EART60702:
Earth and Environmental Data Science

Project 2

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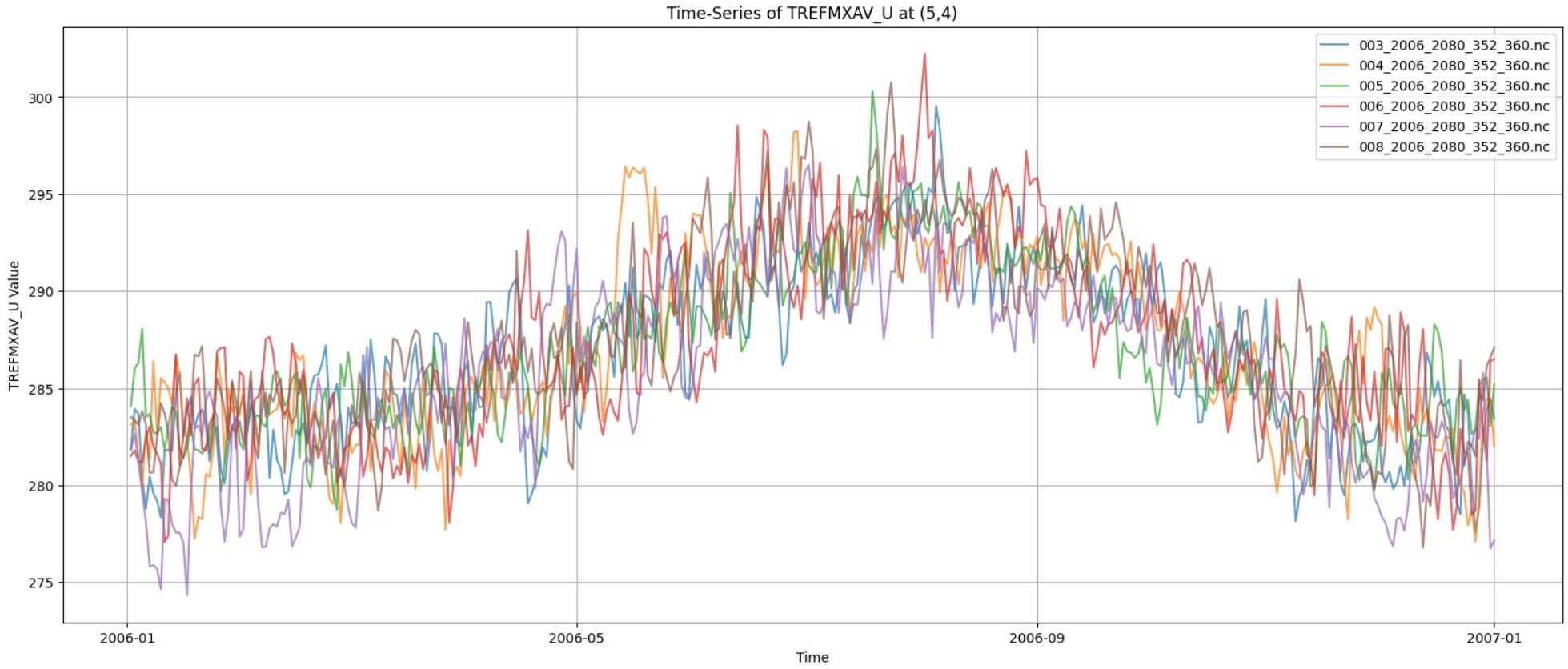
Data

Variable Name	Explanation
TREFMXAV_U	Urban daily maximum of average 2-m temperature
FLNS	Net longwave flux at surface
FSNS	Net solar flux at surface
PRECT	Total (convective and large-scale) precipitation rate (liq + ice)
PRSN	Snowfall_flux
QBOT	Lowest model level water vapor mixing ratio
TREFHT	Reference height temperature
UBOT	Lowest model level zonal wind
VBOT	Lowest model level meridional wind
lat	Latitude
lon	Longitude

