CONFERENCIA INTERNACIONAL DE ARROZ PARA AMÉRICA LATINA Y EL CARIBE
Innovación para alimentar al mundo
Panamá, 10 al 14 de junio de 2024

Conferencia Internacional de Pyricularia en Arroz y Trigo
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AI para el monitoreo de la emisión de metano en ecosistemas arroceros

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CGIAR

Team composition

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Spatial Modelling

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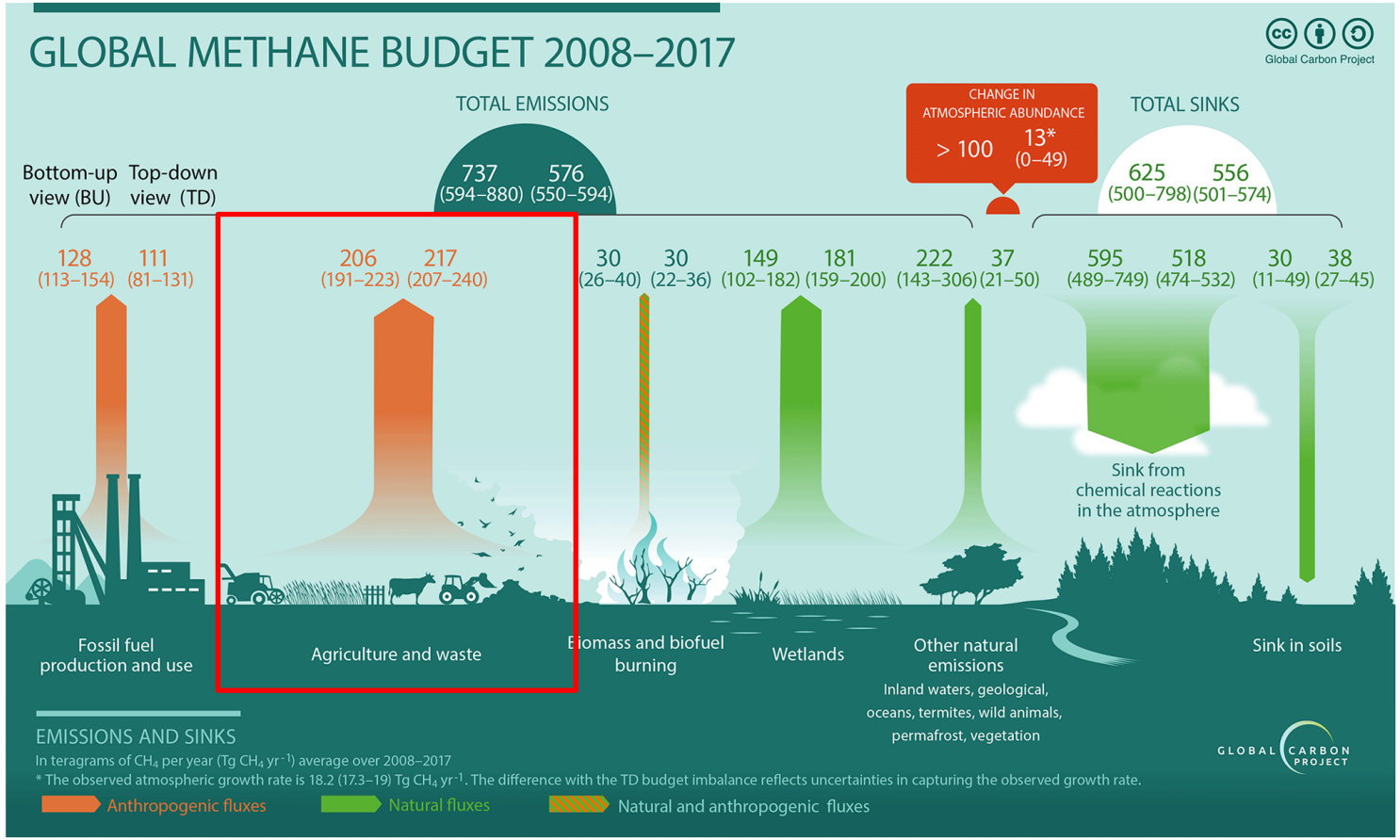
Dr Pascal Sirguey
Remote Sensing

