Make it Rain…

AIFS Indra

Ayesha
Rodrigo
Ethel
Philip

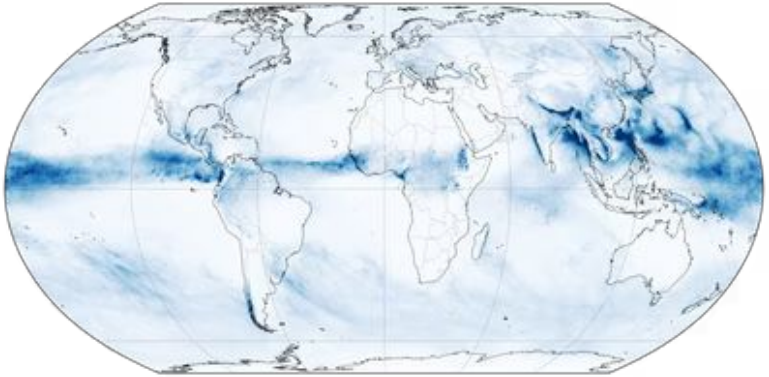
Tutors:
Mario
Ewan

The challenge

- Precipitation is **IMPORTANT** !!!
- AIFS is trained on ERA5 reanalysis data
- Predicted precipitation distribution does not capture realistic features

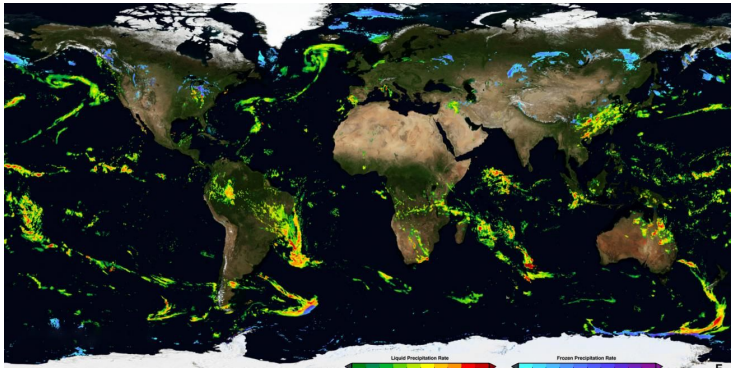
- **Goal:** Fine-tune AIFS on IMERG observational data

ERA5



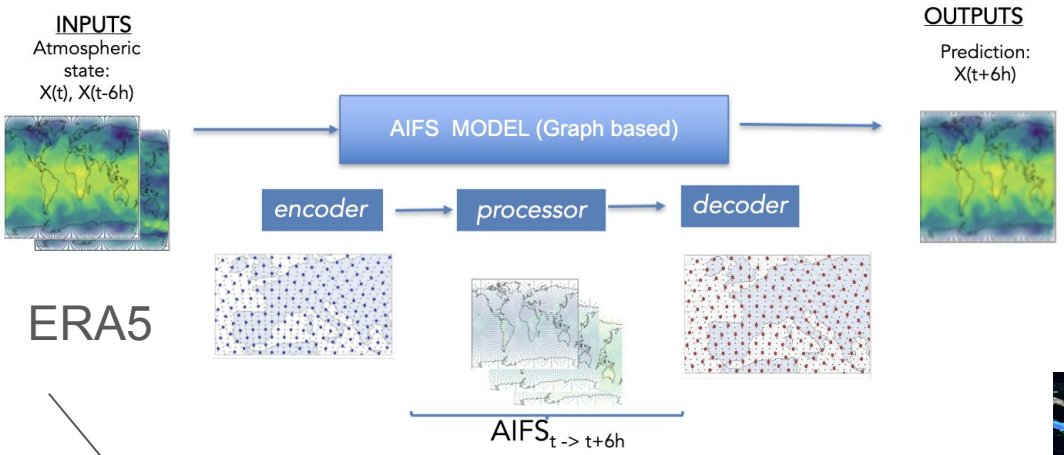
- **Reanalysis** product
- Does not assimilate TP
- Overestimates light precipitation
- Does not capture extremes as well