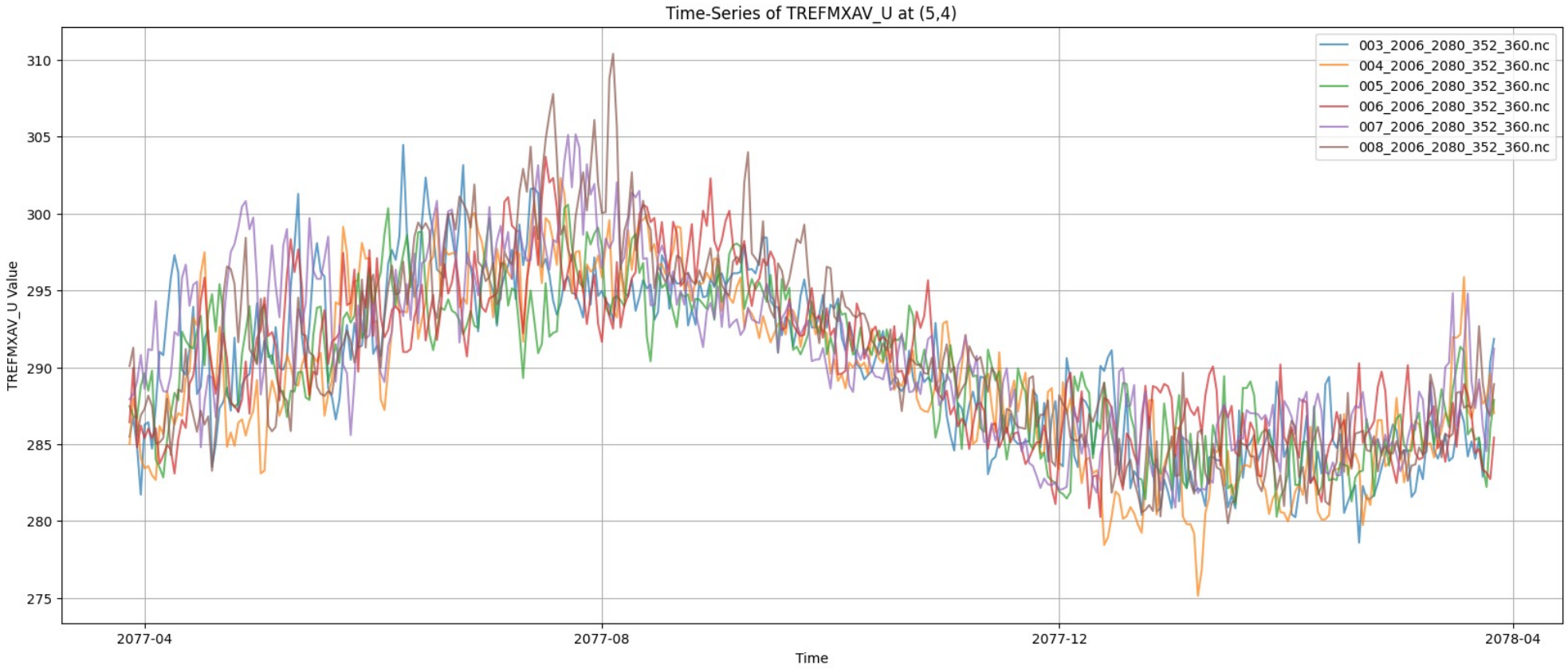
Data

2006


Time-Series of TREFMXAV_U at (5,4)
003_2006_2080_352_360.nc
004_2006_2080_352_360.nc
005_2006_2080_352_360.nc
006_2006_2080_352_360.nc
007_2006_2080_352_360.nc
008_2006_2080_352_360.nc
TREFMXAV_U Value
300
295
290
285
280
275
2006-01
2006-05
2006-09
2007-01
Time