Dr Grant Dick
Artificial Intelligence

Cristhian Delgado
Ph.D. Student

Motivation

Agriculture is a significant source of methane emissions (≈25%)



Source: Saunois, Marielle, et al. "The global methane budget 2000–2017." Earth System Science Data Discussions 2019 (2019): 1-136.

Motivation

Mitigation strategies

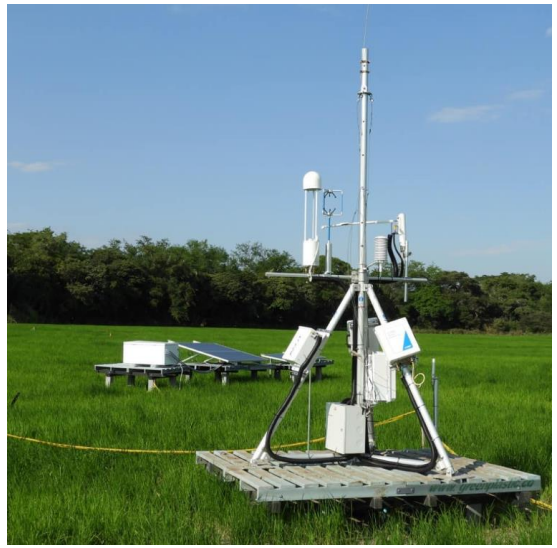
The challenge lies in confirming their scalability and effectiveness at large scale.

Motivation

Current verification methods are effective, but they face practical constraints

Gas Chambers

Eddy covariance



Source: FLAR

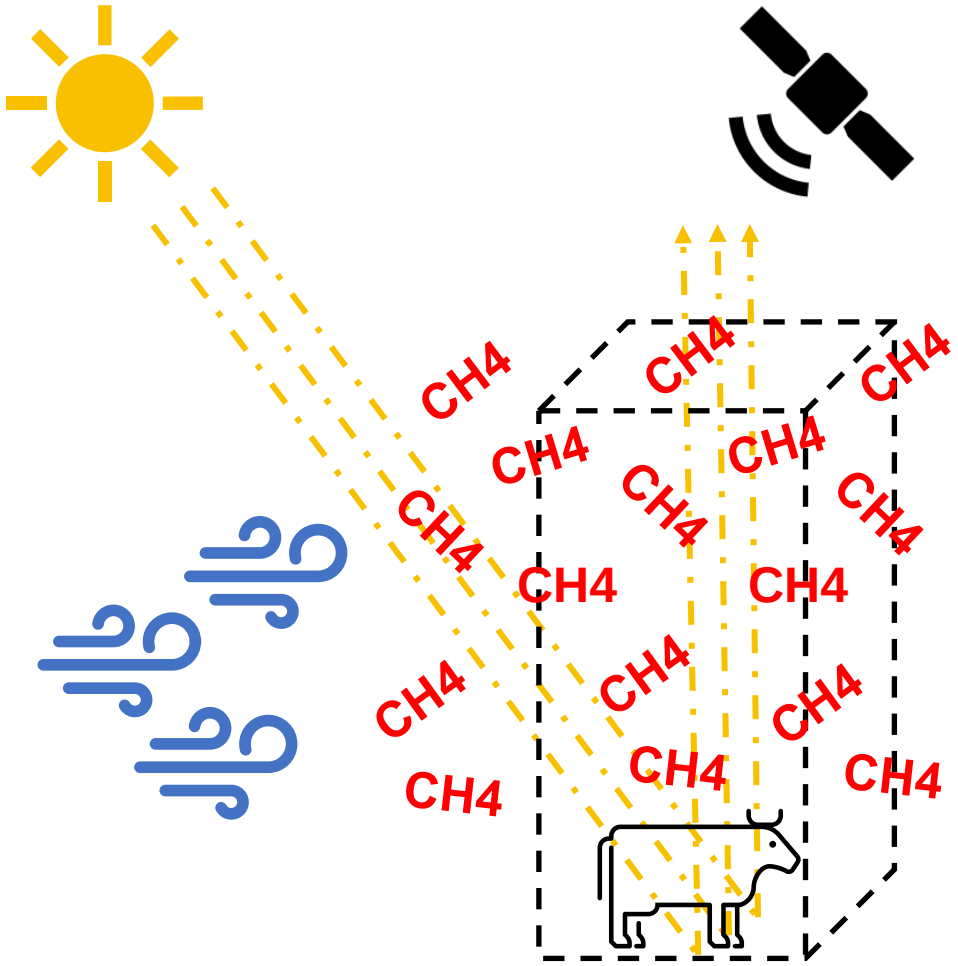
There is significant value in developing verification techniques that can be applied at regional or national scales!