IMERG



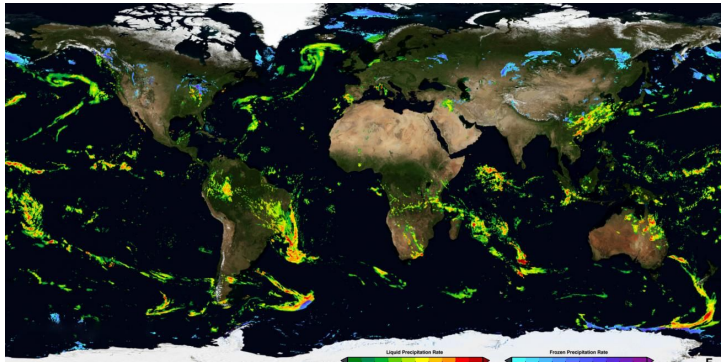
- Satellite **observation** based product
- Calibrated with ground stations
- More realistic*

Make it rain with IMERG!



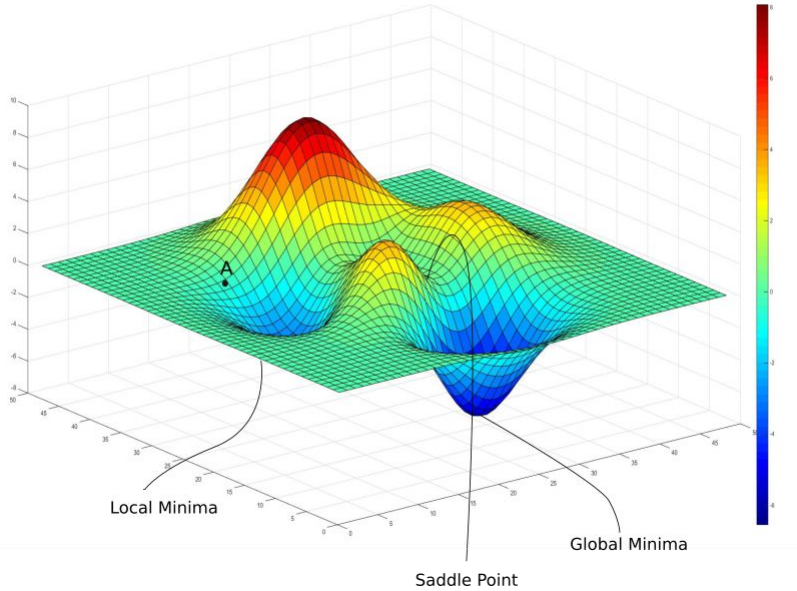
Using a pre-trained model for 50 epochs

Replacing TP in ERA5 with IMERG



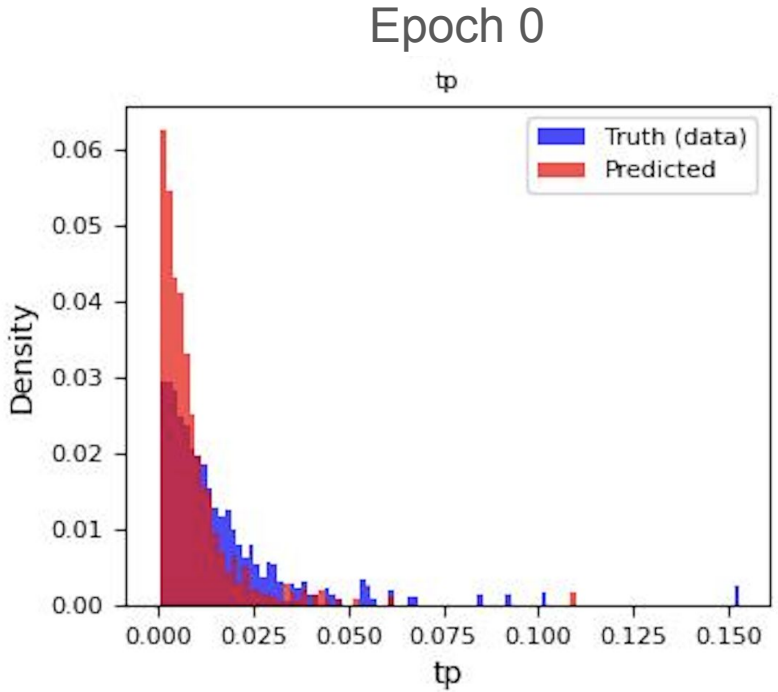
Training Configuration

- Learning rate
  - AIFS default: 1.25e-4
  - AIFS Indra: 7e-5
  - Warm-up steps with high LR=7e-5 to escape local minima