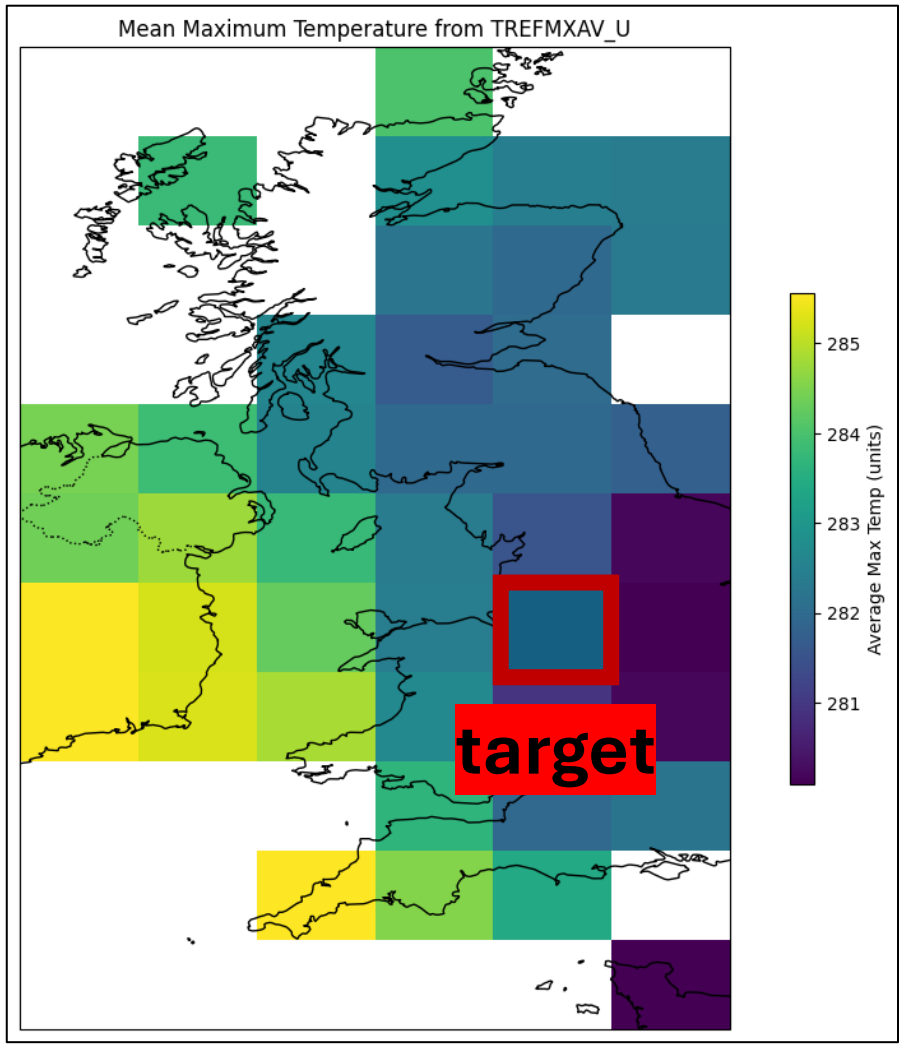
Data

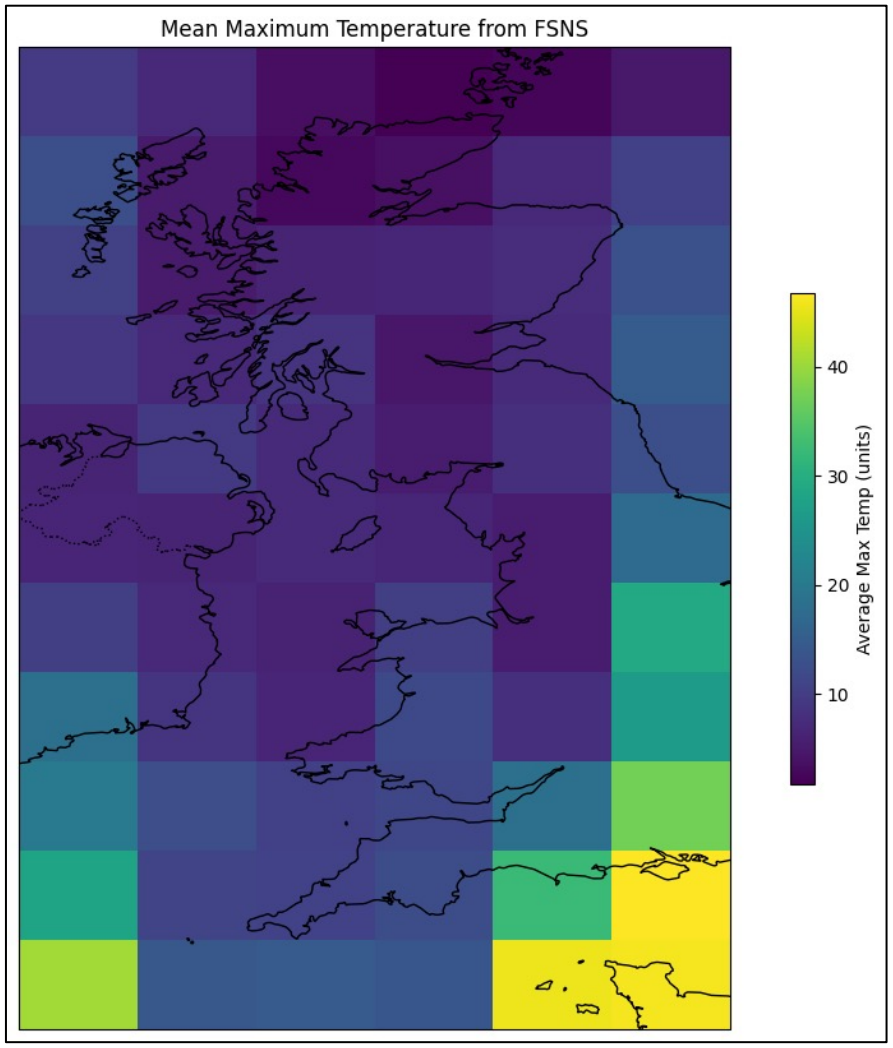
2077


Time-Series of TREFMXAV_U at (5,4)
003_2006_2080_352_360.nc
004_2006_2080_352_360.nc
005_2006_2080_352_360.nc
006_2006_2080_352_360.nc
007_2006_2080_352_360.nc
008_2006_2080_352_360.nc
TREFMXAV_U Value
310
305
300
295
290
285
280
275
2077-04
2077-08
2077-12
2078-04
Time

