



Precipitation Nowcasting using Deep Neural Network

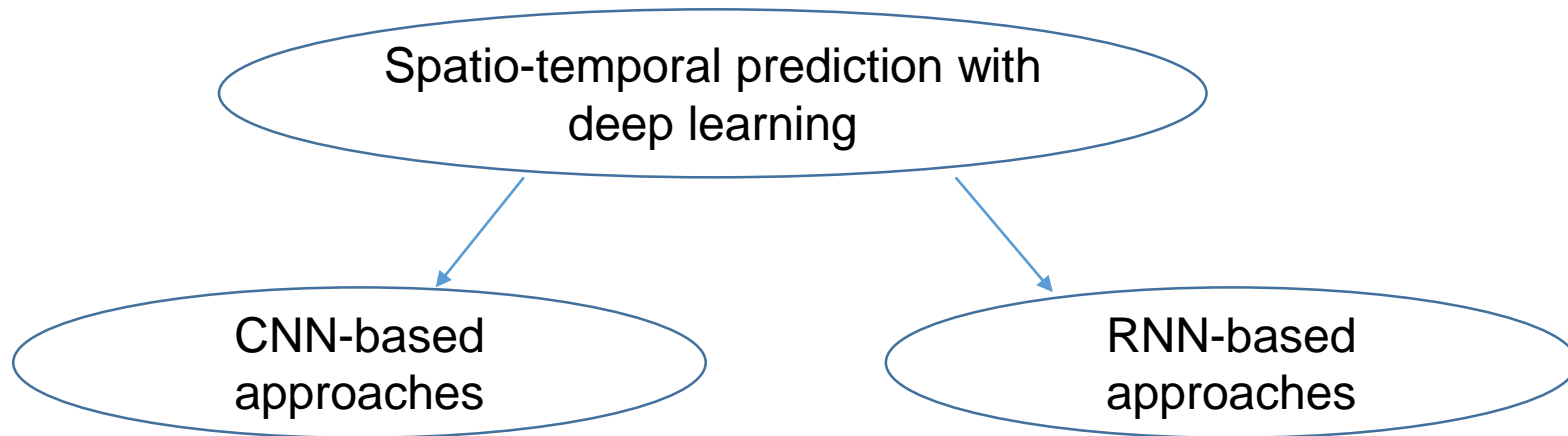
Mohamed Chafik BAKY

Mathieu Serrurier

Spatio-temporal prediction

Precipitation nowcasting
using radar images

- Ill-posed problem: several possible solutions
- Precipitation maps:
 - do not contain all physically relevant information to uniquely predict future precipitation
 - are sampled with low frequency (time step = 15mn)



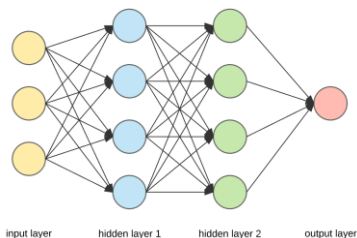
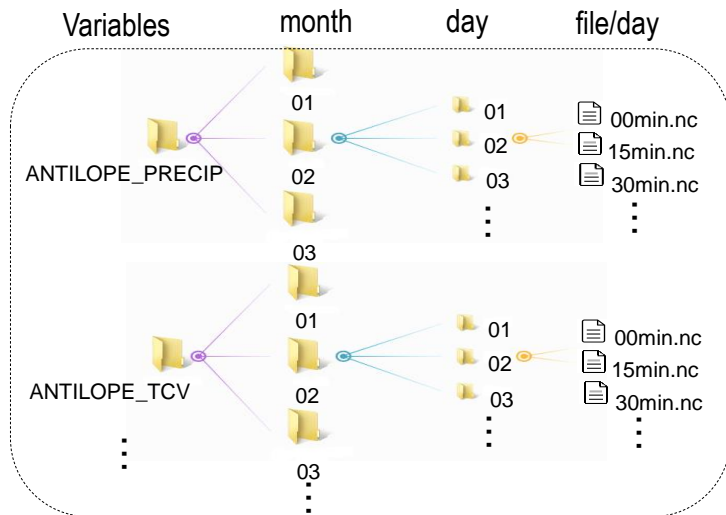
(+) focus on spatial appearances