  - Gradually lower LR to avoid catastrophic forgetting
- To freeze or not to freeze?
  - Did not freeze the encoder and processor layer weights
- Rollout: 1
  - Chosen for faster computation
  - Ideally would increase for better performance.



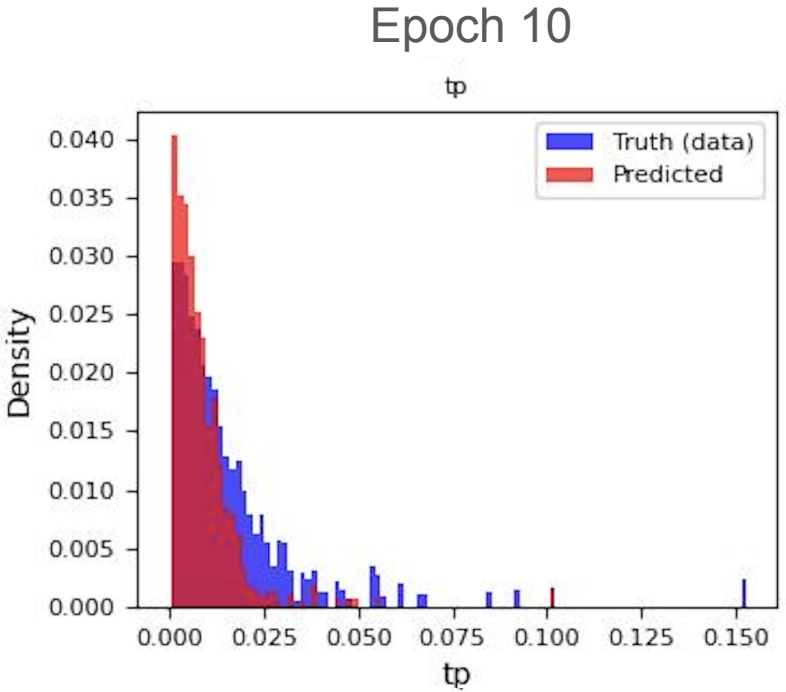
Training… Do things change?

- Over 10 epochs precipitation distribution starts to fit IMERG



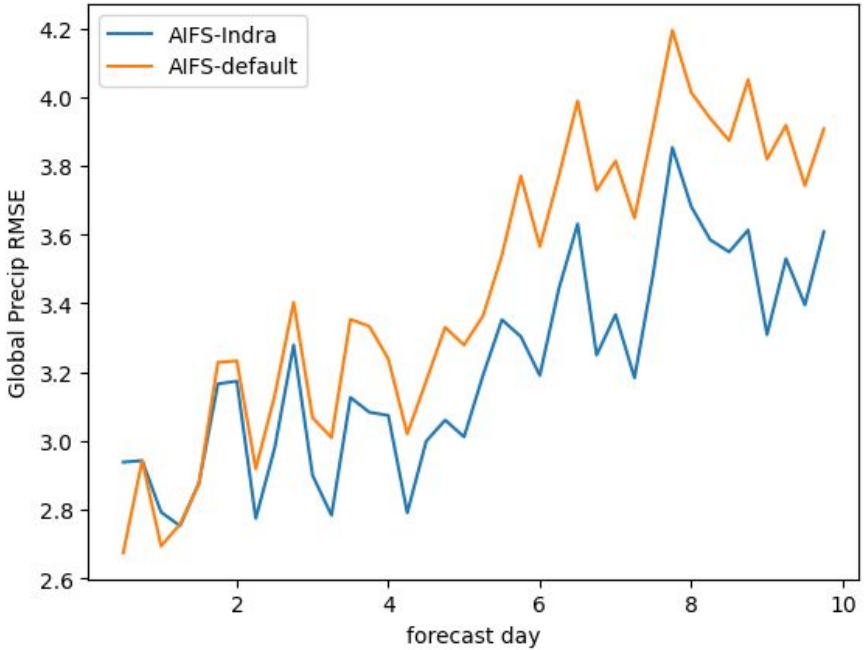
Training… Do things change?