Data

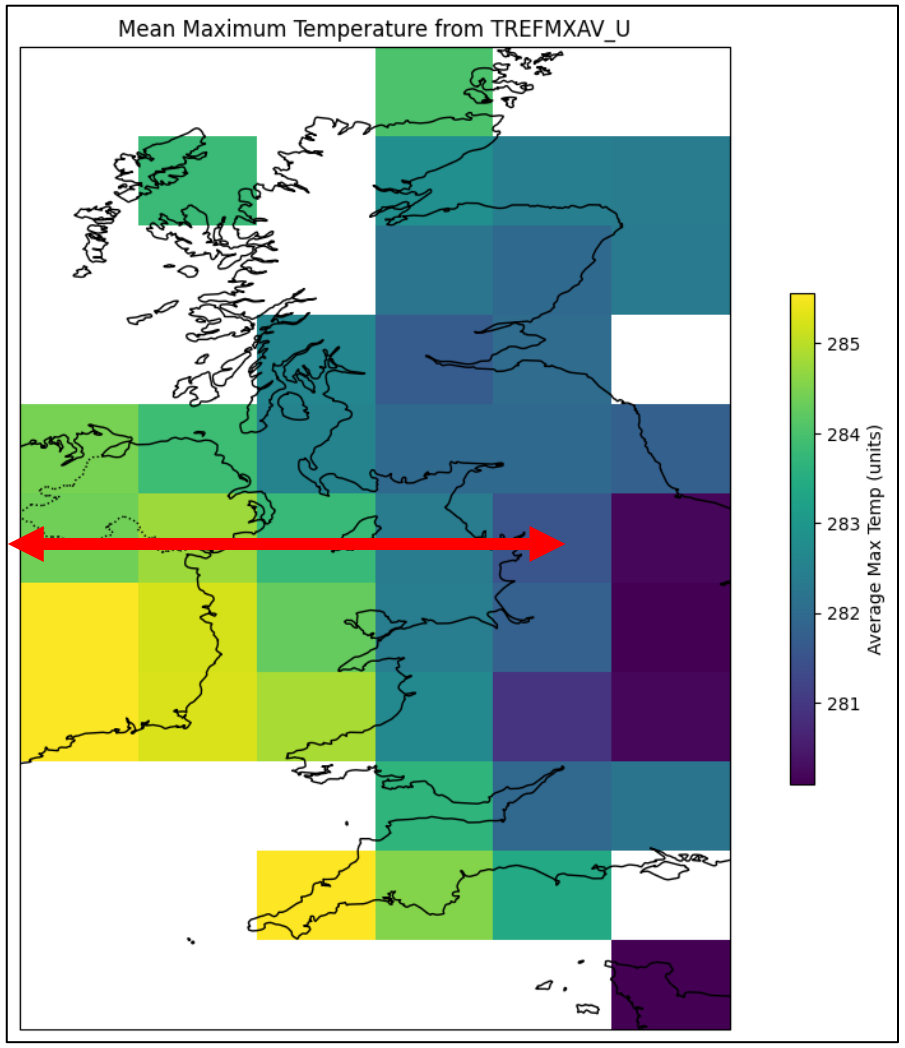
Sample Input

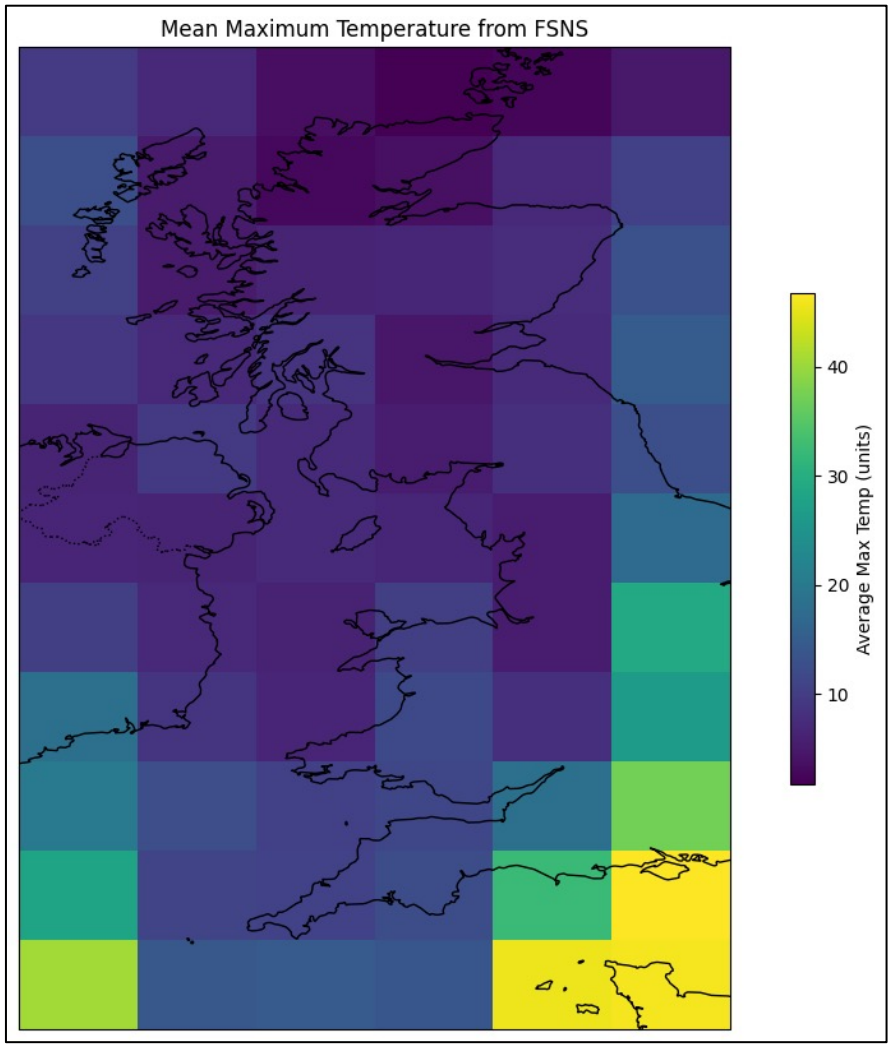




