



Solar energy forecasting using Space data

Marion Lafuma



Reuniwatt: a leader in solar & wind forecasting



Accompanying our clients towards a better management of the weather-sensitivity of their assets thanks to state-of-the-art weather forecasting techniques.

Founded
2010

> 300 projects in
45
countries



Renewable energies



Atmospheric science



Defence & Space

Strong R&D investments

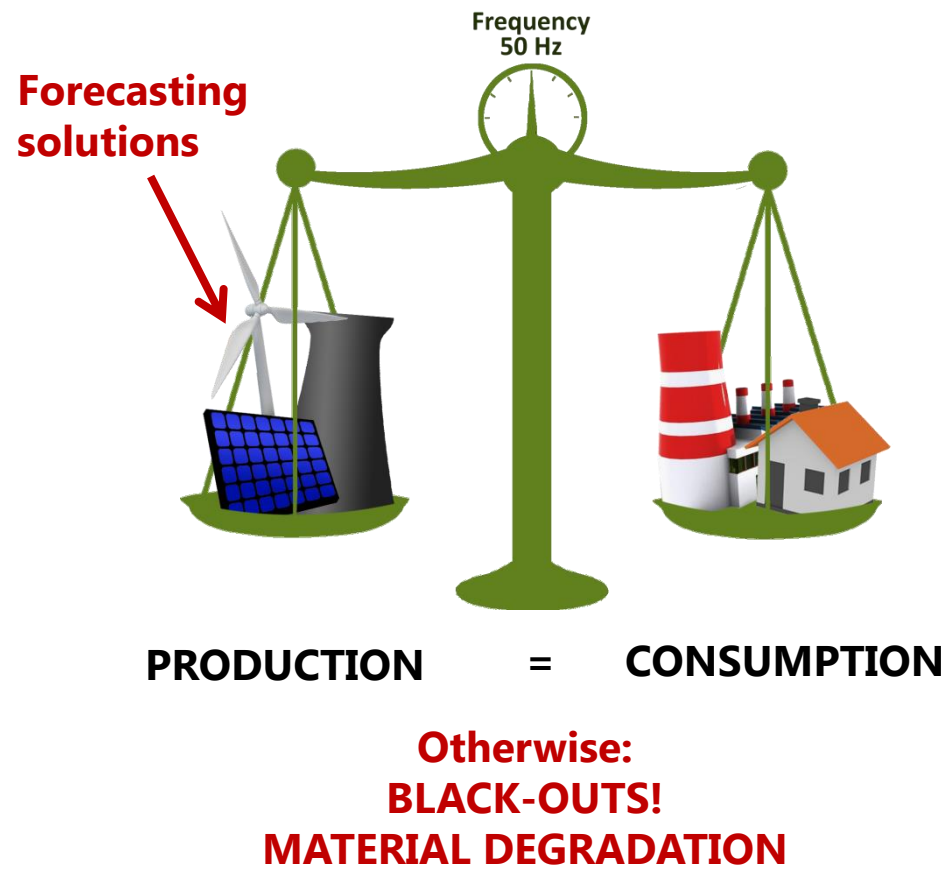
300,000

hours, > 100 publications,
5 patents

Capability as of February 2023



The need for solar forecasts: Grid stability



A cloud passing in front of the sun can instantly cause an **80% decrease** of the local ground irradiance

