives**: Help companies offset footprints by endorsing proven carbon storage areas and sustainable credit investments.

PRODUCT SPECIFICATIONS

Input Data	Sentinel-2
Algorithm	Deep Learning Method (UNet)
Metrics	MAE: 9.17 tonn/ha | RMSE: 11.12
Spatial Resolution	10 m
Temporal Resolution	Annual
Possible Aggregations	Sequential year differences, Multi-year
Format	GeoTiff
Units	Tonnes of Carbon Sequestered
Automation	Fully Automated
Scalability	Global
Production Time	25 min / 100 Sqkm



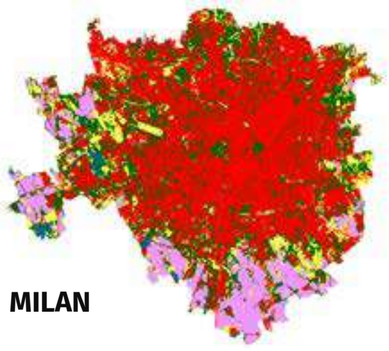
DATA SHEET

Land Cover

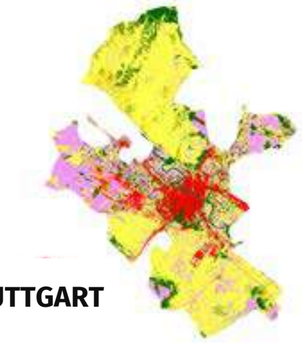
The Land Cover layer provides a comprehensive overview of the Earth's surface, classifying it into 11 classes. These categories include urban areas, forests, water bodies, croplands, and more. The layer has been meticulously crafted utilizing exclusively Sentinel-2 satellite imagery, among other topographic layers. Advanced Deep Learning algorithms were applied to obtain this dataset, ensuring a precise representation of the global landscape.

USE CASES

- **Urban Planning**: Enhance city development strategies with insights into urban expansion, green spaces, and infrastructure planning.
- **Agriculture**: Optimize land use by identifying crop areas, aiding in crop management and yield estimation.
- **Environmental**: Monitor changes in natural habitats, aiding in biodiversity preservation and protected area management.
- **Climate**: Analyze land cover changes to understand climate change impacts on ecosystems better.
- **Infrastructure**: Plan roads, buildings, and utilities more effectively by considering existing land cover.



MILAN

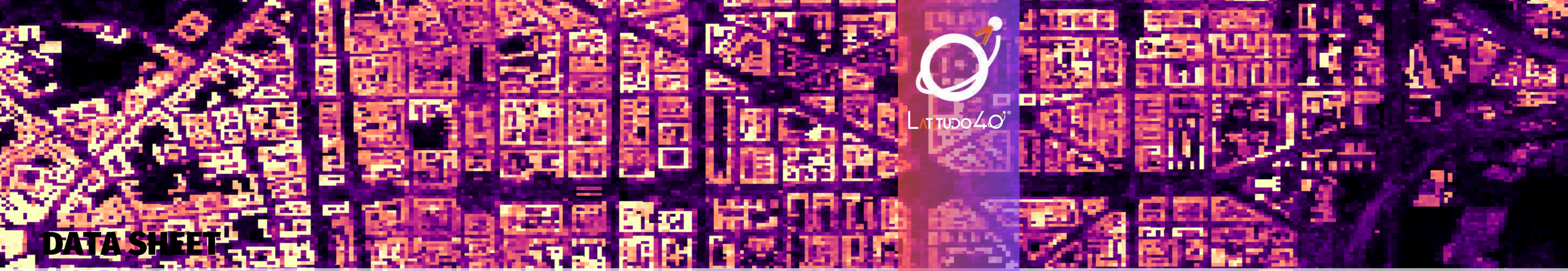


STUTTGART

GENOA

PRODUCT SPECIFICATIONS

Input Data	Sentinel-2
Algorithm	Deep Learning Method (UNet)
Metrics	Pixel Accuracy: 89%, mIoU: 0.71
Spatial Resolution	10 m
Temporal Resolution	Annual
Possible Aggregations	Changes over years
Format	GeoTiff
Units	Categorical, 11 classes
Automation	Fully Automated
Scalability	Global
Production Time	60 min / 100 Sqkm



DATA SHEET

Building Heigth

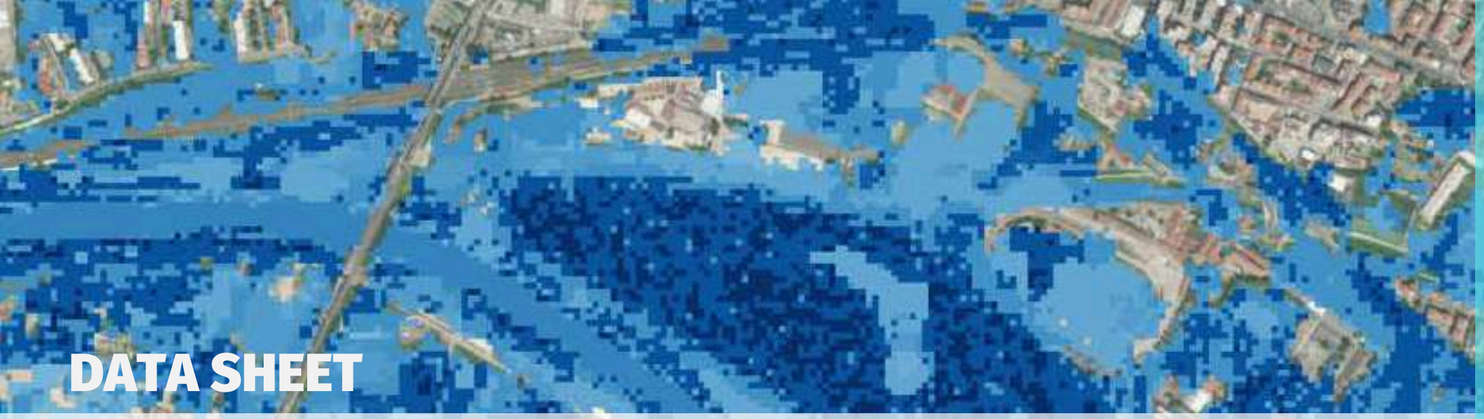
The Building Height layer provides a comprehensive estimation of gross building heights in urban areas, capturing the total vertical measurement of buildings from the base to the highest point. Developed using Latitudo 40's advanced deep learning model applied to Sentinel-2 satellite imagery, this layer ensures precise height estimate across large geographic areas, with a high spatial resolution of 10 meters. By accurately assessing the distribution of building heights, this layer serves as a critical resource for urban planning, supporting data-driven decision-making for professionals requiring a thorough understanding of urban environments.

USE CASES

- **Urban Growth and Zoning Management**: Building height data helps planners enforce zoning laws and regulate building heights in specific areas to maintain a balanced skyline, ensuring sustainable, well-planned vertical expansion.
- **City Compactness and Density Analysis**: Understanding the vertical profile of buildings aids in assessing urban density and compactness, informing policies that promote sustainable development while minimizing sprawl.
- **Disaster Preparedness and Evacuation Planning**: Height data allows planners to create specific evacuation plans for high-rise areas, optimize emergency services routes, and enhance safety protocols, especially for fire, earthquake-prone zones, and flooding.
- **Light and Shadow Planning for Public Spaces**: Knowing building heights allows planners to evaluate the impact of shadows cast on public areas, parks, and residential zones, enabling policies to protect sunlight access and enhance public space livability.