Global revisit time
0
24h

Satellite instruments

Source: Daniel J. Jacob et al. *Quantifying methane emissions from the global scale down to point sources using satellite observations of atmospheric methane*

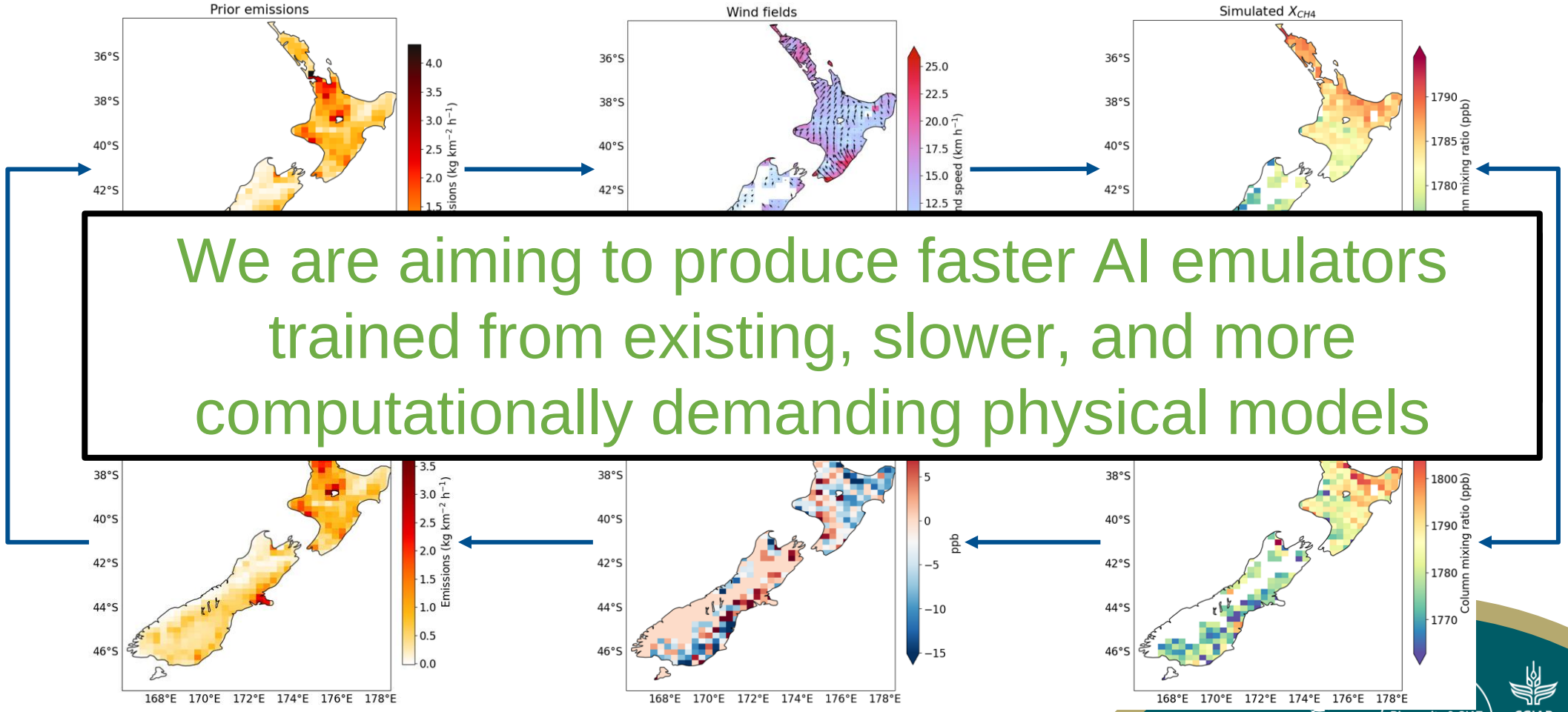
Challenges



- Satellites measure concentrations rather than fluxes (sources).
- Each pixel value is the sum of a “background” signal and the methane coming from the sources we are interested in.
- Global and local wind patterns can strongly influence satellite measurements.

Atmospheric Transport Models (ATMs)