Solar forecasting products & services and their use

InstaCast™

intra-hour solar forecasts



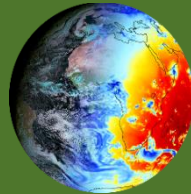
HourCast™

intraday solar forecasts



DayCast™

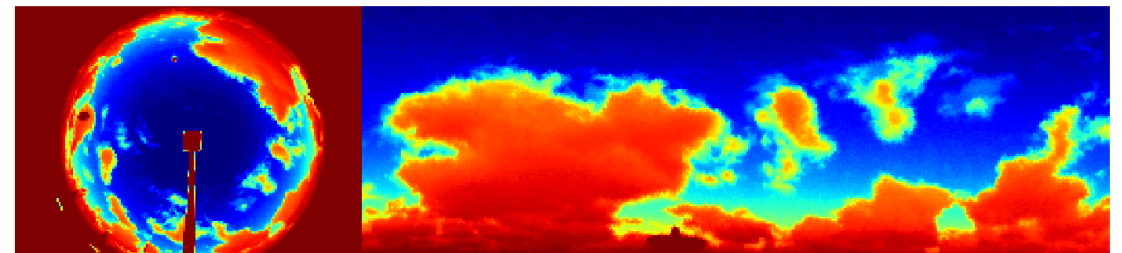
day-ahead solar forecasts



Forecasting

SOLAR FORECASTING

Track clouds from the ground



Solar forecasting products & services and their use

InstaCast™

intrahour solar forecasts



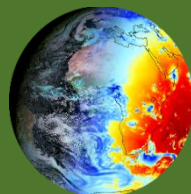
HourCast™

