

GOES-East satellite images processing in Uruguay and future perspectives

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Summary

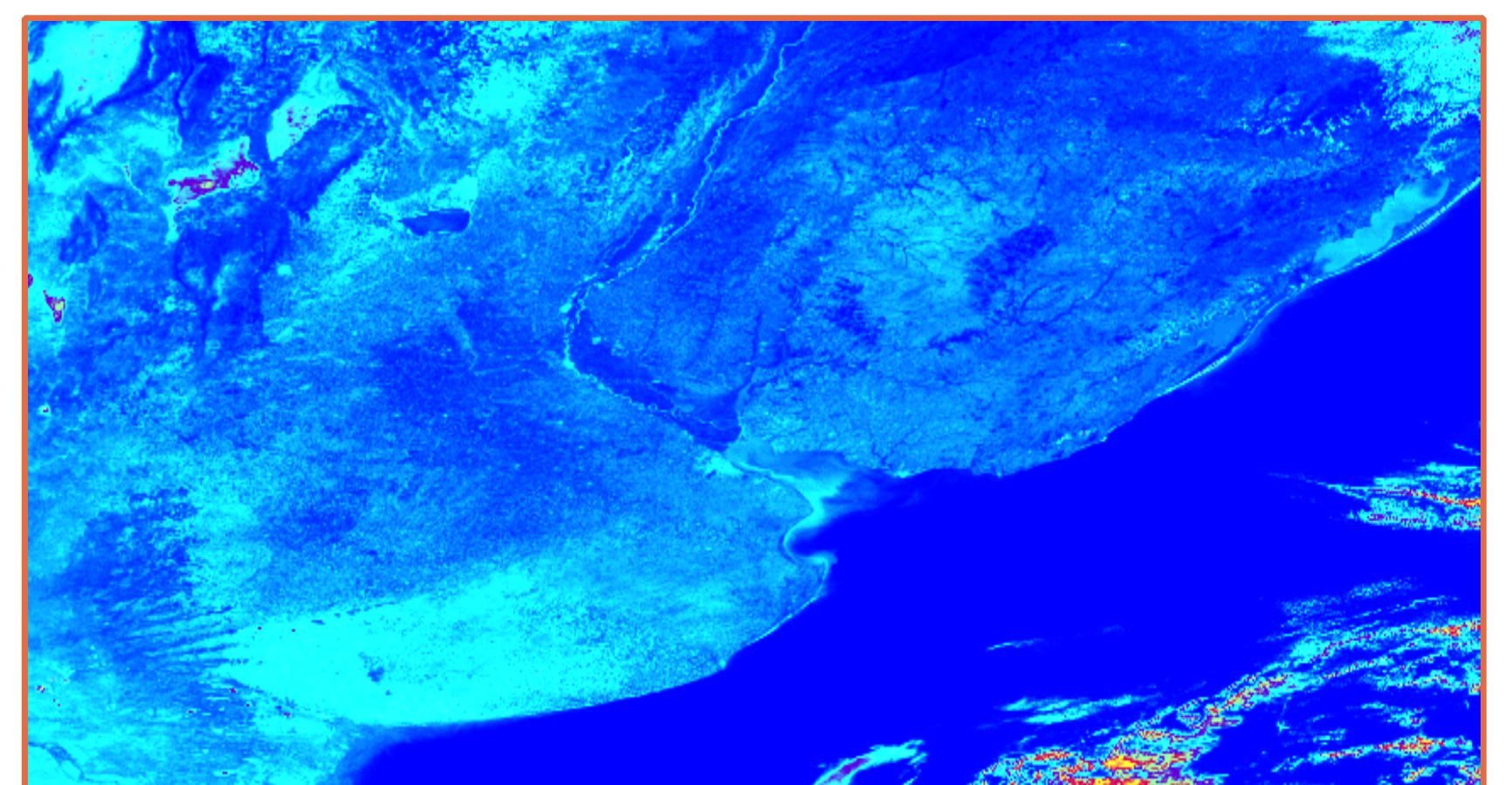
The satellite images processing in Uruguay is still in its initial stages. In the process to develop a solar resource assessment product, the AAAA's images processing has been gradually improved. The solar irradiance product has been used for solar resource characterization and to generate ad-hoc solar data for both energy and agriculture applications. We are currently working in other satellite products, such as the cloud index, fog detection and the cloud classification. Efforts are now underway to install GOES-East receiver as a first step in preparation for the next generation of NOAA satellites.