PRODUCT SPECIFICATIONS

Input Data	Sentinel 2
Algorithm	Machine Learning model
Metrics	Not Applicable
Spatial Resolution	10 m
Temporal Resolution	Annual
Possible Aggregations	Changes over years
Format	Vector
Units	m
Automation	Fully Automated
Scalability	Europe
Production Time	60 min / 100 Sqkm



DATA SHEET

Microclimatic Performance Index

The Microclimatic Performance Index (MPI) evaluates Urban Green Infrastructure's (UGI) ability to combat the Urban Heat Island (UHI) effect. Utilizing parameters like Tree Cover Density (TCD) and Land Cover Classes, UGI areas are rated for their cooling potential, considering factors like shading, evapotranspiration, and albedo. The index offers a systematic approach to quantify UGI's impact on urban temperatures.

USE CASES

- **Urban Planning**: The layer provides planners with data-driven tools to optimize green spaces, improving urban climate resilience.
- **Environmental**: The layer helps conservationists pinpoint critical green pockets, advocating for their protection and enhancement.
- **Healthcare**: Using MPI, health agencies can identify good areas for frail people.

GENOA

FLORENCE

GRAZ

PRODUCT SPECIFICATIONS

Input Data	Sentinel-2
Algorithm	Operational Procedure
Metrics	Not Applicable
Spatial Resolution	10 m
Temporal Resolution	Annual
Possible Aggregations	Changes over years
Format	GeoTiff
Units	Categorical, 20 classes
Automation	Fully Automated
Scalability	Global
Production Time	15 min / 100 Sqkm

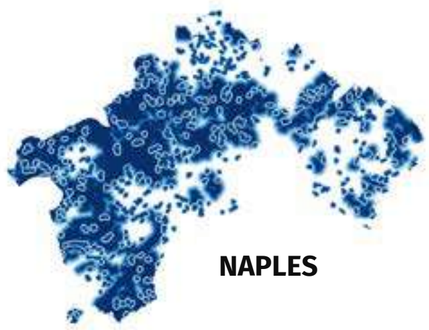
DATA SHEET

Park Cool Islands

The PCI layer classifies urban parks' cooling effects into Major and Minor Cool Islands. Major PCIs are parks over 2 hectares with 50%+ tree canopy, providing cooling up to 300 meters. Minor PCIs offer cooling up to 100 meters and vary in size and canopy coverage. This assists planners in optimizing urban green spaces.

USE CASES

- **Urban Planning**: The PCI layer aids planners in identifying key green spaces for urban cooling, streamlining resilient city designs.
- **Real-Estate**: Developers can promote properties near Major PCIs, emphasizing enhanced comfort and reduced cooling costs.
- **Environmental**: Conservationists can prioritize the protection of Major PCIs, highlighting their crucial role in urban temperature regulation.
- **Healthcare**: Health agencies can pinpoint zones with potential heat risks, focusing on areas distant from significant PCIs for interventions.



NAPLES

MILAN

GRAZ

PRODUCT SPECIFICATIONS

Input Data	Sentinel-2
Algorithm	Operational Procedure
Metrics	Not Applicable
Spatial Resolution	10 m
Temporal Resolution	Annual
Possible Aggregations	Not Applicable
Format	GeoTiff
Units	Categorical, Buffers
Automation	Fully Automated
Scalability	Global
Production Time	20 min / 100 Sqkm

DATA SHEET

Albedo

Albedo is a measure of how much light or radiation is reflected by a surface relative to the amount received. It's usually expressed as a percentage, with higher values indicating surfaces that reflect more radiation and lower values for those that absorb more. Albedo is significant in studying climate and environmental science, as it affects Earth's heat balance. High albedo surfaces, like snow and ice, reflect more solar energy, while low albedo surfaces, such as forests or urban areas, absorb more, influencing local and global temperatures.

MILAN
2023-07-10

MILAN
2023-09-08

USE CASES

- **Urban Planning**: Construction and architecture firms can use albedo studies for roof reflectivity to create energy-efficient buildings. Higher albedo roofs reduce cooling needs and energy costs, enhancing sustainability and appeal in the green building market.
- **Urban Heat Island Mitigation**: Environmental consultants can advise cities on using high-albedo materials for roofs and urban surfaces to reduce the urban heat island effect, leading to cooler cities and improved public health.
- **Real Estate**: Real estate investors can retrofit properties with high-albedo roofing to lower internal temperatures and energy costs, increasing property appeal and value, especially for sustainability-focused tenants and buyers.

PRODUCT SPECIFICATIONS

Input Data	Sentinel-2
Algorithm	Operational Procedure
Metrics	Not Applicable
Spatial Resolution	10 m
Temporal Resolution	On image availability
Possible Aggregations	Roof Reflectivity on Buildings, Others
Format	GeoTiff
Units	Index
Automation	Fully Automated
Scalability	Global
Production Time	5 min / 100 Sqkm

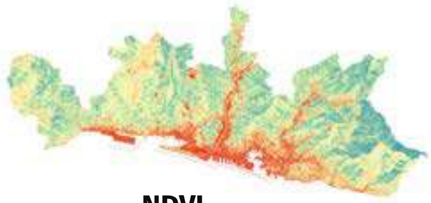
DATA SHEET

Multispectral Indexes

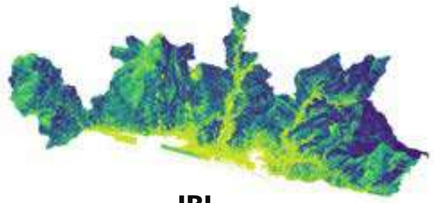
Multispectral indexes transform satellite imagery, taken across different wavelengths, into actionable insights. With resolutions ranging from 30 meters to 30 centimeters, they shed light on vegetation health, soil moisture, and water quality. These indexes are pivotal for sectors like agriculture, forestry, urban planning, and environmental conservation, offering a clear understanding of complex spectral data and supporting informed decisions across industries.

USE CASES

- **Agriculture**: Multispectral indexes provide vital information on soil health, crop conditions, and irrigation needs, aiding in improved yield and sustainable farming practices.
- **Urban Planning**: Multispectral indexes facilitate urban growth tracking and infrastructure monitoring, enabling smarter city planning.
- **Real-Estate**: Multispectral data assists developers in land evaluations, optimizing both economic and environmental outcomes.
- **Emergency**: Change detection highlights zones impacted by floods, fires, or other natural disasters, enabling rapid response.
- **Machine-Learning**: Multispectral indexes are invaluable features in training models, driving advancements in satellite image interpretation and application across sectors.



NDVI

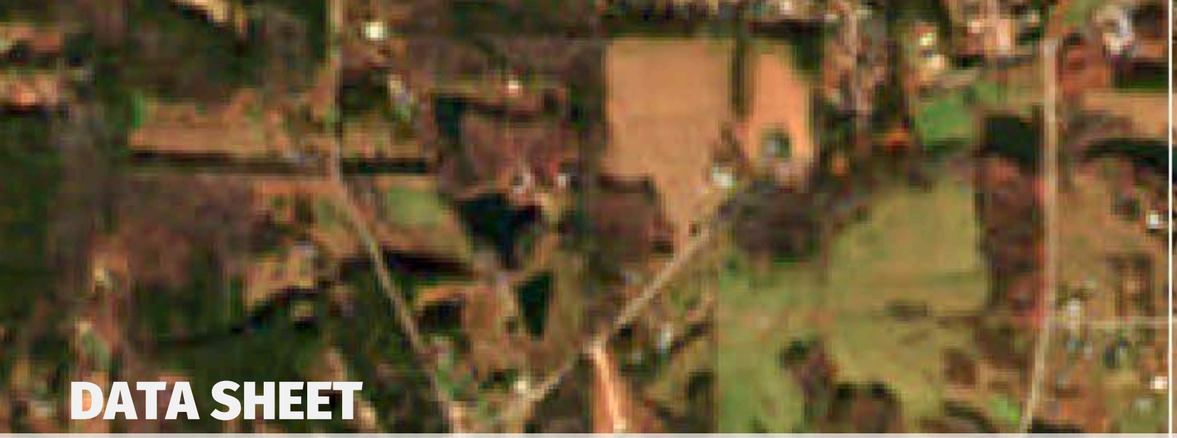


IBI

SAVI

PRODUCT SPECIFICATIONS

Input Data	Sentinel-2 | Landsat | Planet | L40 Super Resolution | Others
Algorithm	Operational Procedure
Metrics	Not Applicable
Spatial Resolution	10 m | 30 m | 3m | 1m | up to 30 cm
Temporal Resolution	On image availability
Possible Aggregations	Zonal Statistics, Temporal Aggregations, Time Series Analysis
Format	GeoTiff
Units	Index
Automation	Fully Automated
Scalability	Global
Production Time	5 min / 100 Sqkm