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DayCast™

day-ahead solar forecasts

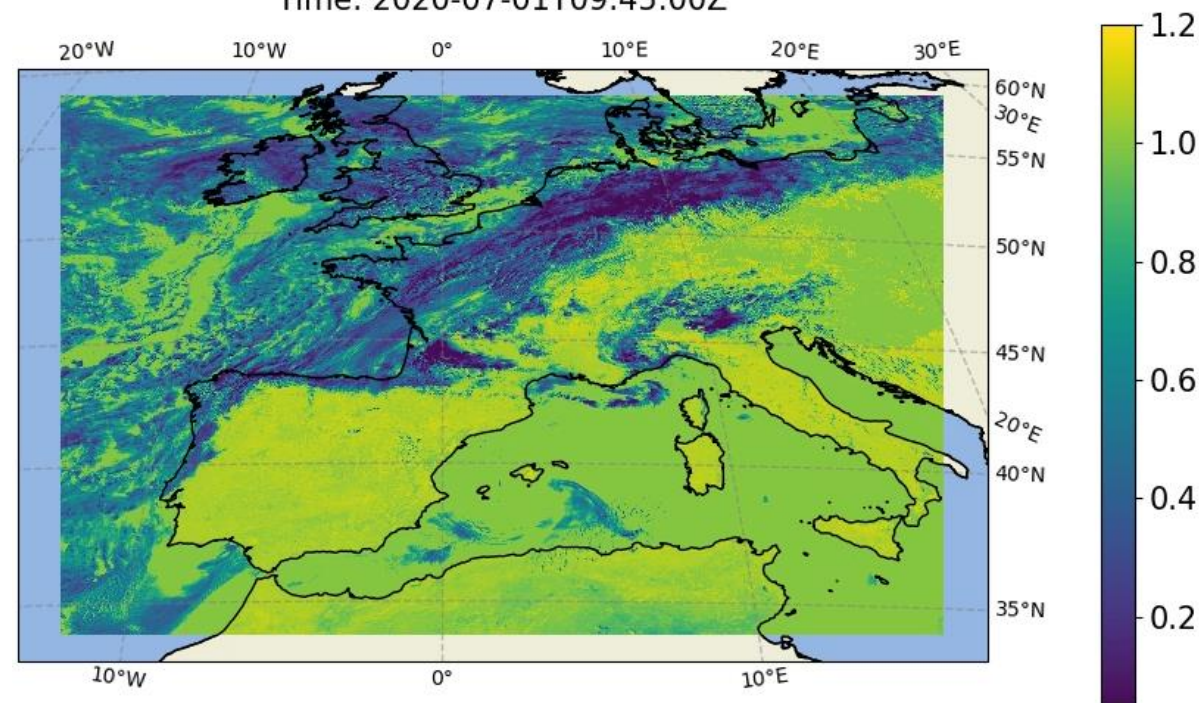


Forecasting

SOLAR FORECASTING

Track clouds from space

Time: 2020-07-01T09:45:00Z



Solar forecasting products & services and their use

InstaCast™

intrahour solar forecasts



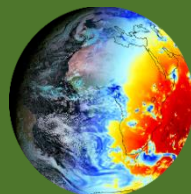
HourCast™

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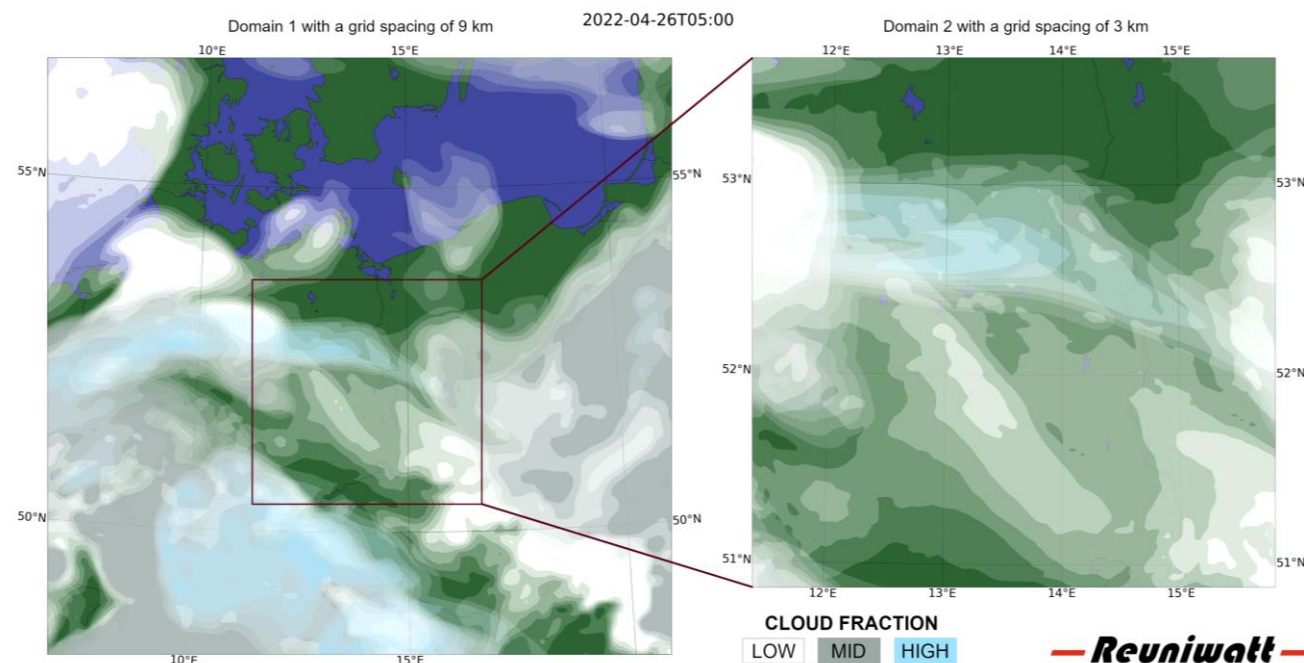
Forecasting