GOES satellite processing in Uruguay

- The calibration of raw satellite images (digital counts) is done as recommended by NOAA's OSPO and NOAA's STAR.
- Reflectance and Reflectance Factor are calculated from the visible channel.
- Brightness Temperature is calculated from the infrared channels.
- Solar resource assessment product based on the visible channel.
- Current work: cloud index and cloud segmentation and clasification.

Local GOES-East data bank

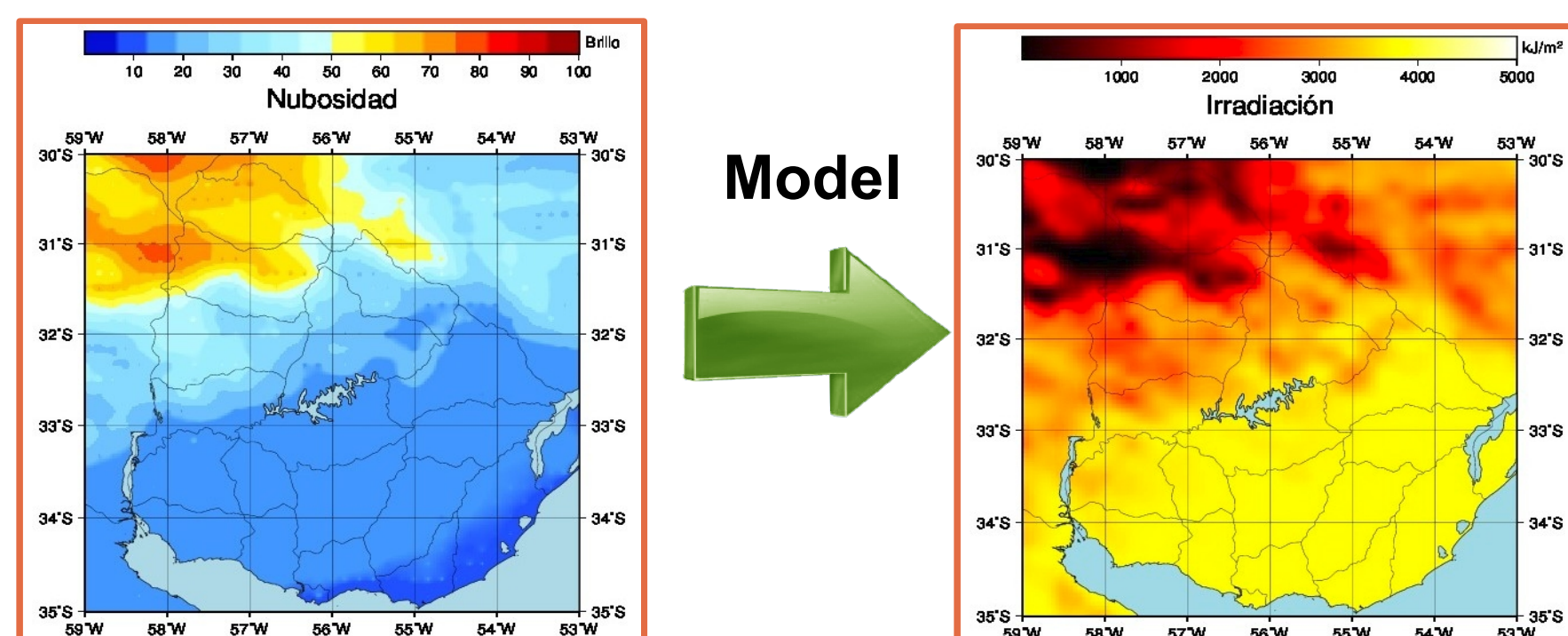
- Uruguay still doesn't host an operational GOES receiver.
- The GOES-East satellite images were downloaded from NOAA's CLASS website.
- It is composed of more than 600.000 images of the visible and infrared channels from 01/01/2000 to date.
- Includes all the images of the territory of Uruguay and surrounding areas with a 1 km nominal resolution.



Satellite solar resource assessment

Developed solar irradiance model:

- It is a modification of a pre-existing statistical model (JPT).
- A set of parameters must be adjusted to the target region using high quality solar irradiation ground measurements.
- Based on the visible channel image, 3 sky conditions are distinguished: clear sky, cloudy sky and partially cloudy.