DATA SHEET

Sentinel-2 Super Resolution

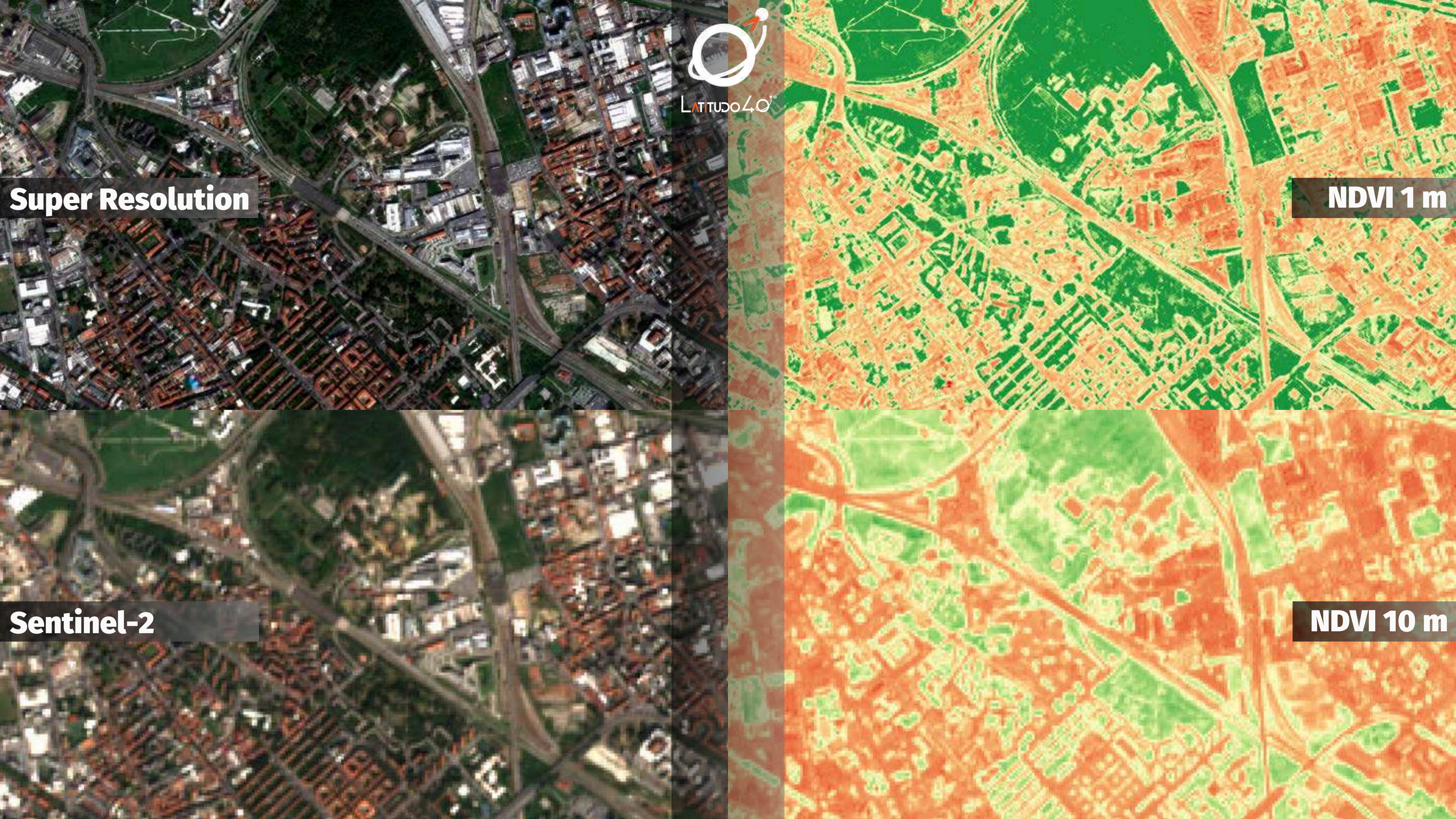
The 10x Sentinel-2 Super Resolution Layer takes the original Sentinel-2 MSI and advances its spatial resolution to 1 meter for all 12 bands. Utilizing sophisticated upscaling techniques, this layer offers an unparalleled level of detail, granting users the capability for more in-depth analysis and interpretation. Whether for an agricultural assessment, intricate urban planning, or nuanced environmental observations, the heightened clarity across all 12 bands ensures a richer and more detailed understanding of each image.