(+) capture time dynamics with recurring connections

(-) predict a limited number of images in a single pass

(-) suffer from the vanishing gradient problem

Météo France data



Neural network

2) Dataloader

- Load only one part of data into memory
- Use of batches
- Use of multiple threads
- Data transformation
- Data standardization

Data preparation

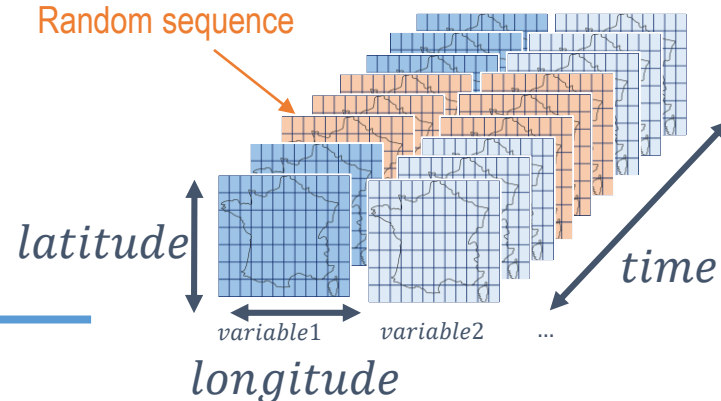
1) File concatenation

- 1 netcdf file
- Easy parsing
- Reduced storage space

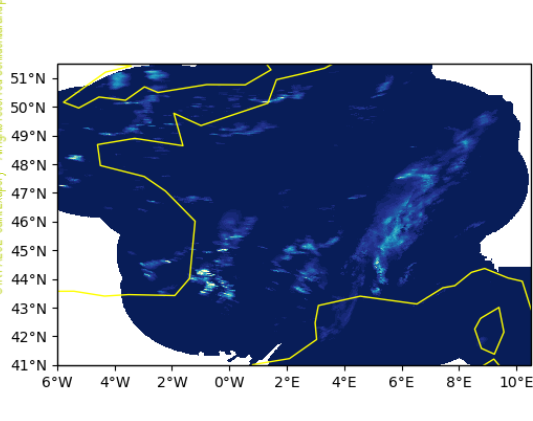


Meteo_france_data.nc

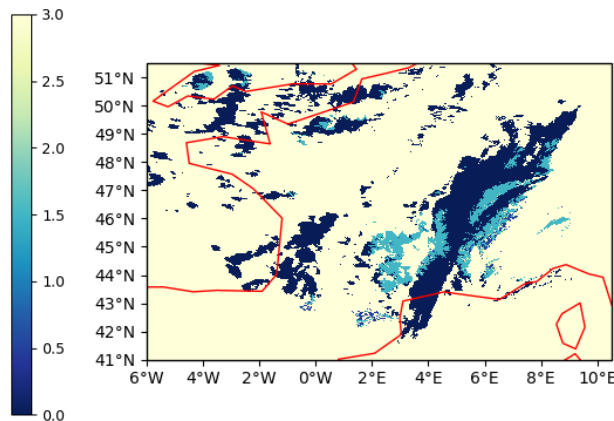
Random sequence



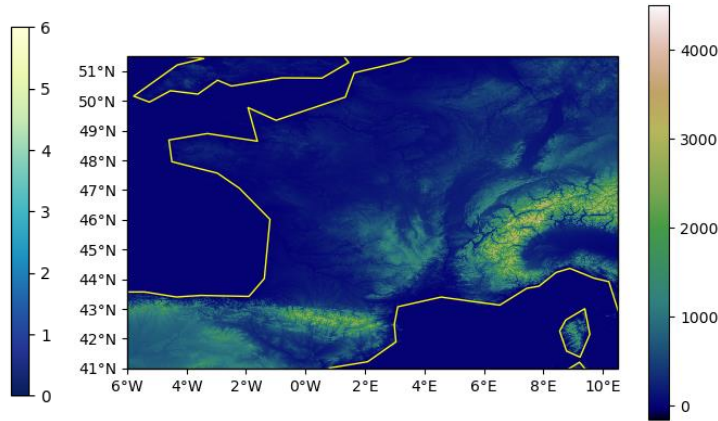
- Météo France data :
 - ANTILOPE_PRECIP: Precipitation (time step = 15 mn)
 - AHYDRE_PROFIL_TW: Temperature profile type (time step = 5 mn)
 - Relief