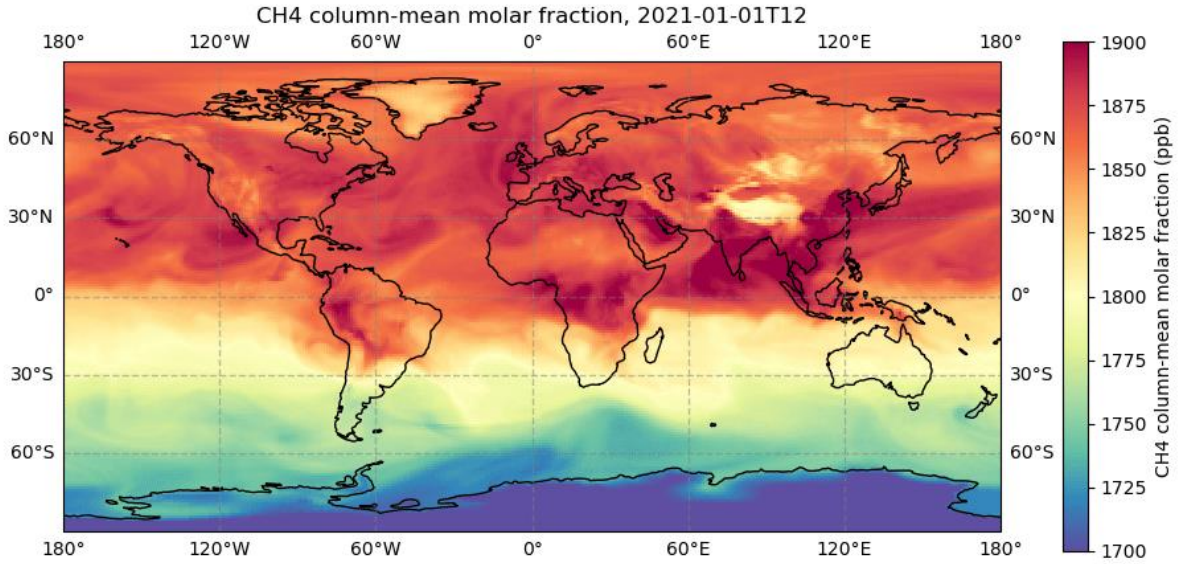
Physicochemical model

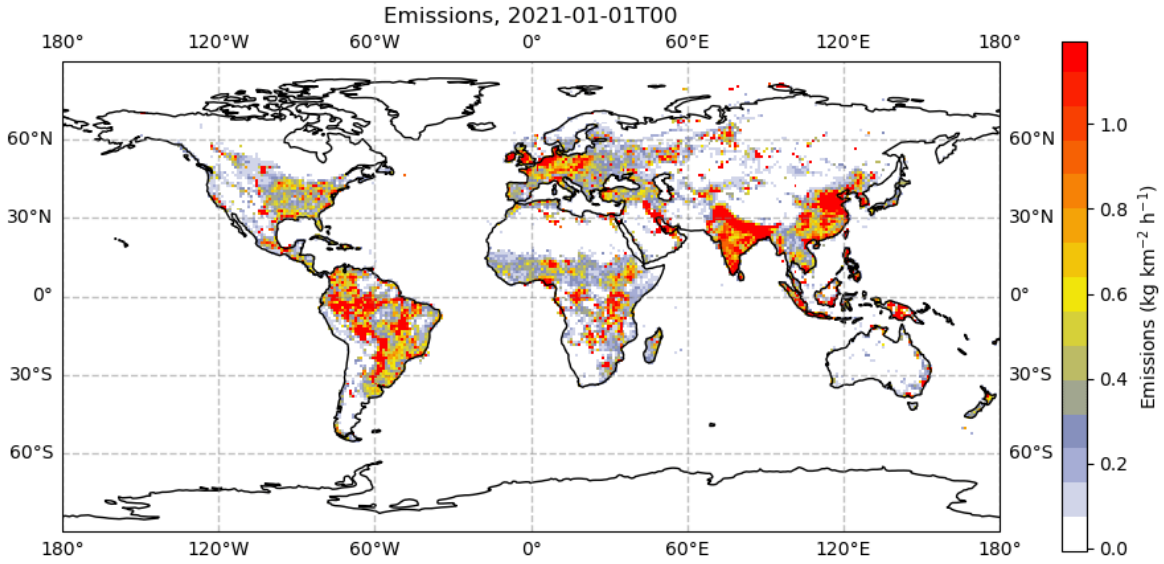


We are aiming to produce faster AI emulators trained from existing, slower, and more computationally demanding physical models