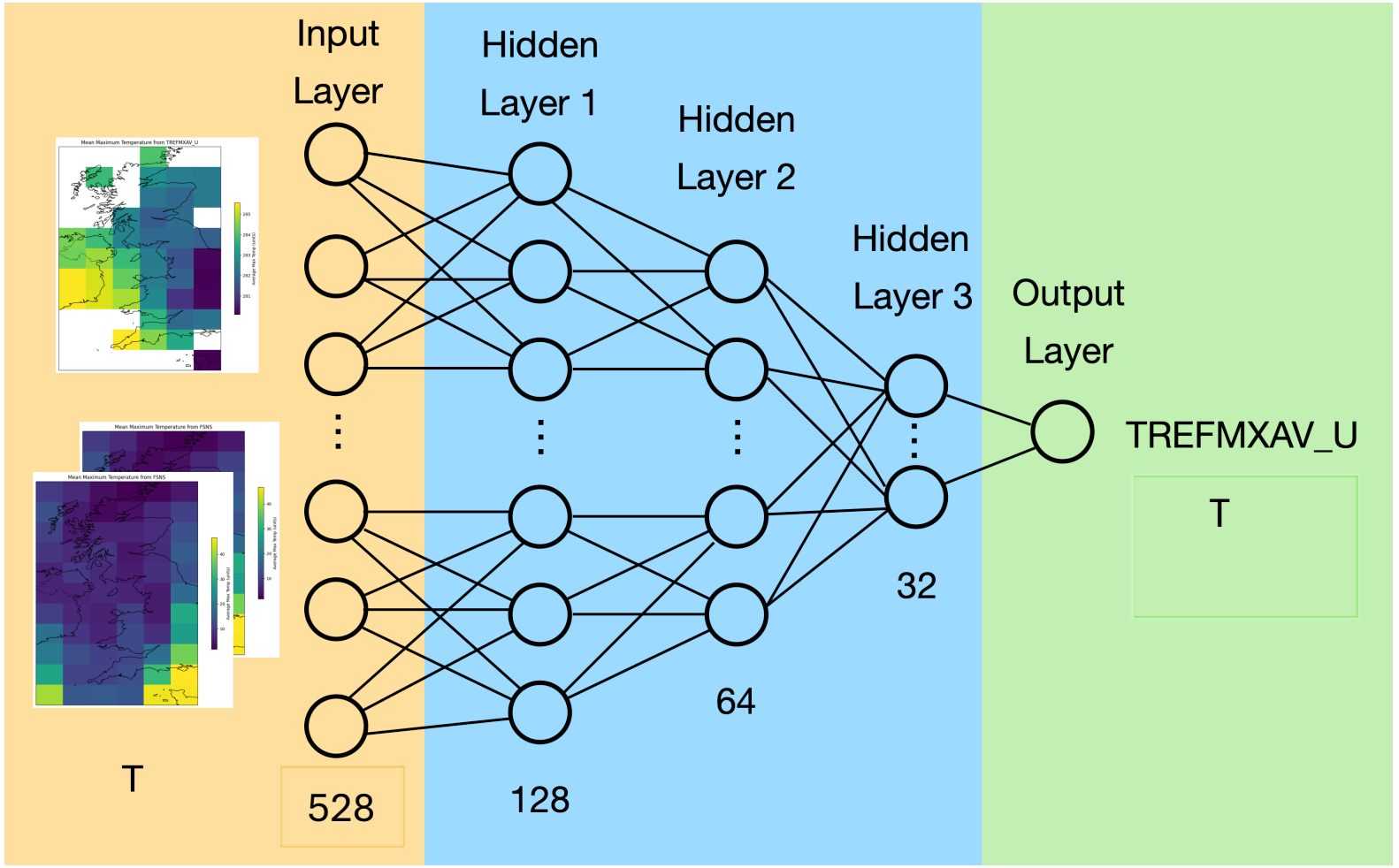
Data

~1 day

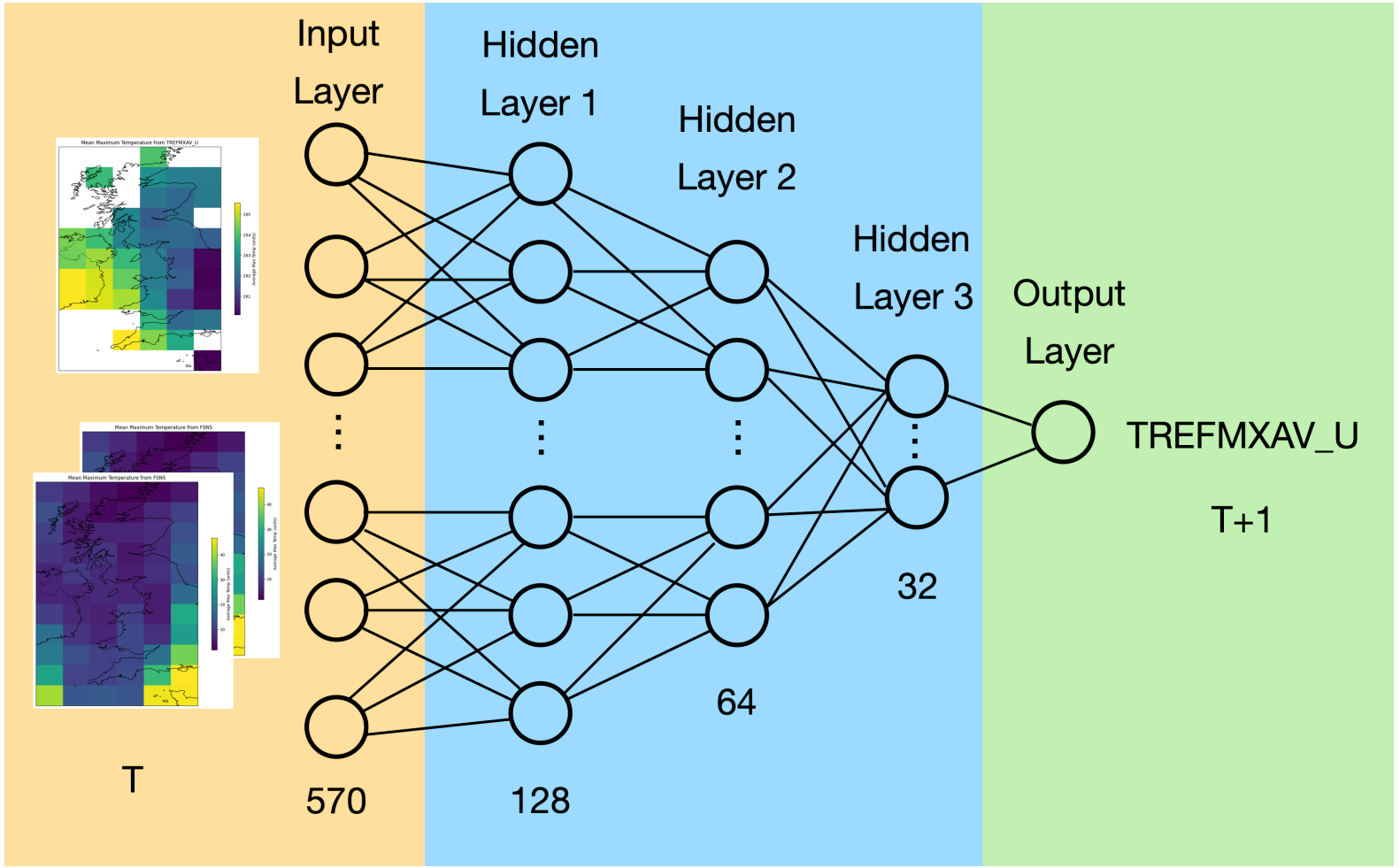

Mean Maximum Temperature from TREFMXAV_U
285
284
283
282
281
Average Max Temp (units)


Mean Maximum Temperature from FSNS
40
30
20
10
Average Max Temp (units)

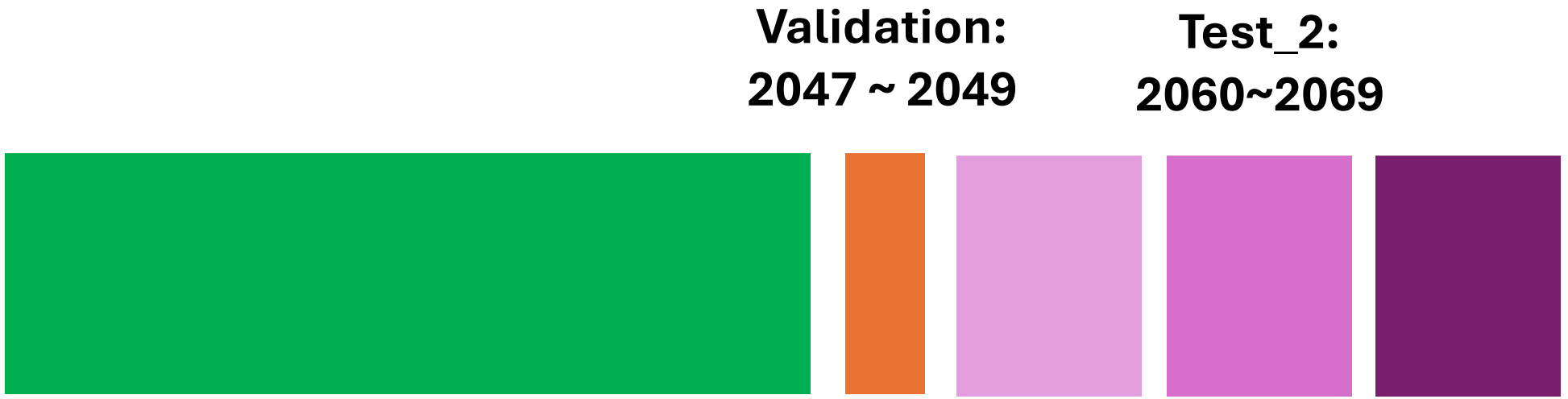
Model – DNN - Estimation



Model – DNN - Forecast

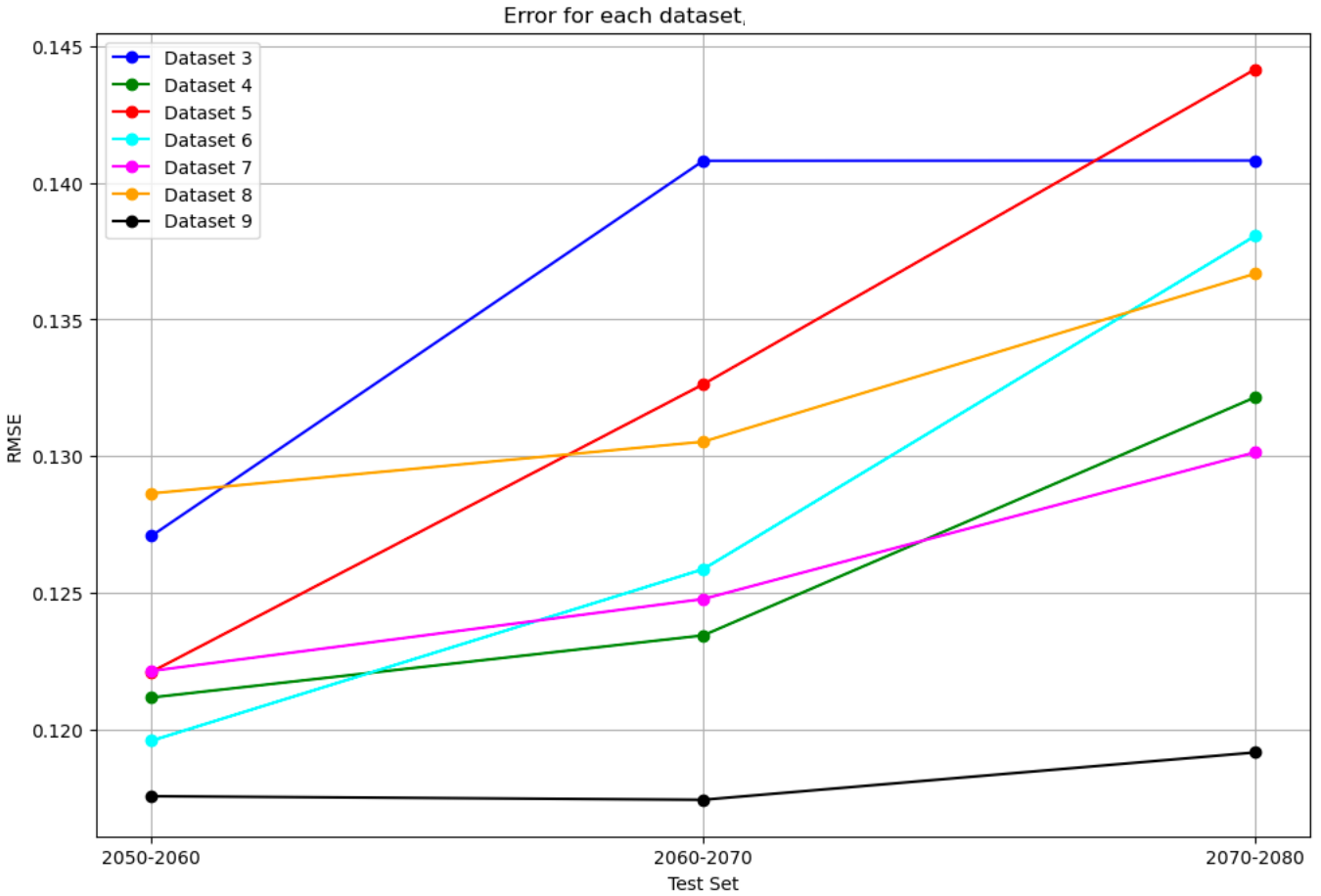


Train



Three test datasets are used for comparing the model's performance across different climates.