SOLAR FORECASTING

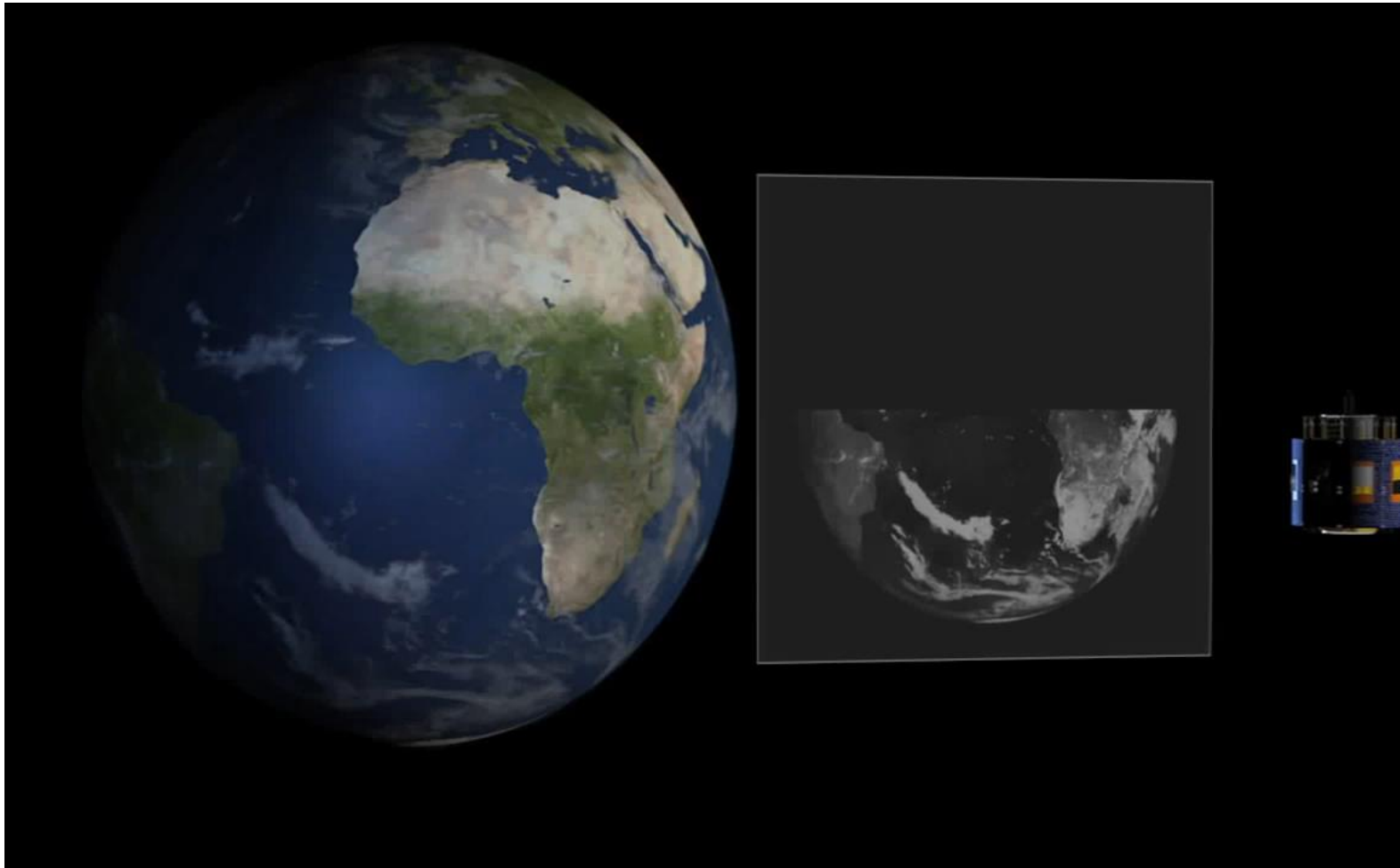
Track clouds using NWP

WRF-Solar forecast of cloud cover for Central Europe

WRF-Solar v4.4, initialised with GFS 0000 UTC



HourCast™: intraday forecasting using satellite images



The image is a composite graphic on a dark background. On the left is a large, realistic image of the Earth showing Africa and Europe. In the center is a smaller, square inset showing a satellite view of the Earth with a white cloud pattern. To the right of the inset is a small, detailed image of a satellite in orbit.

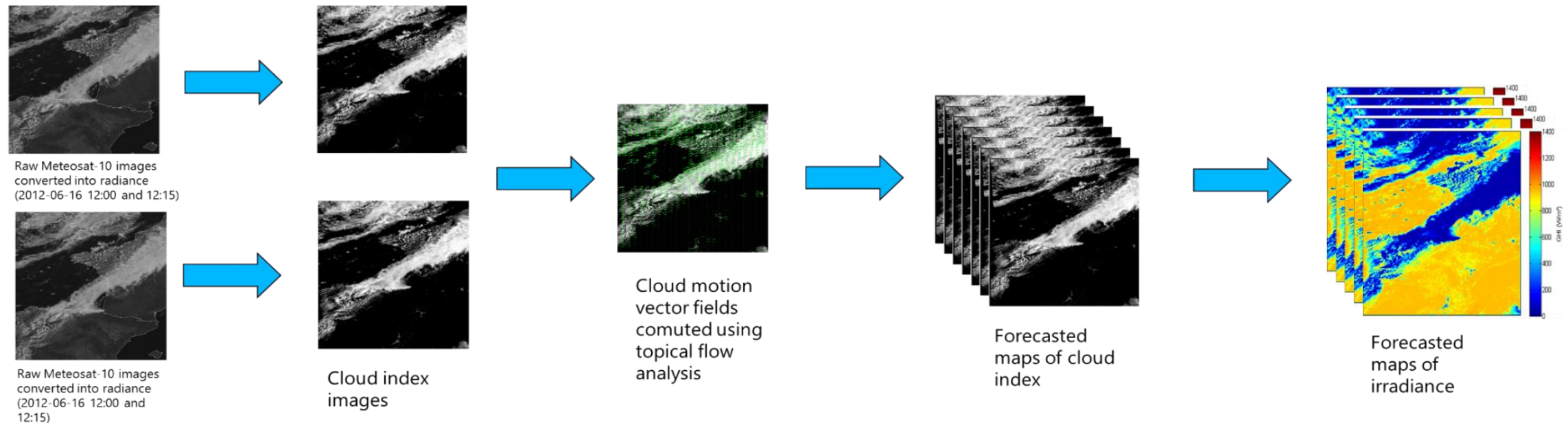
- ✓ Very accurate anticipation of solar irradiance for the next hours
- ✓ **10/15-min updates**
- ✓ **Global service** thanks to 5 satellites
- ✓ No hardware: **Swift deployment** and maintenance-free