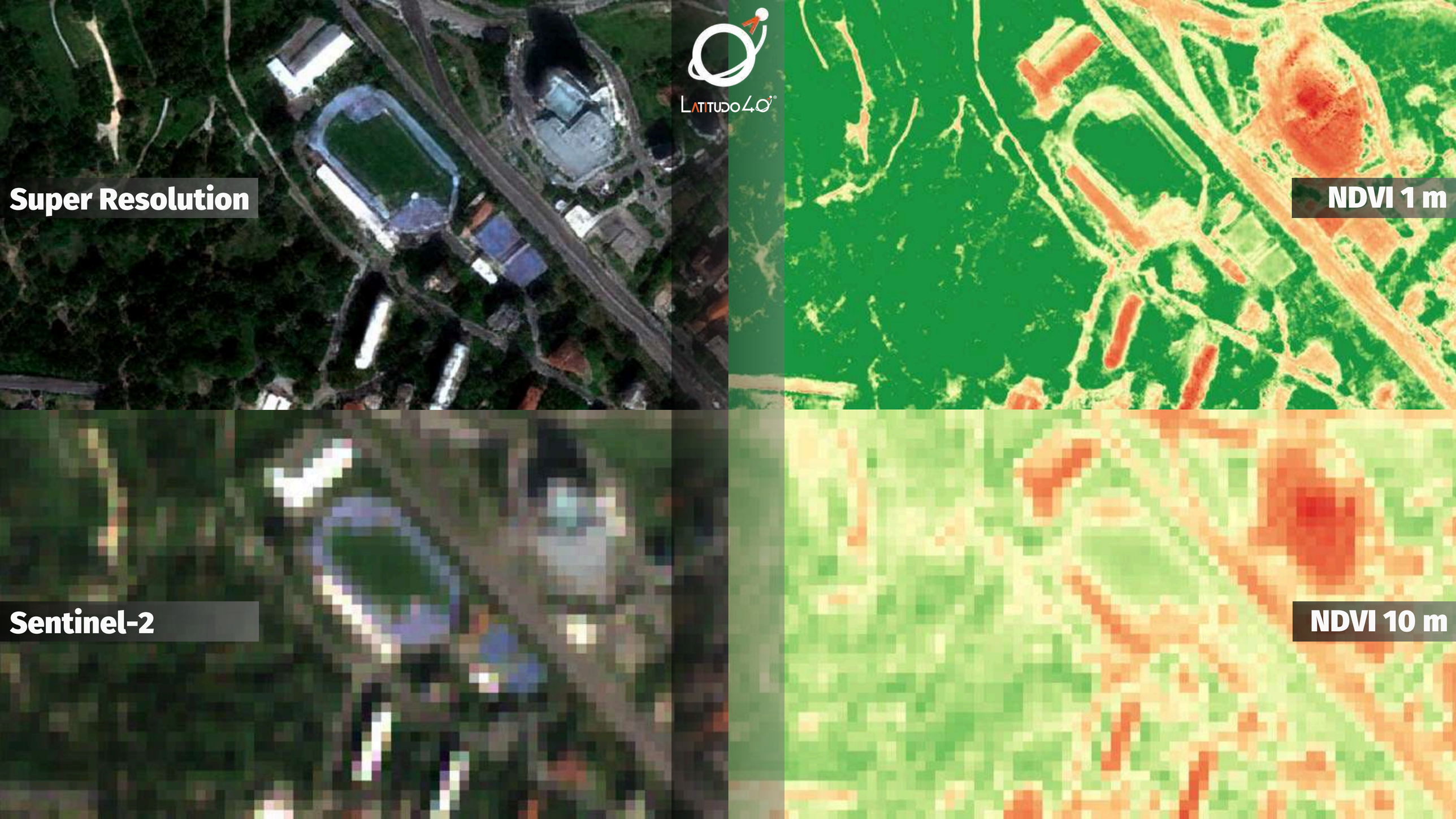
USE CASES

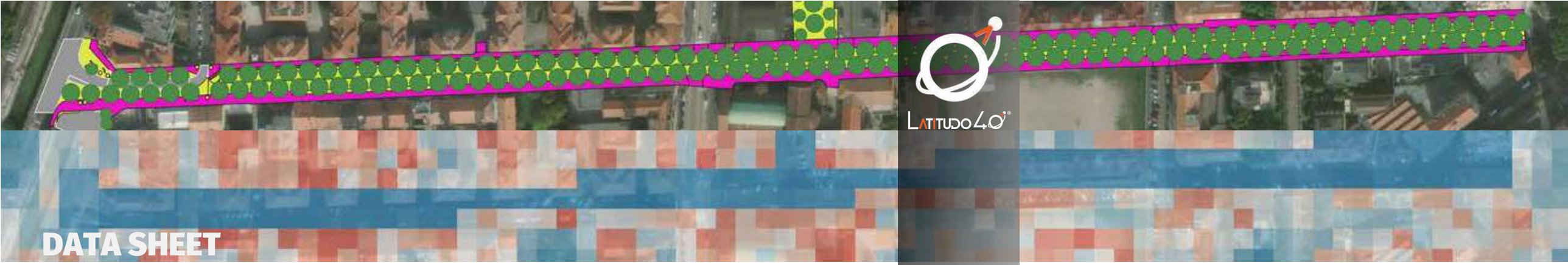
- **Urban Planning**: Detailed 1-meter resolution supports rapid change detection, enabling city planners to address urban transformations and developments promptly.
- **Agriculture**: Precise imagery allows farmers to detect early signs of pest infestations, diseases, or waterlogging, ensuring timely interventions.
- **Emergency**: The enhanced resolution is vital for emergency services to locate and respond to flooded zones, ensuring quicker rescue and relief operations.
- **Others**: Possibly, all feasible use cases with Sentinel-2 can be replicated at this augmented resolution.

PRODUCT SPECIFICATIONS

Input Data	Sentinel-2
Algorithm	Deep Learning Method (GAN)
Metrics	RMSE, SSIM, PSNR
Spatial Resolution	2.5 m | 1 m
Temporal Resolution	On image availability
Possible Aggregations	Not Applicable
Format	GeoTiff
Units	Reflectance
Automation	Fully Automated
Scalability	Global
Production Time	5 min / 100 Sqkm


Super Resolution
NDVI 1 m
Sentinel-2
NDVI 10 m


Super Resolution
NDVI 1 m
Sentinel-2
NDVI 10 m



DATA SHEET

Urban Simulation Tool

The L40 Satellite Simulator represents an advanced integration between urban planning and artificial intelligence, offering a sophisticated tool for modeling and analyzing urban scenarios. Through the use of vector data and the application of Generative Adversarial Networks (GANs) to satellite imagery, this system allows for detailed and highly customizable simulations of urban interventions, serving as a tool for exploring innovative urban configurations and optimizing existing plans.

USE CASES

- **New Urban Project Scoring**: Urban Developers, with the L40 Satellite Simulator, can evaluate and score potential urban projects based on factors like location, environmental impact, and infrastructure compatibility.
- **Study the Evolution of an Urban Project**: Urban researchers can use the L40 Satellite Simulator to track and analyze the development and impact of an urban project over time, assessing changes in land use, population density, and environmental effects.
- **Disaster Response** and **Resilience Planning**: Emergency agencies leverage the L40 for simulating disaster impacts, enhancing preparedness, and strategizing effective response and recovery plans for urban areas.

PRODUCT SPECIFICATIONS

Input Data	Sentinel-2
Algorithm	Deep Learning Method (GAN)
Metrics	RMSE, SSIM, PSNR
Spatial Resolution	1 m | 10 m
Temporal Resolution	On image availability
Possible Aggregations	Not Applicable
Format	GeoTiff
Units	Reflectance
Automation	Fully Automated
Scalability	Global
Production Time	90 min / 100 Sqkm

DATA SHEET

Air Quality

Air quality data refers to the information collected on the presence and concentration of pollutants in the air. It's gathered through monitoring stations and satellite observations, providing historical data on air pollution levels. Air quality indices (AQI) are used to translate these concentrations into understandable terms for the public, indicating how polluted the air currently is or forecasting how polluted it will become. Higher AQI values represent higher levels of air pollution and greater health concerns.

Main Pollutants

- Particulate Matter: **PM2.5**, **PM10**
- Ozone (**O3**)
- Nitrogen Dioxide (**NO2**)
- Sulfur Dioxide (**SO2**)
- Carbon Monoxide (**CO**)

USE CASES

- **Public Health Monitoring and Response**: Health organizations can use air quality data to assess the impact of air pollution on public health, issue warnings during high pollution events, and develop strategies for reducing exposure to harmful pollutants.
- **Environmental Policy and Regulation**: Government agencies can analyze air quality trends to inform environmental policy, regulation development, and enforcement activities. This can help in setting air quality standards, assessing compliance with these standards, and identifying areas that require pollution control measures.
- **Urban Planning and Development**: City planners and developers can use air quality data to design urban environments that minimize pollution exposure. This can include the placement of green spaces, traffic management, and zoning decisions that consider air quality impacts.
- **Insurance Risk Assessment**: Insurance companies can use air quality data to assess risks related to air pollution and develop insurance products that consider environmental factors.

PRODUCT SPECIFICATIONS

Input Data	CAMS | Google Air Quality
Algorithm	Operational Procedure
Metrics	Not Applicable
Spatial Resolution	0.1° regular lat-lon grid | 500m
Temporal Resolution	Hourly
Possible Aggregations	Daily, Monthly
Format	GeoTiff
Units	Physical Quantity
Automation	Fully Automated
Scalability	EU | Global
Production Time	20 min / 100 Sqkm

DATA SHEET

Flooding Risk Analysis

The flood risk index is calculated using a statistical model that integrates data from Sentinel-2, Sentinel-1, DEM, and ERA5. The single risk score combine different peril (pluvial, fluvial and coastal). The layer identifies areas with differing levels of flood risk, helping to inform decisions in insurance, real estate, climate change adaptation, and urban planning. In addition, various KPIs and analyses are performed on valuable assets (such as buildings or farmland).