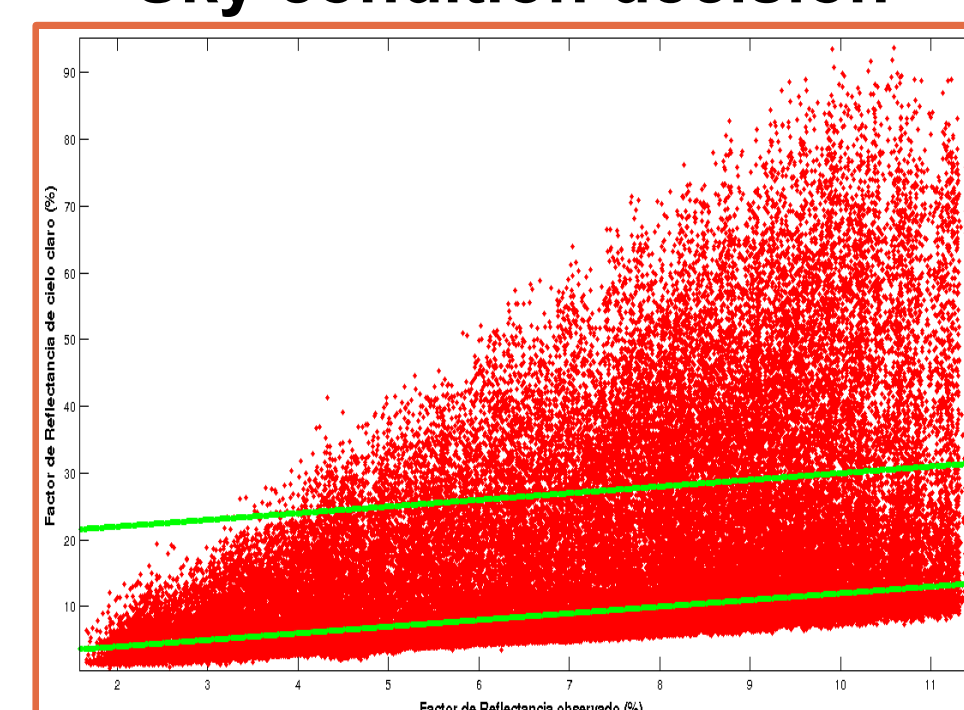


- Data from Uruguay's solar measurement network are used.

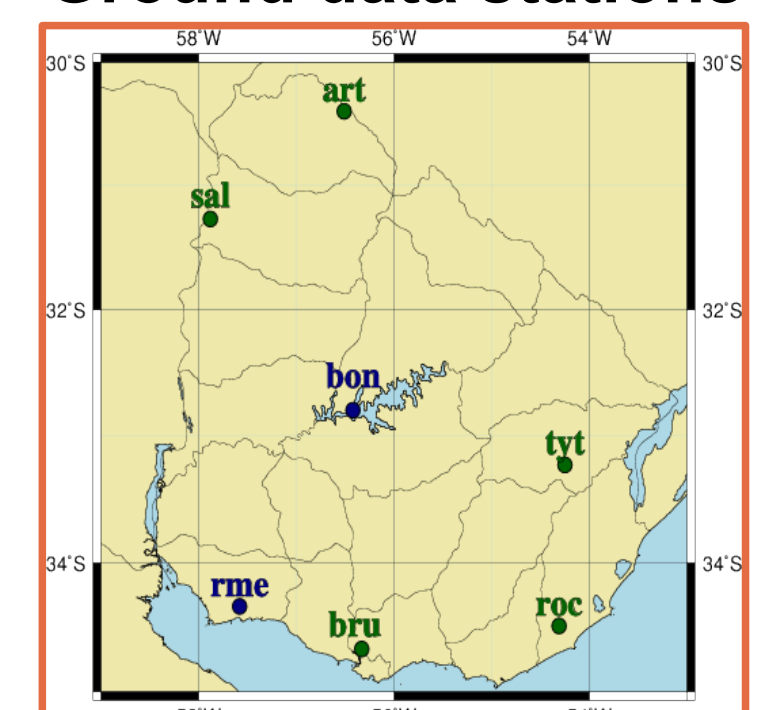
• A different set of model's parameters is adjusted for each sky condition. The sky condition is set using the Reflectance Factor of the image and of a clear sky condition.

- An iterative procedure is implemented to adjust a model to estimate the Reflectance Factor of the clear sky condition.