CAMS (V22R2)

Dataset (1° x 1°)

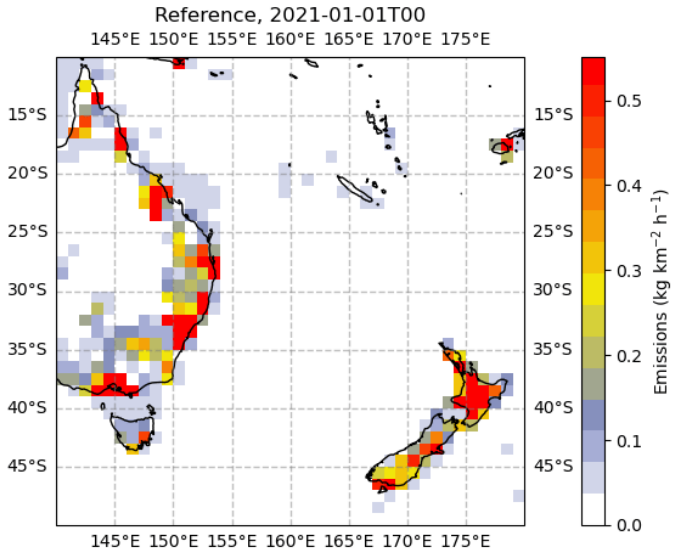


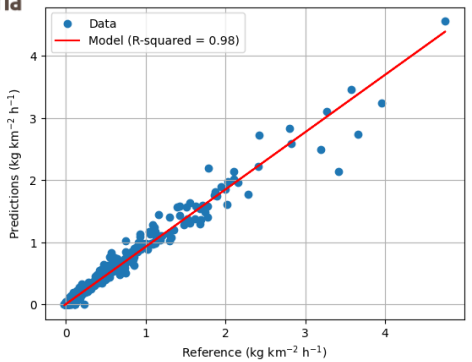


Sources: European Centre for Medium-Range Weather Forecasts (ECMWF).