USE CASES

- **Insurance**: Utilize risk categories to create distinct rating areas, ensuring that insurance premiums reflect the varying levels of risk across different regions, establishing fair pricing.
- **Real Estate**: Apply risk categories to assess and visualize risk variations across large sites, aiding in precise underwriting and risk management, enabling comparison and identification of high-risk assets within a portfolio.
- **Climate Change**: Use changes flooding risk to project how climate change might alter future risks, particularly under different emissions scenarios.
- **Urban Planning**: Incorporate flooding risk assessments into urban planning to design safer, more resilient communities by identifying high-risk areas early in the development process.

PRODUCT SPECIFICATIONS

Input Data	Sentinel-2, Sentinel-1, DEM, ERA5
Algorithm	Statistical Model
Metrics	Not Applicable
Spatial Resolution	30 m
Temporal Resolution	Annual
Possible Aggregations	Not Applicable
Format	GeoTiff & GeoJson
Units	Risk Index
Automation	Fully Automated
Scalability	Global
Production Time	60 min / 100 Sqkm

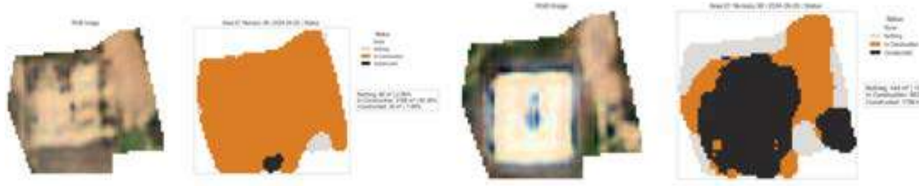
DATA SHEET

Construction Site Monitoring

Construction Site Monitoring is an algorithm developed as a monitoring system for construction sites by analyzing satellite imagery. The system classifies areas into three categories: in construction, built, and no activity. Thanks to our super-resolution algorithm, we utilize high-resolution images to monitor changes in land cover and structures. We provide metrics such as the percentage of new constructions and areas undergoing significant transformation, which are highly useful for urban planning purposes.

USE CASES

- **Real Estate**: Use construction activity data to evaluate and visualize development trends across large properties, supporting precise asset valuation, risk assessment, and portfolio management. Identify areas of rapid change or stagnation for strategic decision-making.
- **Urban Planning**: Integrate construction monitoring findings into urban planning to guide infrastructure development, optimize resource allocation, and ensure compliance with zoning regulations. Early detection of construction activities allows for proactive planning and risk mitigation.
- **Environmental Monitoring**: Monitor construction trends to evaluate their impact on land use, green spaces, and ecosystems. Identify areas where urban expansion may pose environmental risks or opportunities for conservation efforts.



PRODUCT SPECIFICATIONS

Input Data	Sentinel-2 Super Resolution
Algorithm	Machine Learning Model
Metrics	Not Applicable
Spatial Resolution	1 m
Temporal Resolution	On image availability
Possible Aggregations	Not Applicable
Format	GeoTiff & GeoJson
Units	Categorical, 3 classes
Automation	Fully Automated
Scalability	Global
Production Time	10 min / Area Of Interest

DATA SHEET

Services Accessibility

This analysis evaluates the accessibility of services for each building, considering categories such as shops, restaurants, supermarkets, and communal areas. The minimum distance to each service is calculated based on the actual roads and pathways, providing a clear indication of proximity and convenience for residents

USE CASES

- **Urban Planning:** Integrate service accessibility data into urban planning to identify underserved areas and prioritize resource allocation. By considering road-based distances, planners can ensure equitable access to essential amenities for all residents.
- **Real Estate:** Use road-based service accessibility metrics to assess the attractiveness of residential areas, offering valuable insights for property valuation and investment decisions.
- **Policy Making:** Provide policymakers with detailed road-based accessibility reports to support the development of inclusive urban environments, addressing disparities in service distribution and improving community well-being.
- **Community Development:** Use accessibility data, calculated along roads and pathways, to design interventions that enhance connectivity to key services, building more vibrant and sustainable neighborhoods.

PRODUCT SPECIFICATIONS

Input Data	Sentinel-2, OSM
Algorithm	Operational Procedure
Metrics	Not Applicable
Spatial Resolution	10 m
Temporal Resolution	Annual
Possible Aggregations	Not Applicable
Format	GeoTiff & GeoJson
Units	Distance (meters)
Automation	Fully Automated
Scalability	Global
Production Time	10 min / 100 Sqkm

DATA SHEET

Accessibility to Public Transports

The public transport accessibility index expresses, as a percentage, how easily a building can access public transport relative to the entire analyzed area. This metric provides a clear understanding of public transport coverage and convenience for residents.

USE CASES

- **Urban Planning:** Incorporate public transport and sustainable mobility indices into urban planning to identify gaps in coverage and prioritize the development of accessible, eco-friendly transportation networks.
- **Real Estate:** Use these indices to evaluate the connectivity and attractiveness of properties, offering valuable data for investment and development strategies.
- **Policy Making:** Provide policymakers with detailed accessibility indices to support the design of inclusive and sustainable transportation policies, providing equitable mobility opportunities.
- **Community Development:** Use public transport and sustainable mobility data to plan interventions that enhance connectivity and encourage the use of public and active transport, contributing to healthier, more sustainable communities.

PRODUCT SPECIFICATIONS

Input Data	Sentinel-2, OSM
Algorithm	Operational Procedure
Metrics	Not Applicable
Spatial Resolution	10 m
Temporal Resolution	Annual
Possible Aggregations	Not Applicable
Format	GeoTiff & GeoJson
Units	Index
Automation	Fully Automated
Scalability	Global
Production Time	10 min / 100 Sqkm

DATA SHEET

Photovoltaic Potential Estimation

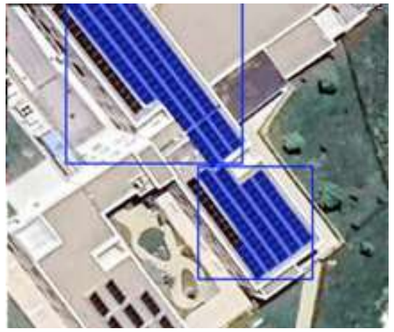
The photovoltaic potential estimation algorithm evaluates the suitability of each building for solar panel installation. It considers critical factors such as the slope and orientation of building surfaces, which influence the efficiency of solar energy capture.

Additionally, the algorithm incorporates global solar radiation data to provide a comprehensive analysis of solar energy availability.

The output is a standardized metric ranging from 0 to 1, where 0 represents minimal or no potential for solar energy generation and 1 indicates optimal conditions for photovoltaic systems.

USE CASES

- **Urban Planning:** Use photovoltaic potential metrics to guide the development of energy-efficient cities. Identify high-potential areas for renewable energy projects, optimize zoning regulations for solar installations, and integrate clean energy goals into urban growth strategies.
- **Real Estate:** Use solar potential data to evaluate and enhance property value by identifying buildings suited for solar panel installations. Support risk assessment and portfolio diversification by focusing on sustainable and energy-efficient assets.
- **Renewable Energy Development:** Use solar potential analyses to identify prime locations for rooftop solar projects and large-scale solar farms. Facilitate strategic investments in clean energy and support the transition to a greener energy grid.