Sky condition decision

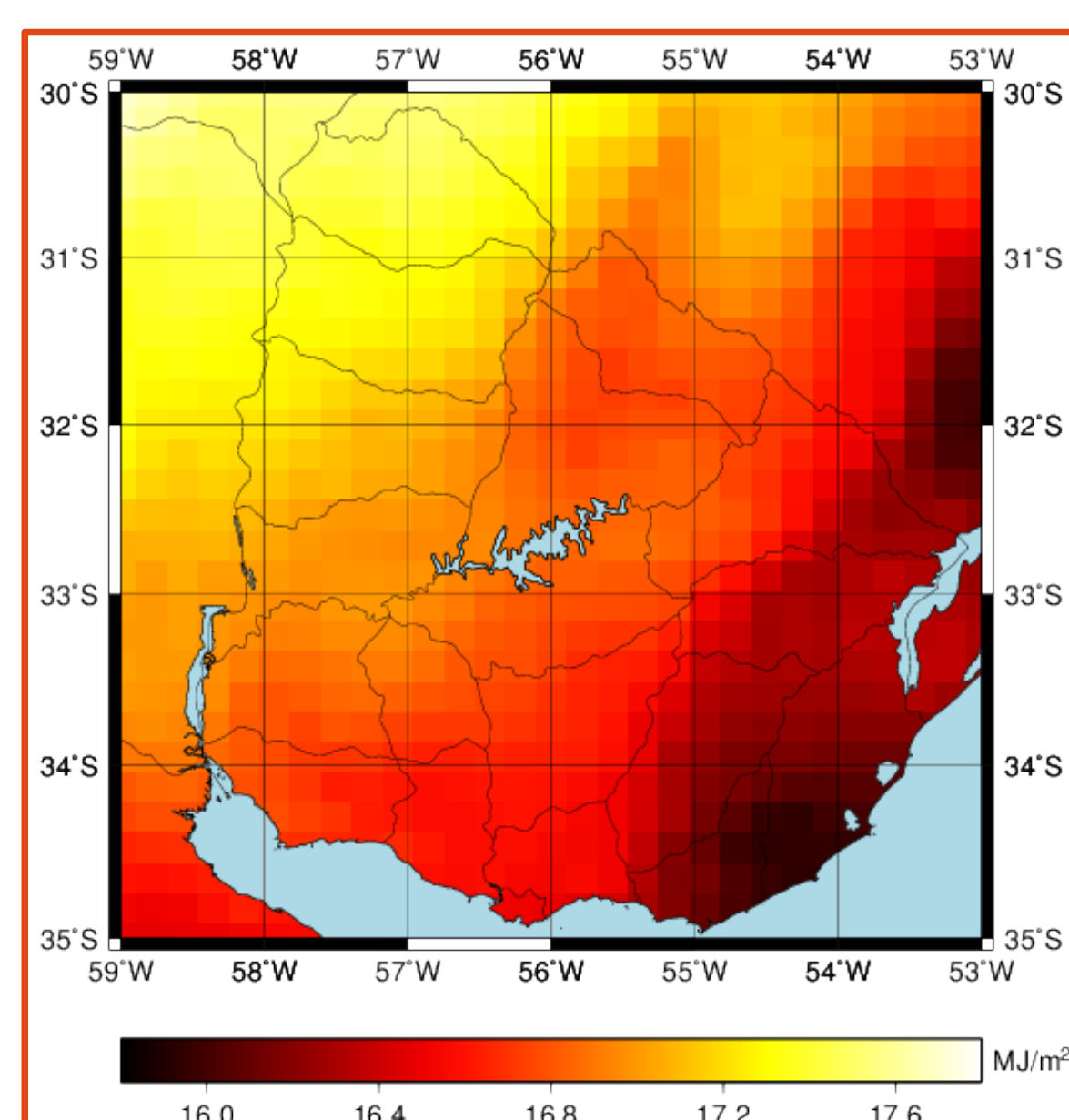


Ground data stations



Result: Uruguay's solar map 2.0

Solar irradiation satellite data are generated for the 15 years' image database. An annual map of daily irradiation is obtained.



Uncertainty: less than 2%.

Conclusions and future perspectives

- First efforts towards a satellite infrastructure are now underway.
- In the present year Uruguay is going to install its first GOES receiver. It is intended to be a initial step before NOAA's next generation satellites which will have much higher data rates.
- Access to real-time information will allow to work on solar irradiance forecast and to integrate the information in weather numerical models.
- The images will be accesible for the national meteorological institute (INUMET), the national University and other public institutions.
- The access to satellite information will encourage the development of operational satellite tools in Uruguay for decision making.

Acknowledgements:

