






Toward Foundation Models for Earth Monitoring: Proposal for a Climate Change Benchmark

@ Service Now

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Climate Change Tasks



Forest carbon
quantification



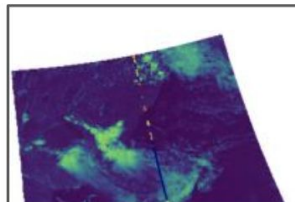
Methane plume
detection



Filling data
gaps



Cattle counting



Cloud
segmentation



Land cover
classification

At every Climate Change workshop, we learn about new creative ways to use ML on Earth monitoring.

At the core of these ML models lies a **pretrained model** to:

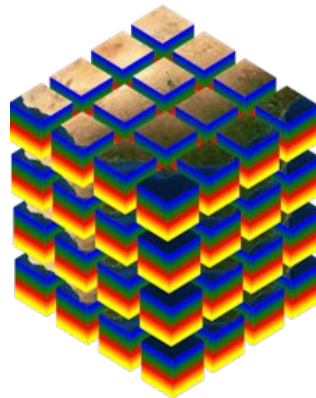
- Increase performance
- Accelerate training
- Potentially more robust to distribution shift

Limitations of ImageNet Pretrained Models

- ResNet variants [pretrained on Imagenet](#) is perhaps the most common.
- It has important [limitations](#) for remote sensing:
 - 1st person view
 - Only RGB
 - No temporal dynamics
 - Only 1 Million images



Vs



Upcoming pre-trained models

There is a large amount of untapped information to be explored.

We expect upcoming large pre-trained models to leverage

- Very large amount of data
- Spatio-spectro-temporal structure in the data
- Multi-frame super-resolution signals
- Other modalities such as SAR, Weather, Terrain Elevation
- Semantic Information such as Open Street Map

A Climate Change Benchmark

A pretrained model is only as useful as its performances on downstream tasks.

To this end, we propose a benchmark composed of climate-related tasks.

We aim to:

- Stimulate the development of foundation models for Earth monitoring,
- Provide a systematic way of measuring the quality of models
- Provide tools and insights for solving climate-related tasks
- Preemptively reduce negative impacts of foundation models

What to expect

- About 15 climate change related datasets
 - With some new datasets
- All with permissive licenses (e.g. Creative Common)
- A github codebase to help fine-tune on various type of tasks such as:
 - Classification
 - Semantic Segmentation
 - Detection / Counting
- Experiments on existing pre-trained models

Call for Actions

This proposal is also a call for actions.

We welcome:

- Proposals for datasets to include in the benchmark
- Any recommendation on the evaluation procedure that can help mitigate negative impacts of foundation models for earth monitoring.