credits: EUMETSAT

HourCast™ method

Reuniwatt's proprietary method for **irradiance estimation from satellite images** is improving the method Heliosat-2 and is compatible with the different geostationary satellites.

Our forecasting method is based on the calculation of a Cloud Motion Vector. The process is illustrated below.



Overview of Reuniwatt's HourCast™ methodology

Satellite forecasting use cases

Grid management



Clients: Electricity Network Operators



Needs: Anticipate the country/region's renewable energy production in the coming hours to adapt the overall means of production

Plant operations



Clients: Independent Power Producers, Plant Operators



Needs: Fulfil a country's grid code requirements in terms of forecasting to avoid penalties and maximise the injection of renewable energy sources in the energy mix

Energy trading, aggregation



Clients: Energy traders, Aggregators

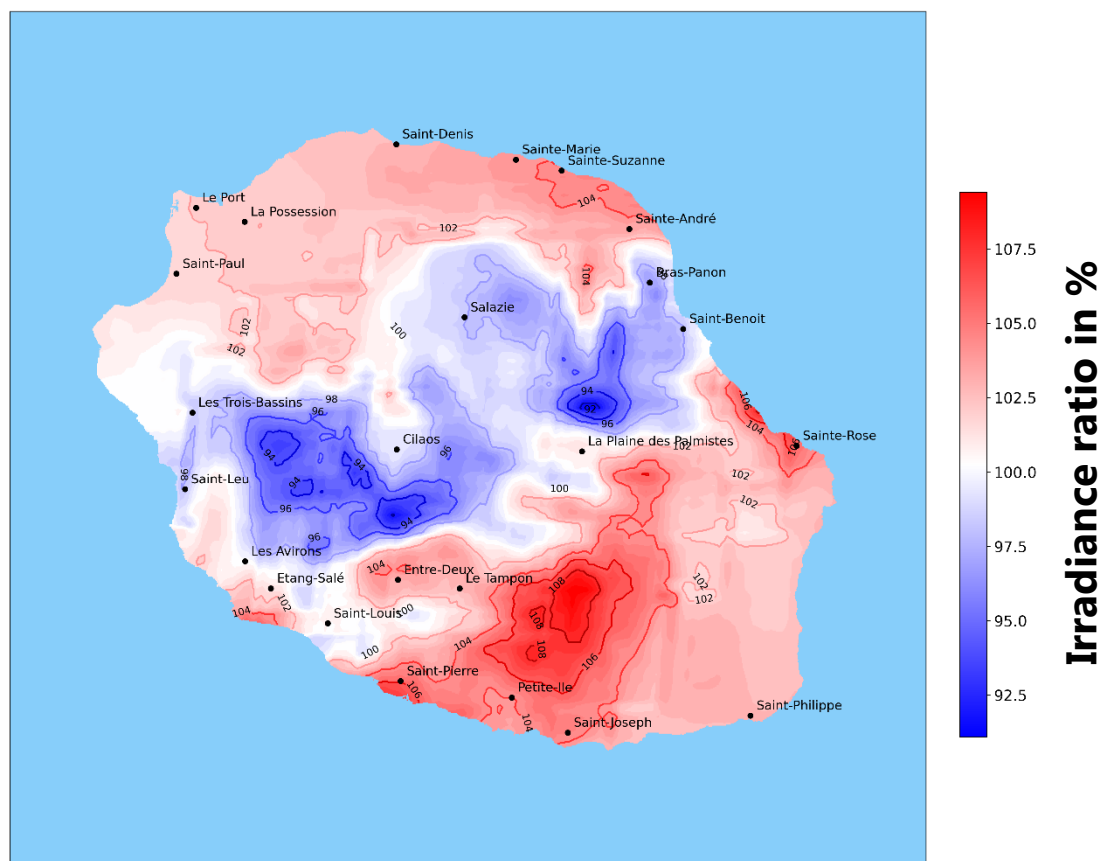


Needs: Optimise bids on the electricity markets, Reduce portfolio balancing costs, Anticipate electricity spot prices

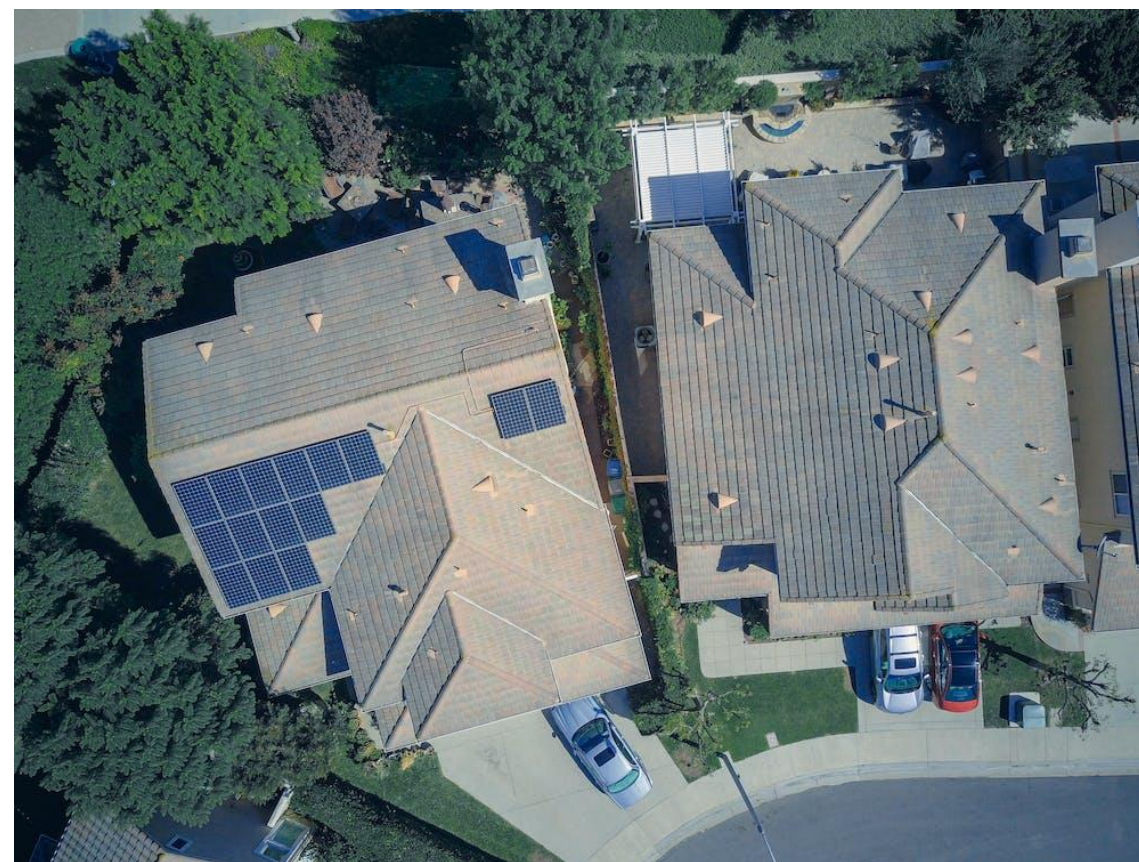
Other applications using satellite data

■ Solar cadaster

Reunion Island's cumulative annual ratio 2021/2020



■ Real-time monitoring for rooftop photovoltaic



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Questions welcome!

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— Reuniwatt —

Excellence in forecasting

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