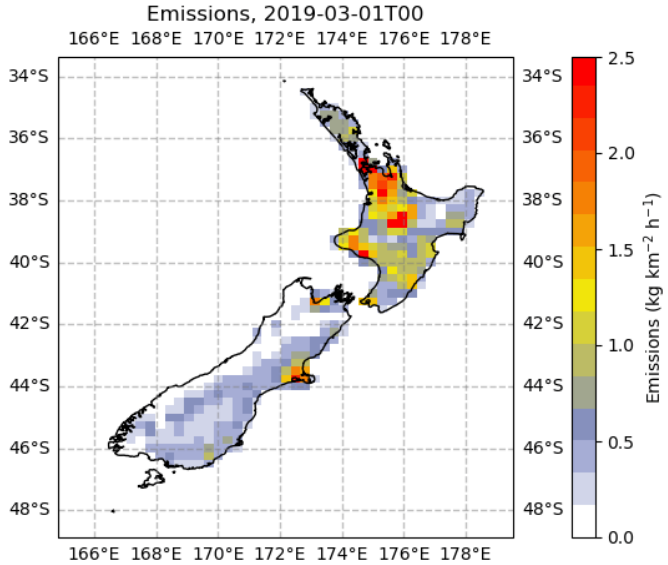
The approach

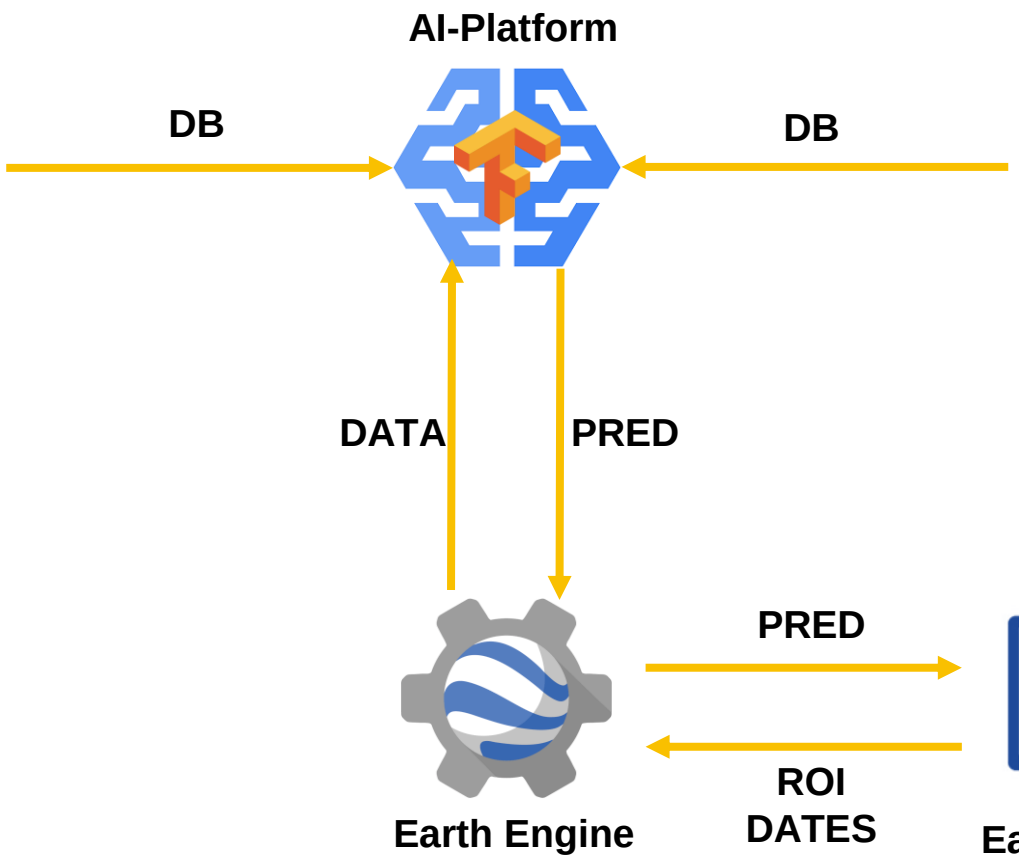
CAMS (100km)