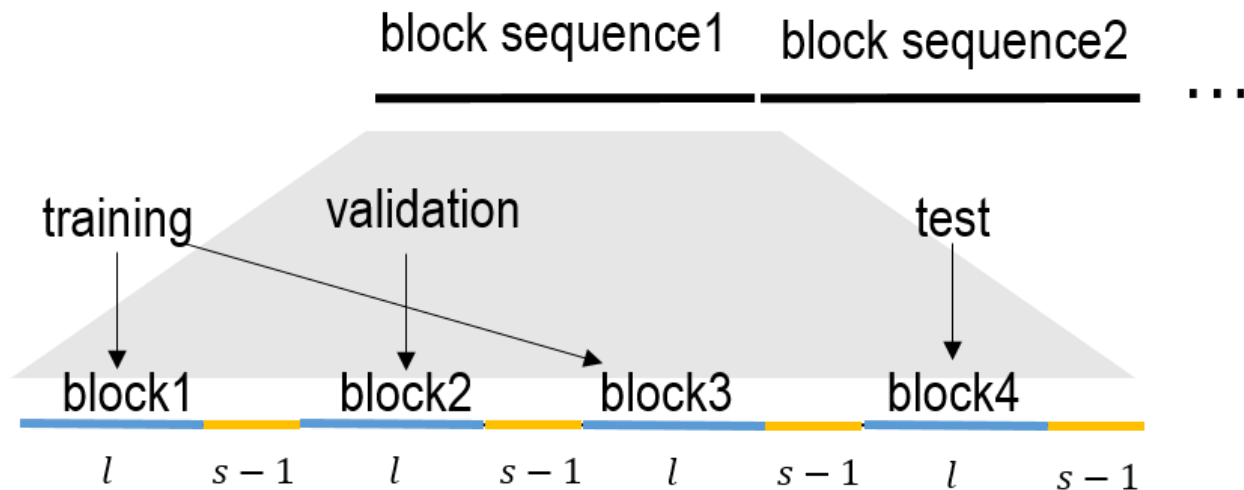
Precipitation



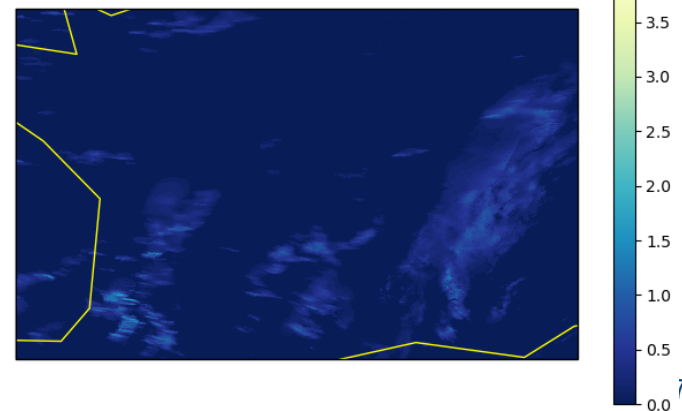
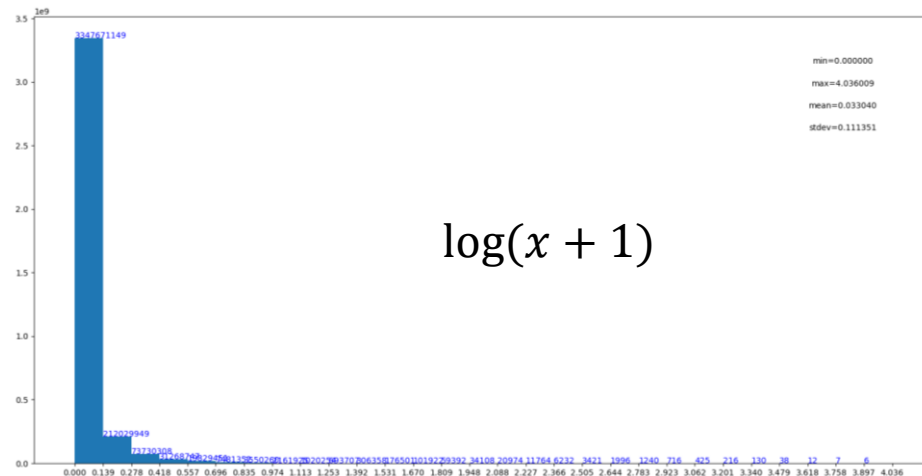
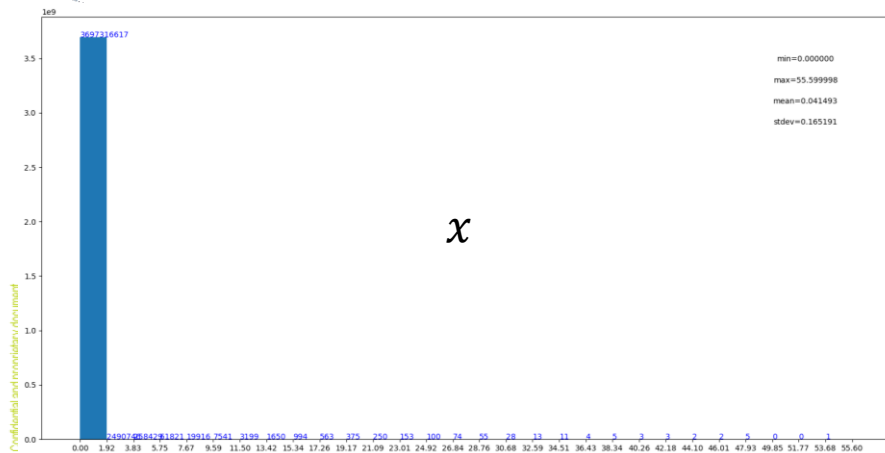
Temperature profile type



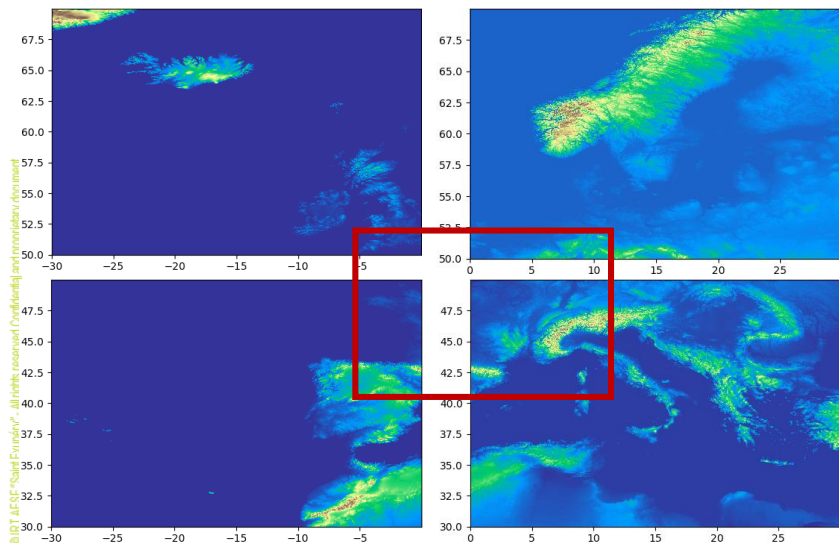
Relief



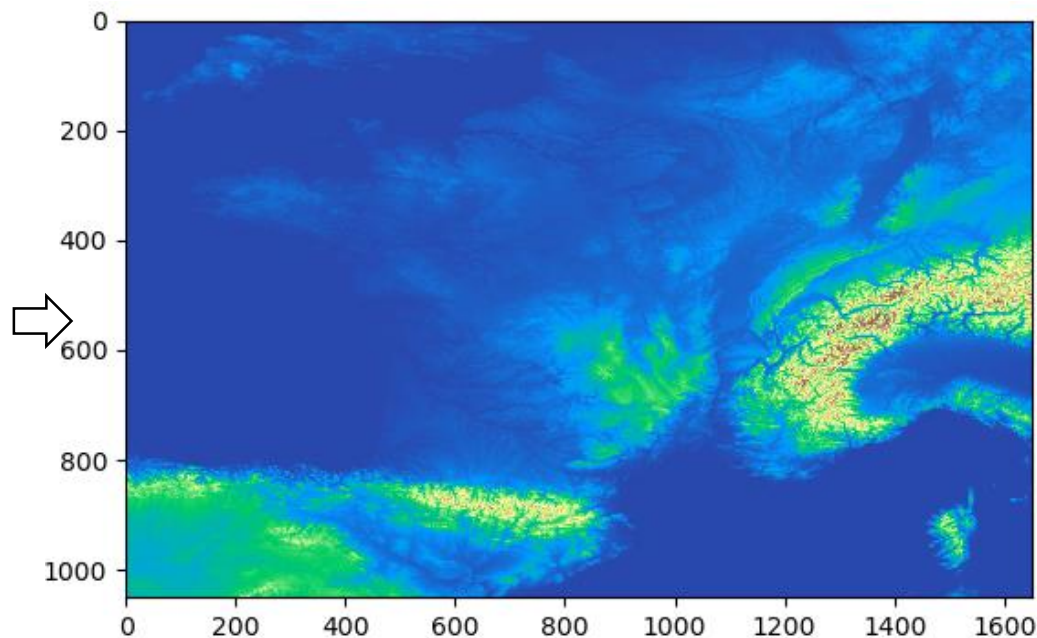
s : length of image sequence given to neural network (6 inputs + 6 outputs)



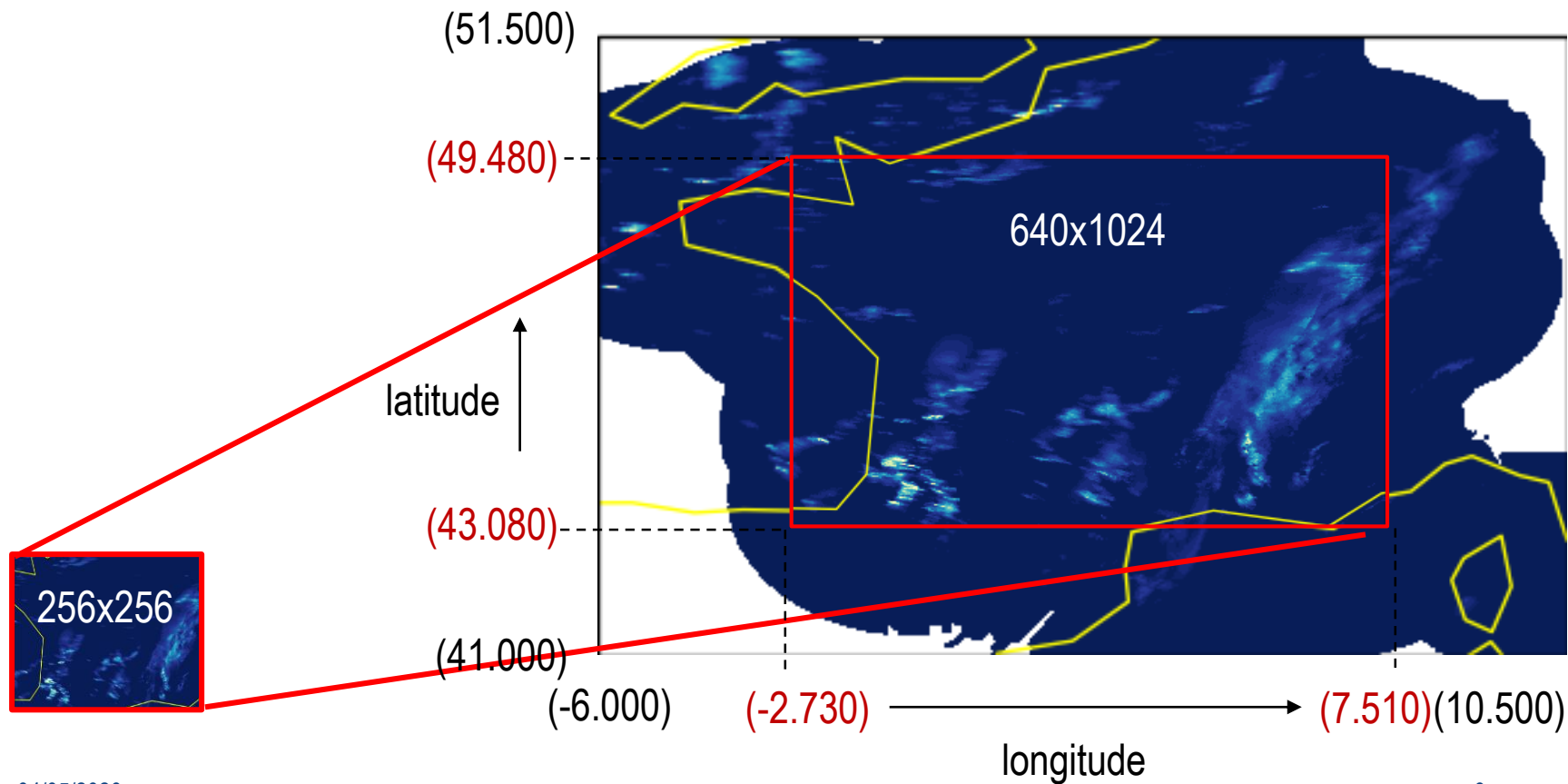
GMTED2010

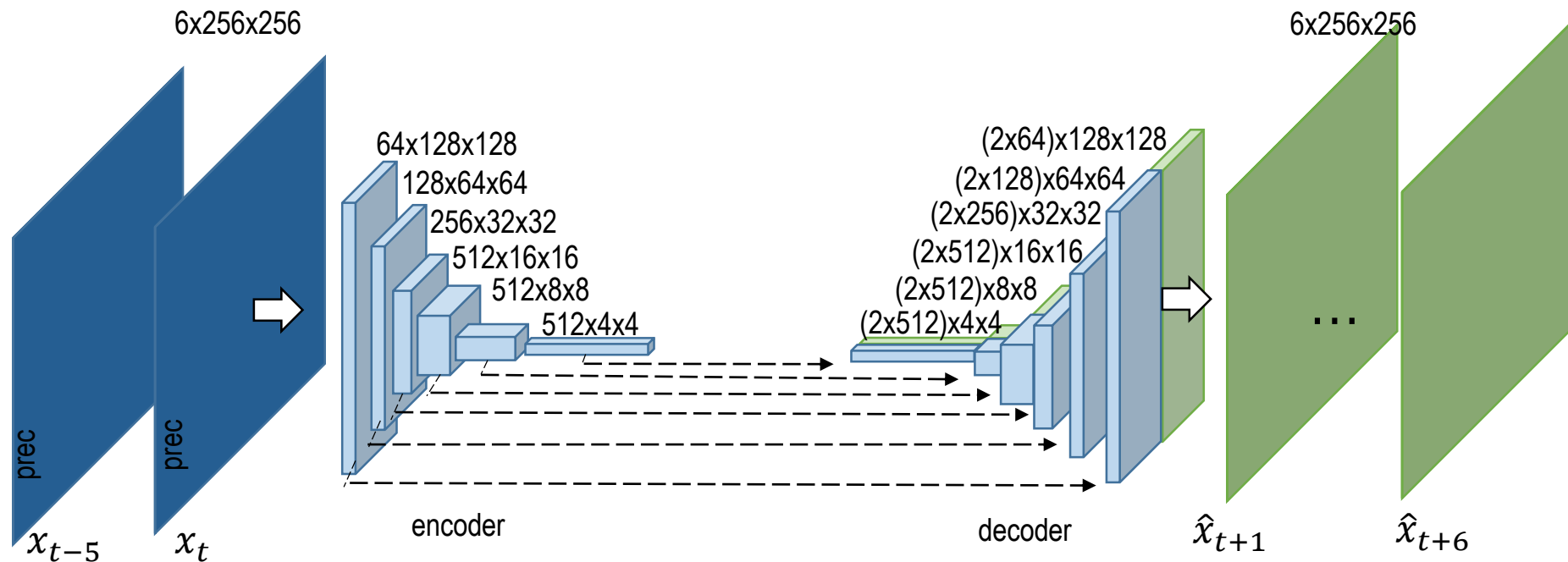


30 arc-sec = 0,00833333 degree

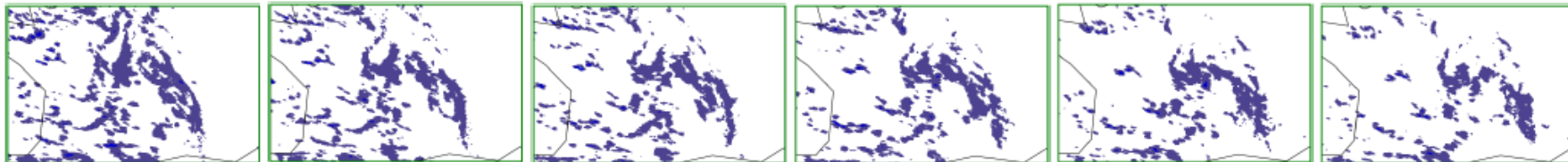


0,01 degree

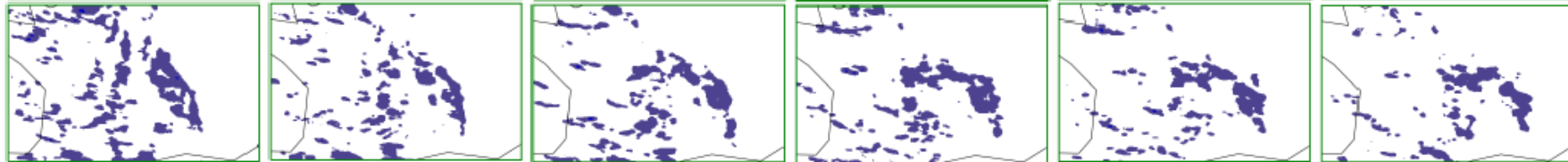




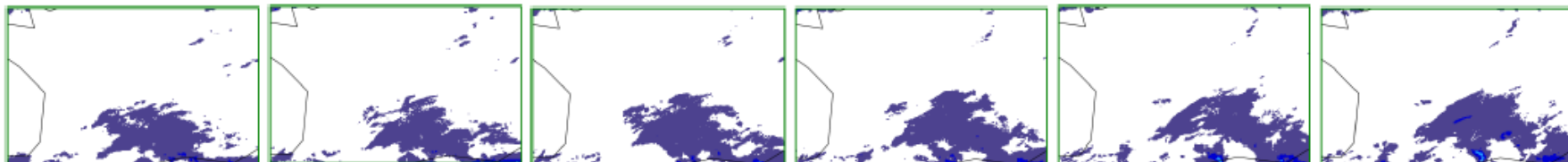
GT



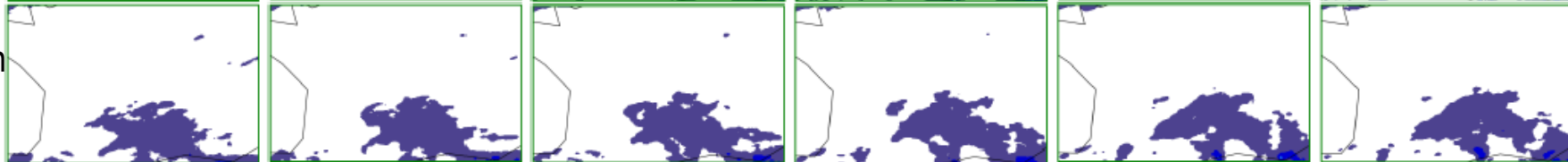
prediction



GT



prediction



+15min

+45min

+1h15

+1h45

+2h15

+2h45

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Merci de votre attention

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