PRODUCT SPECIFICATIONS

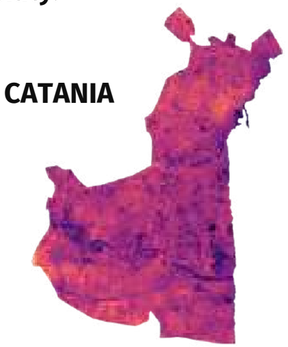
Input Data	Sentinel-2
Algorithm	Operational Procedure
Metrics	Not Applicable
Spatial Resolution	10 m
Temporal Resolution	Annual
Possible Aggregations	Not Applicable
Format	GeoTiff & GeoJson
Units	Index
Automation	Fully Automated
Scalability	Global
Production Time	15 min / 100 Sqkm

DATA SHEET

CO2 Estimation

The CO_2 Estimation Layer provides information about the concentration of carbon dioxide (CO_2) levels in the atmosphere. This dataset enables seamless integration with GIS platforms, remote sensing tools, and digital twin applications. The layer applies in-situ data calibration to ensure high accuracy and reliability.

CATANIA



USE CASES

- **Urban Planning & Smart Cities:** Identify CO_2 hotspots in metropolitan areas to inform green infrastructure development, optimize traffic flow, and enhance urban sustainability strategies.
- **Environmental Monitoring:** Support climate change research by tracking CO_2 variations over time, analyzing seasonal patterns, and correlating emissions with land-use changes.
- **Carbon Footprint Analysis:** Assist policymakers, and researchers in quantifying regional carbon emissions and evaluating the impact of mitigation policies.
- **Digital Twins & Simulation Models**: Integrate with urban digital twin platforms to model CO_2 dispersion, assess air quality impacts, and optimize carbon reduction strategies.
- **Agriculture & Forestry**: Monitor CO_2 fluxes over forested and agricultural regions to evaluate carbon sequestration potential and guide reforestation efforts.
- **Health & Air Quality Studies**: Assess potential health risks and improve air quality management.

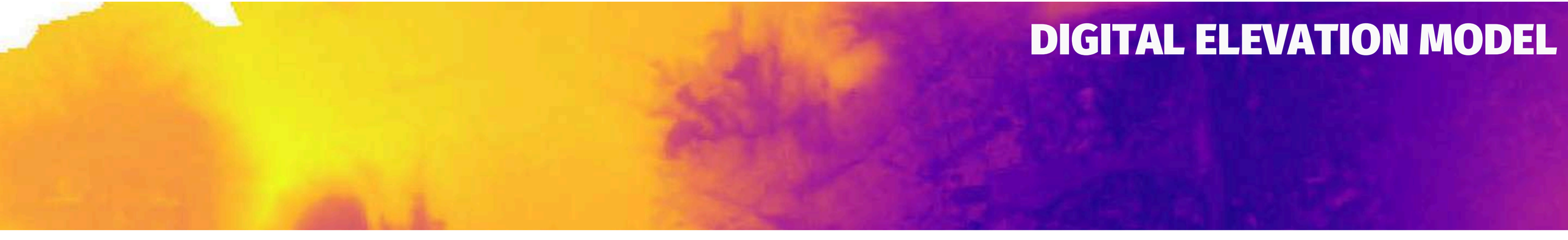
PRODUCT SPECIFICATIONS

Input Data	Sentinel-2
Algorithm	ML
Metrics	Not Applicable
Spatial Resolution	10 m
Temporal Resolution	daily
Possible Aggregations	weekly, monthly, annual
Format	GeoTiff
Units	ppm
Automation	Fully Automated
Scalability	Global
Production Time	15 min / 100 Sqkm

LATITUDO 40

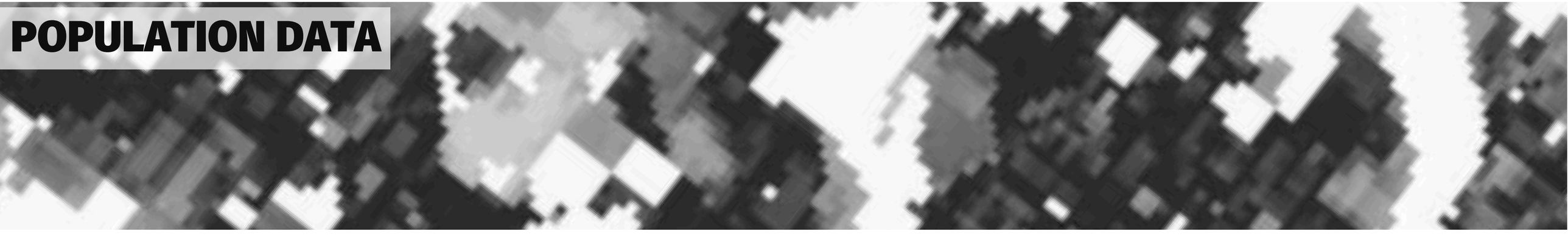
OTHER DATA

BUILDING HEIGHT



DIGITAL ELEVATION MODEL

POPULATION DATA

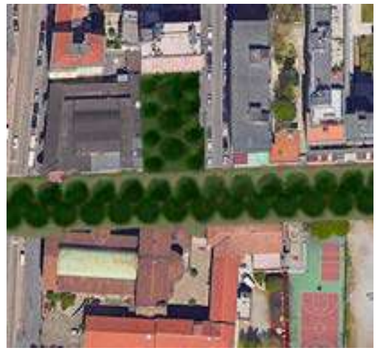


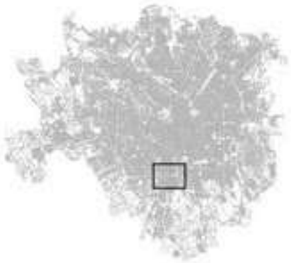
Real-World Use Cases of Our Layers Empowering Smart & Sustainable Decisions

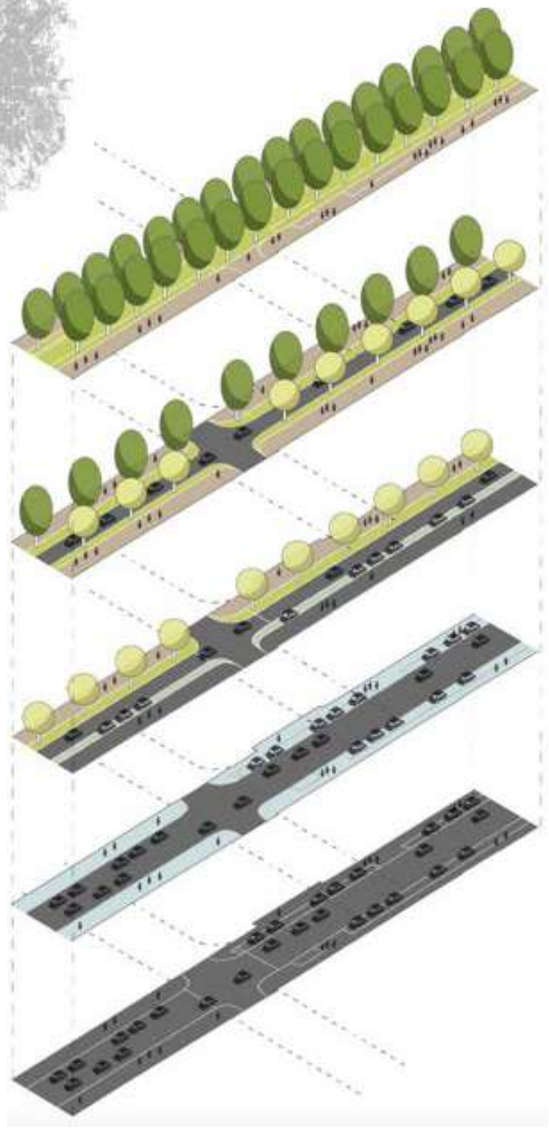
NBS MITIGATION EFFECT, MILAN USE CASE

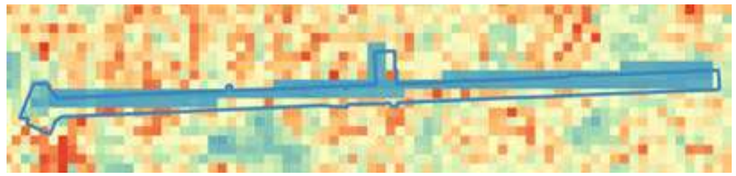
① **NbS Design**

② **Synthetic Multispectral Data by Generative AI**

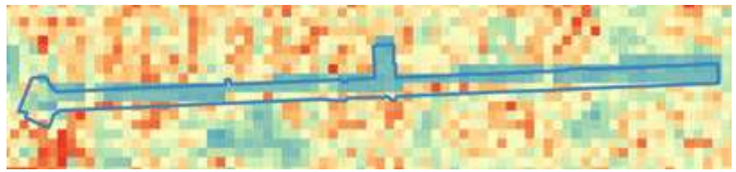




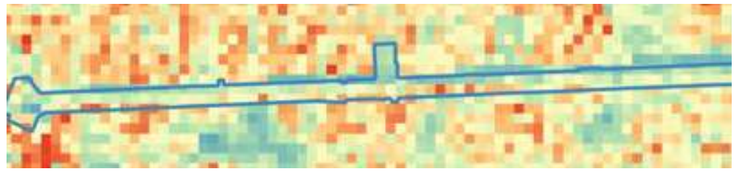




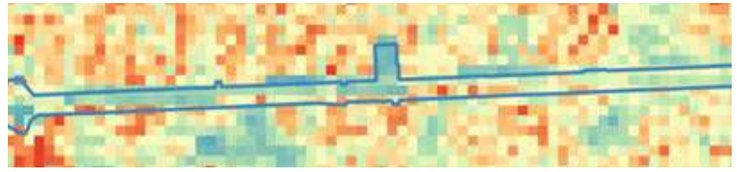
Scenario **4**
Average: **41,13 °C**



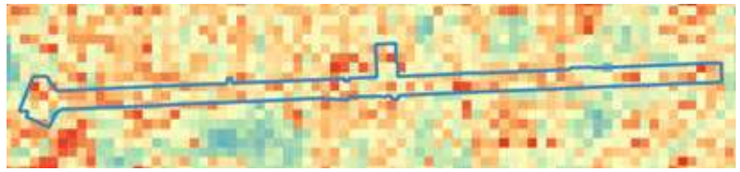
Scenario **3**
Average: **43 °C**



Scenario **2**
Average: **44,29 °C**



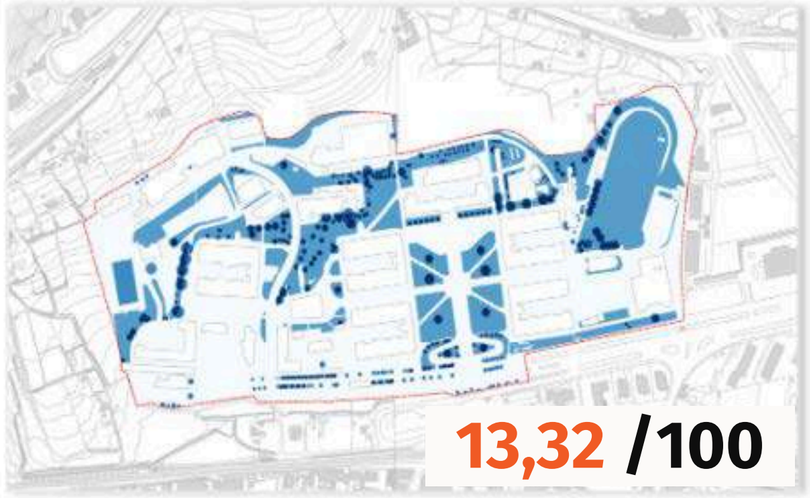
Scenario **1**
Average: **44,60 °C**

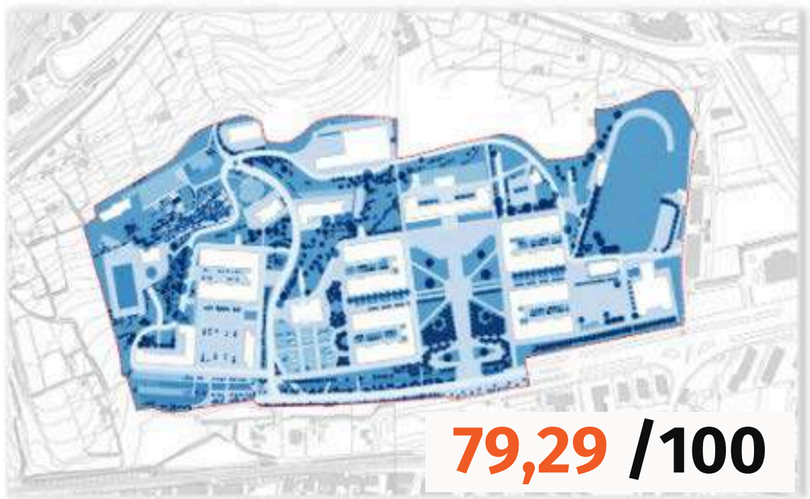


Scenario **0**
Average: **45,60 °C**

PROJECT SCORING, NAPLES USE CASE

Current Situation





Project Scenario

This approach allows for evaluating microclimate performance right from the design stage, enabling the development of more sustainable projects. With this method, it's also possible to have concrete, **quantifiable metrics to compare** and justify the selection of one **project** over another.

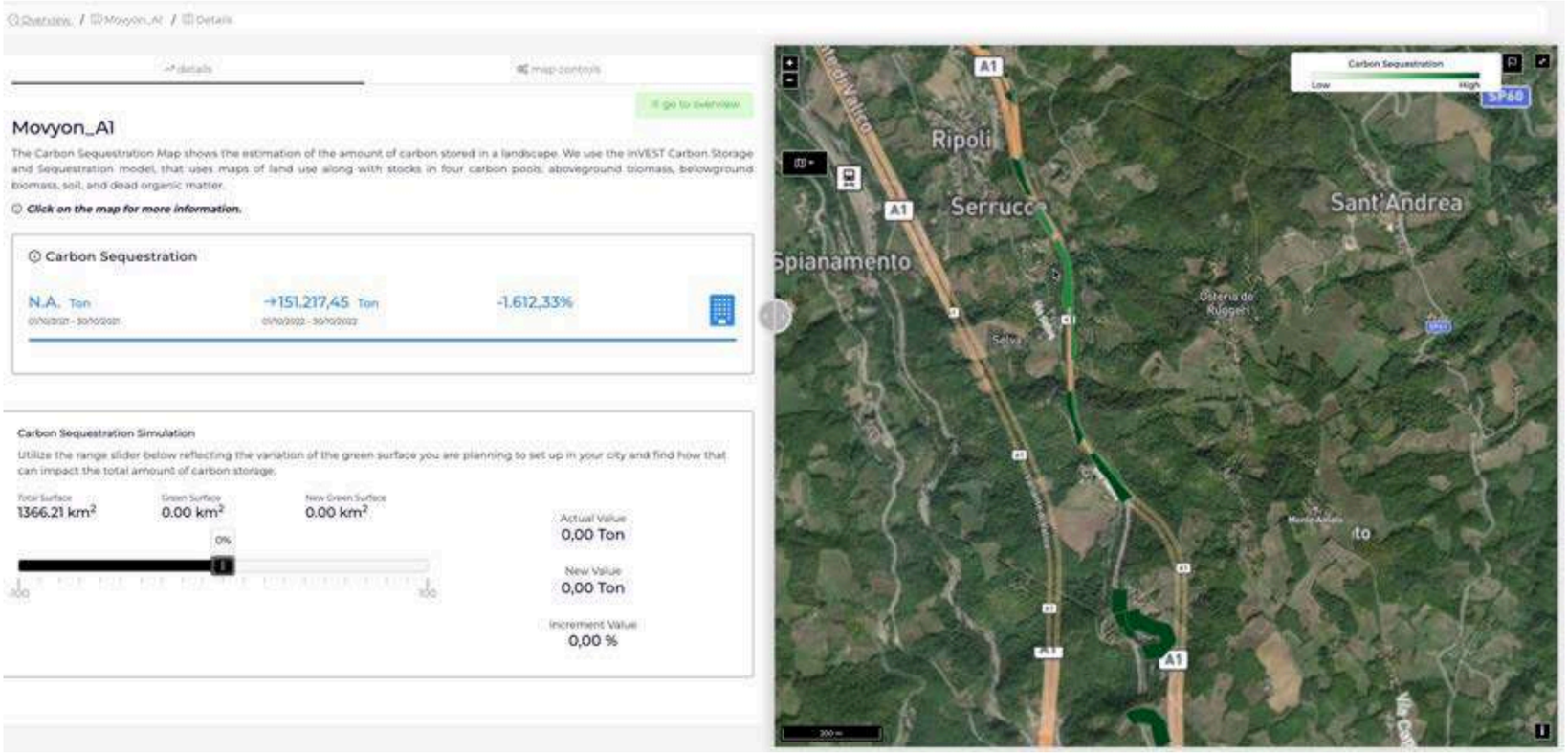
Best locations to install Photovoltaic and Carbon Stock Analysis

Estimate a feasibility score for each of the nearly 8000 areas on the highway land to facilitate planning

Today

Inspection is done by specialized workers sweeping all areas

Impressive cost reduction and time savings are achieved



The analysis was carried out taking into account the tradeoff between trees and solar panels by going on to suggest different types of intervention depending on the situation

Statistics Canada

LATITUDO 40

Buildings Construction Phases

Thanks to our super-resolution algorithm, it's possible to classify the building's construction phases with Sentinel-2 images obtaining good results!

88% Accuracy
87% F1

Possibility to have nationwide mapping every week monitoring the progress of work and potential malfeasance

Today

Monitoring with very-high-resolution commercial images and very high cost (tens of millions) - Sustainability issue

With comparable results, an 85 % cost cut is achieved

Land Clearing

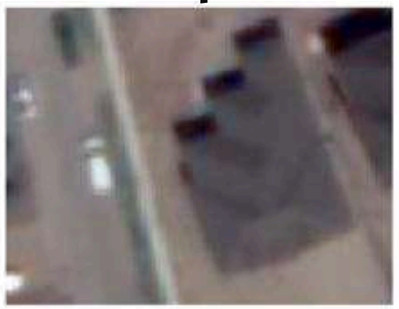
Pre-foundation

Foundation

Structure

Pre-occupation

Occupied



Deloitte.

LATITUDO 40

Parking's lot Occupancy Ratio from Sentinel-1 images

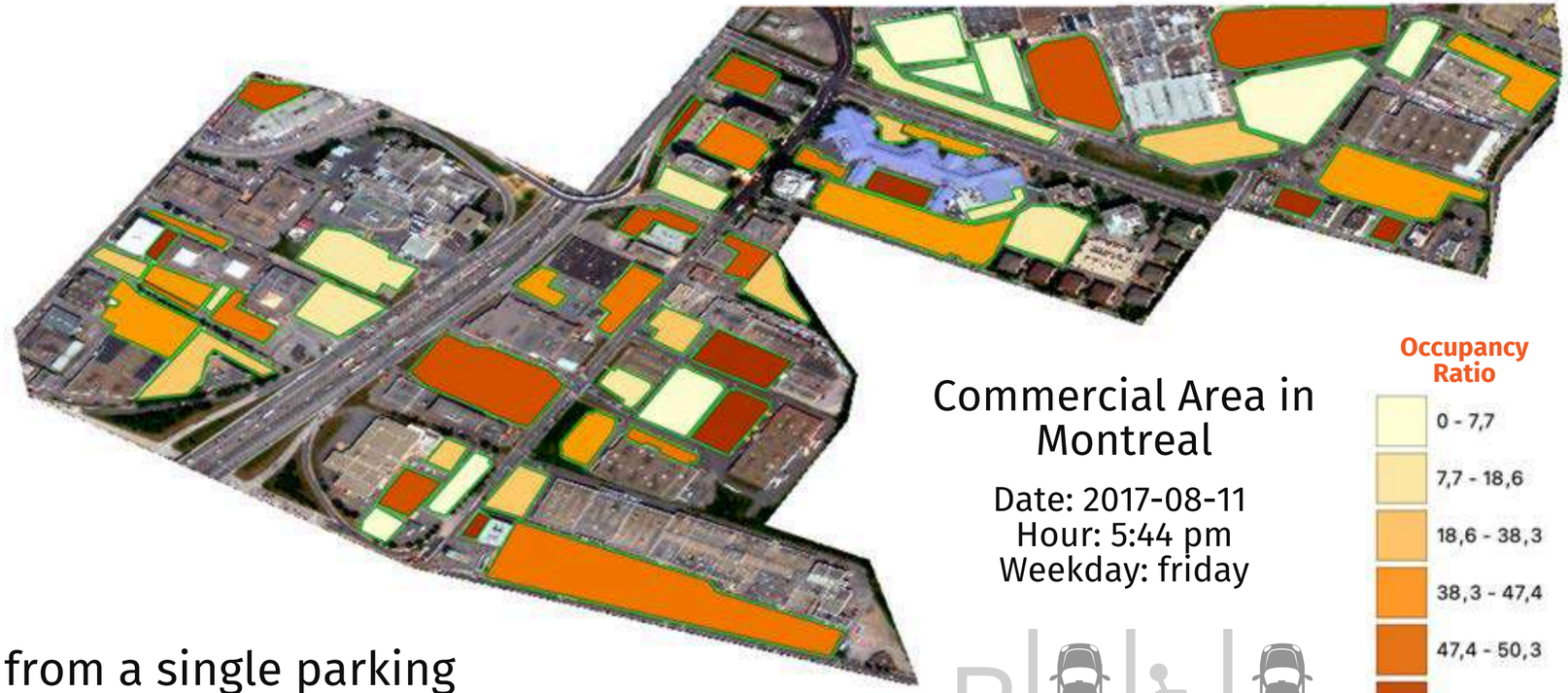
A cost-effective solution for a weekly estimation associated with the type of economic activity

Extract some economic indicators derived from parking analysis

Today

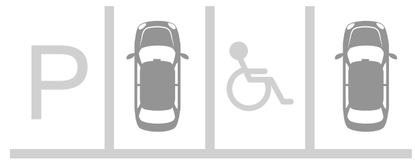
Use of high-resolution satellite images and/or cameras on parking lots
Problem of Cost and Scalability

Devised a scalable approach from a single parking lot to an entire country that allows valuable information to be extracted for minimal investment



Commercial Area in Montreal

Date: 2017-08-11
Hour: 5:44 pm
Weekday: friday



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