IMI (25km)





https://research.google/outreach/phd-fellowship/recipients

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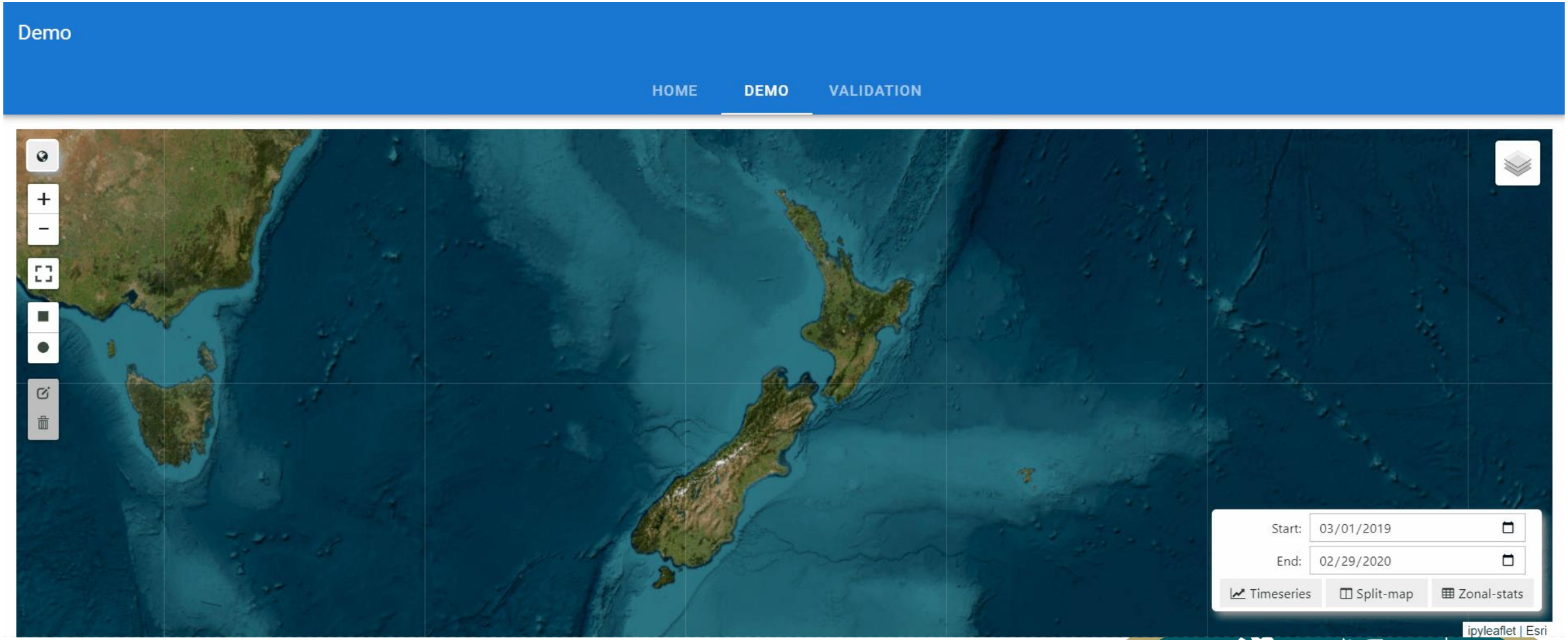
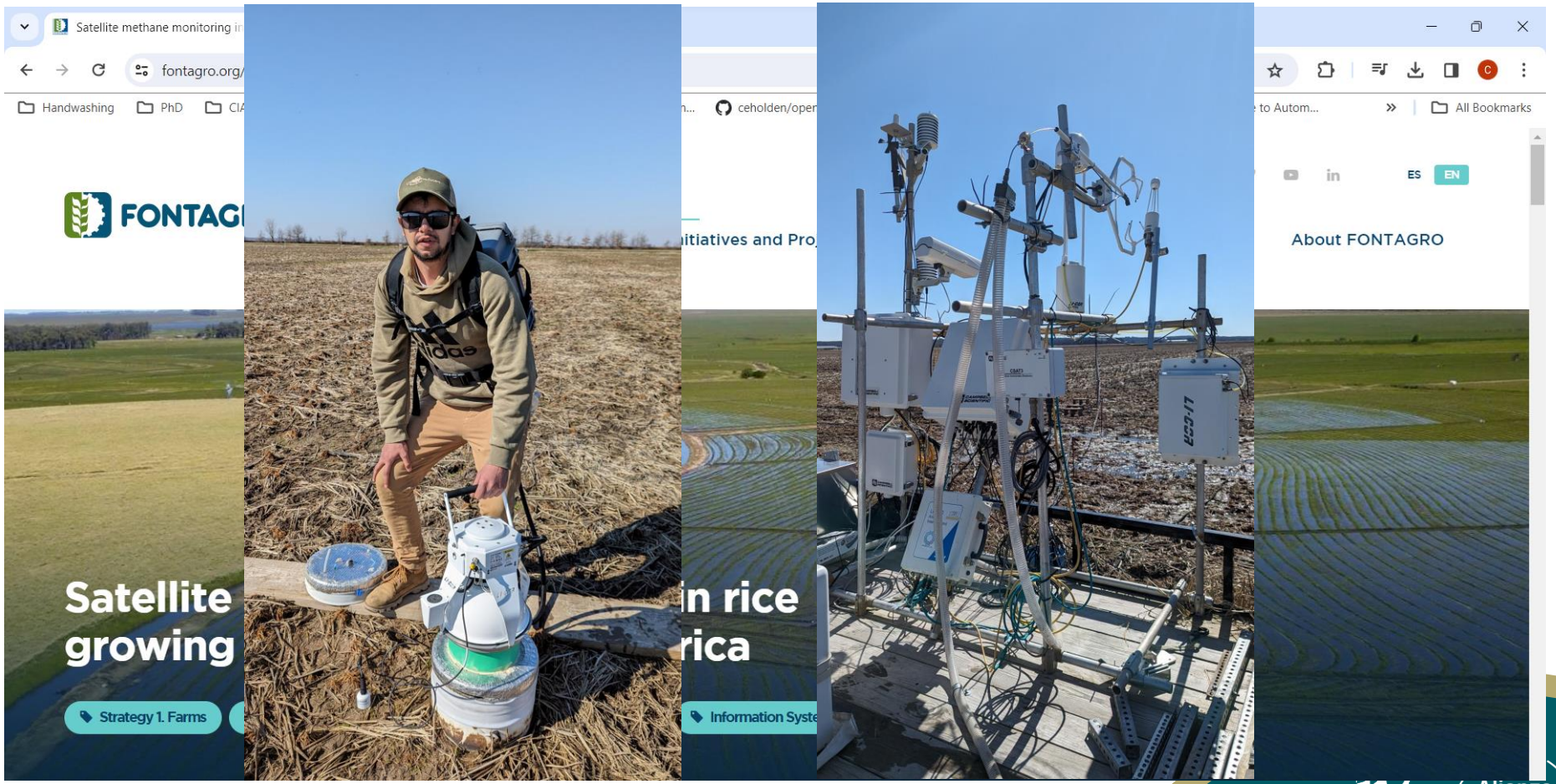
Demo



https://spacebase.co/challenges/space-challenge-2023/

Validation

Ground truth data



https://www.fontagro.org/new/proyectos/monitoreo-metano/en

Future work

- Deploy the AI models in Google Vertex AI for the final users:
  - Farmers
  - Researchers
  - Policy makers
  - Target satellites

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SPACEBASE

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