- Over 10 epochs precipitation distribution starts to fit IMERG
- More GPU's and iterations through dataset could have squeezed out more 👀

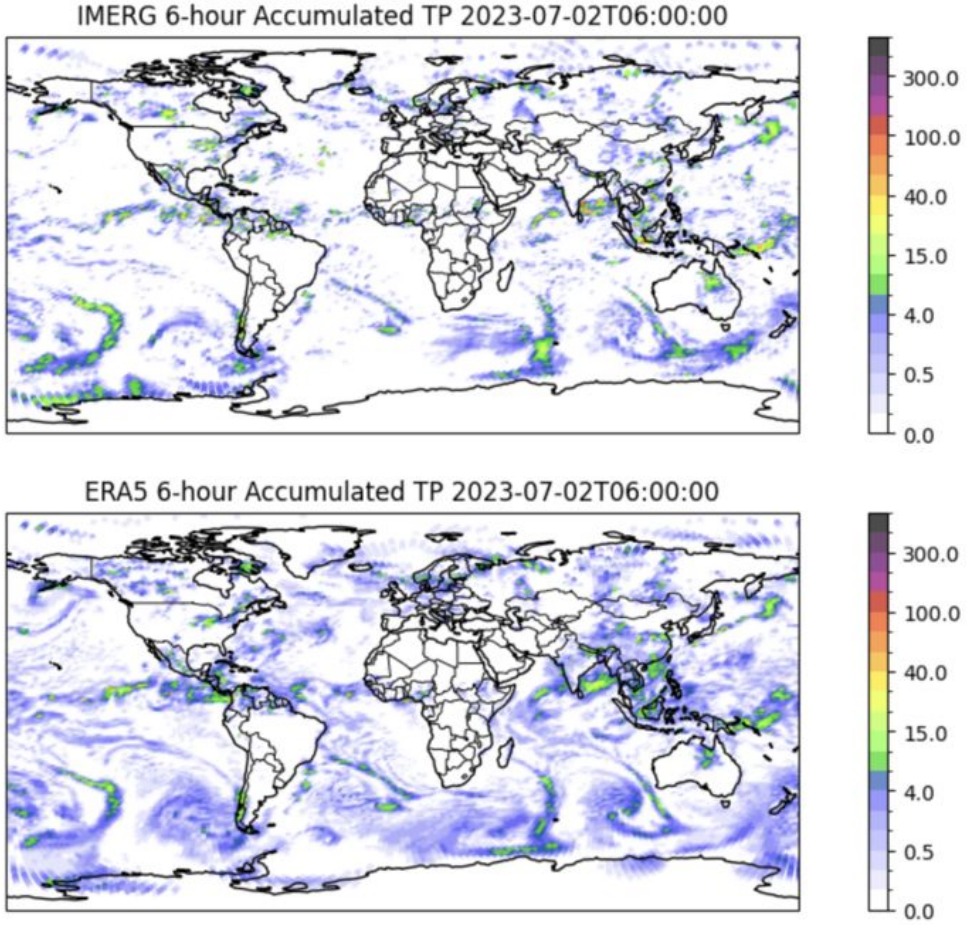


Global RMSE against independent year of IMERG

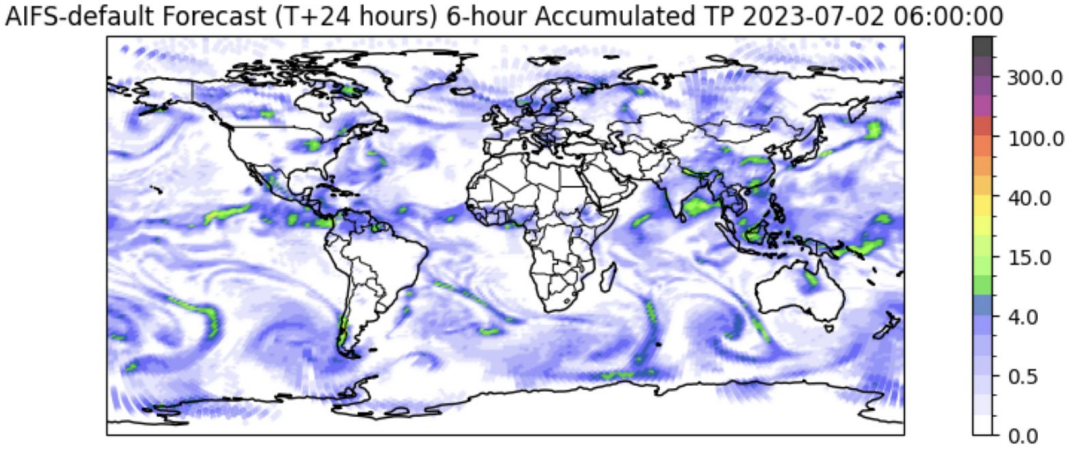
- July 2023 forecast RMSE vs IMERG (independent year)
- We capture IMERG better!

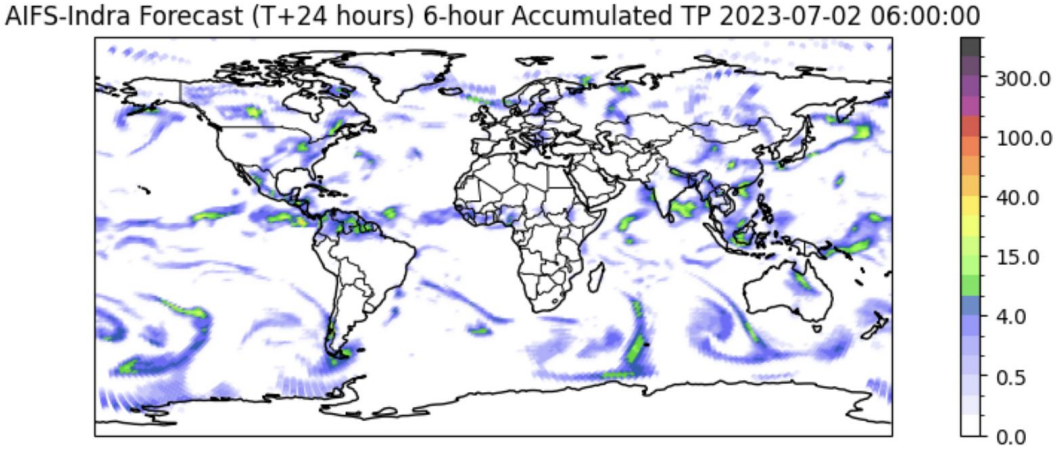


- July 2023 IMERG vs ERA5



- July 2023 forecast AIFS-default vs AIFS-Indra
- AIFS-Indra smooths out light precipitation





May 2023

Italy

Latest Europe World EU Policy Business Travel Next Culture Green Hea

orld

e hit by severe floods
aves in the south

BBC

Italy hit by severe flooding after heavy rain

Share

Connecting Waterpeople

smart
water magazine

HOME PRINT EDITION NEWSLETTER MY FEED NEWS ENTITIES THEMES EVENTS Q & A

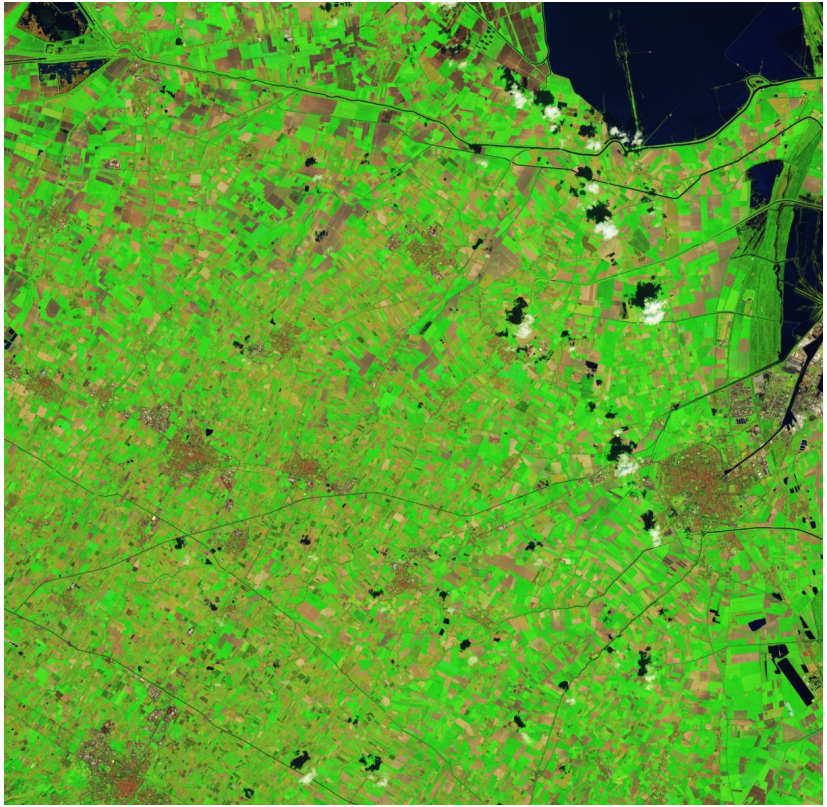
Quick search in Smart Water Magazine

NEWS » EUROPE » ITALY

Italy allocates €1b for flood recovery and prevention in Emilia-Romagna, Tuscany, and Marche

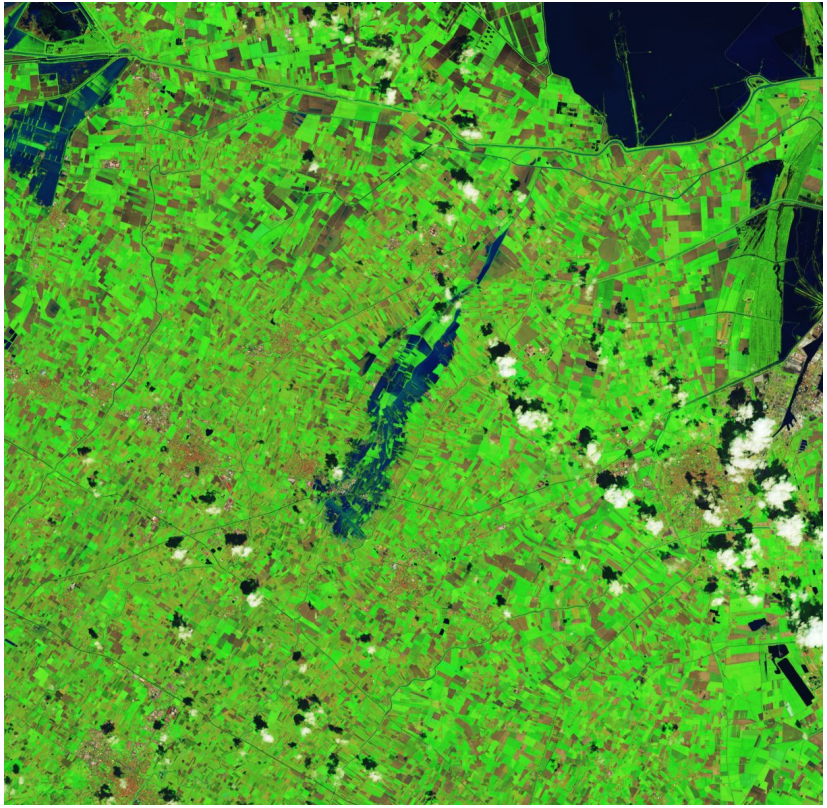
May 2023

Italy



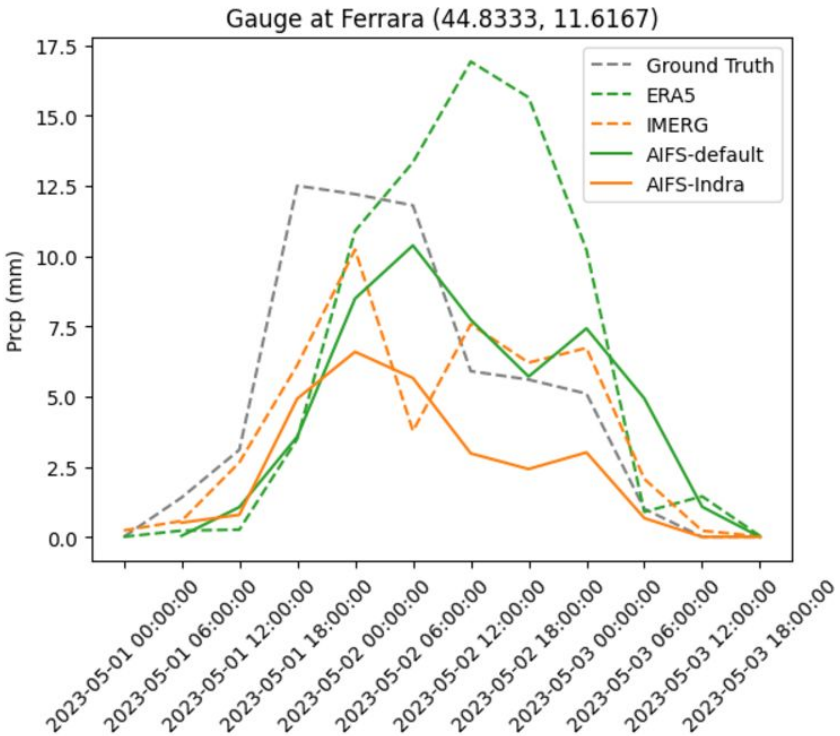
May 2023

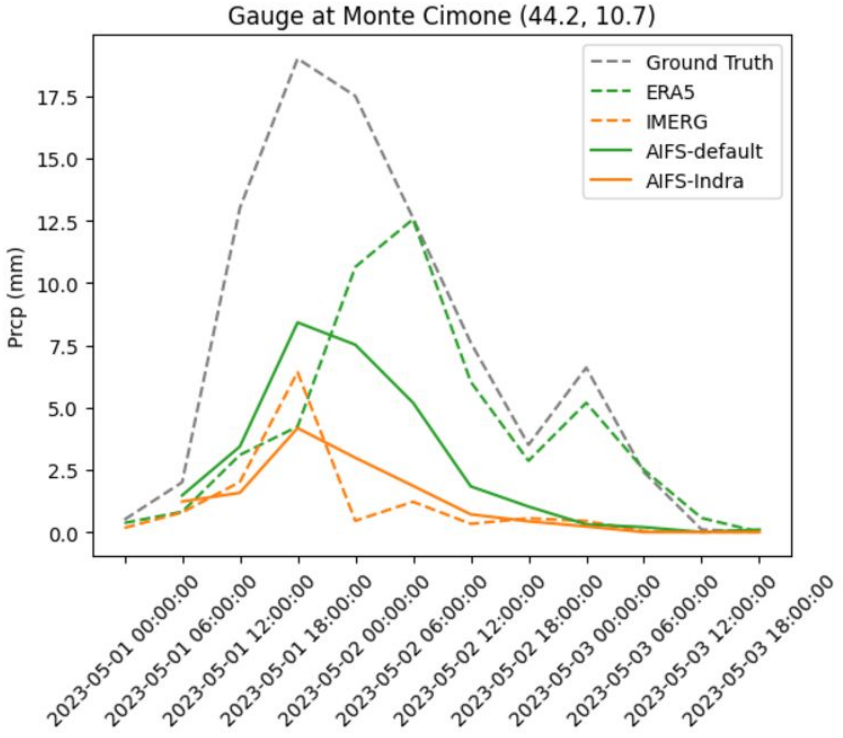
Italy



May 2023

Italy





Init time: 2023-05-01 00:00:00

Limitations

Resolution	Training compute
Spatial evaluation	Limited verification

ERA5
IMERGE
AIFS
INDRA
imgflip.com