Result - Estimation

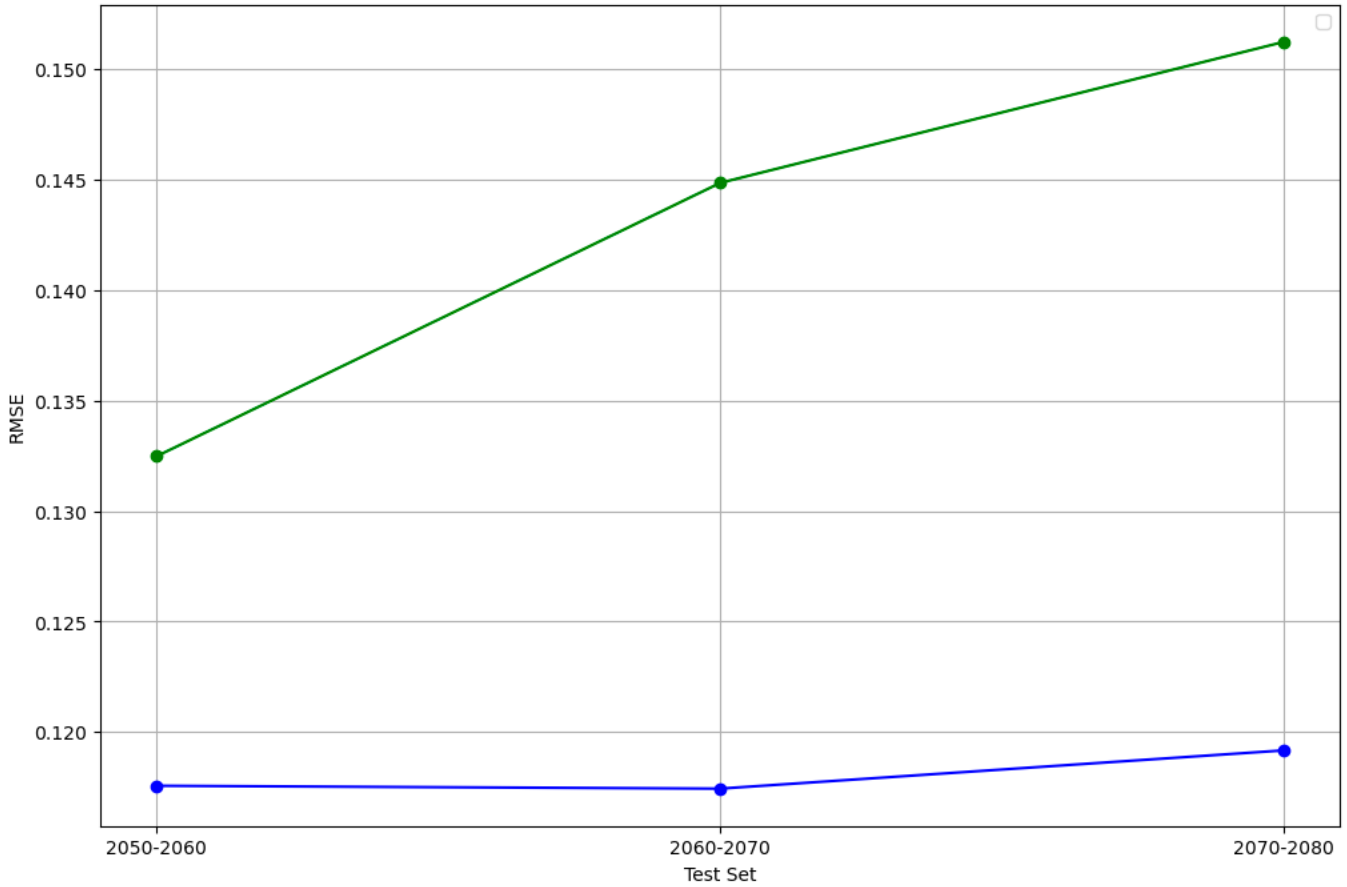


Single member training

Merged training

- **Using multiple members for training helps.**
- **It is harder to predict in a more future climate.**

Result – Estimation

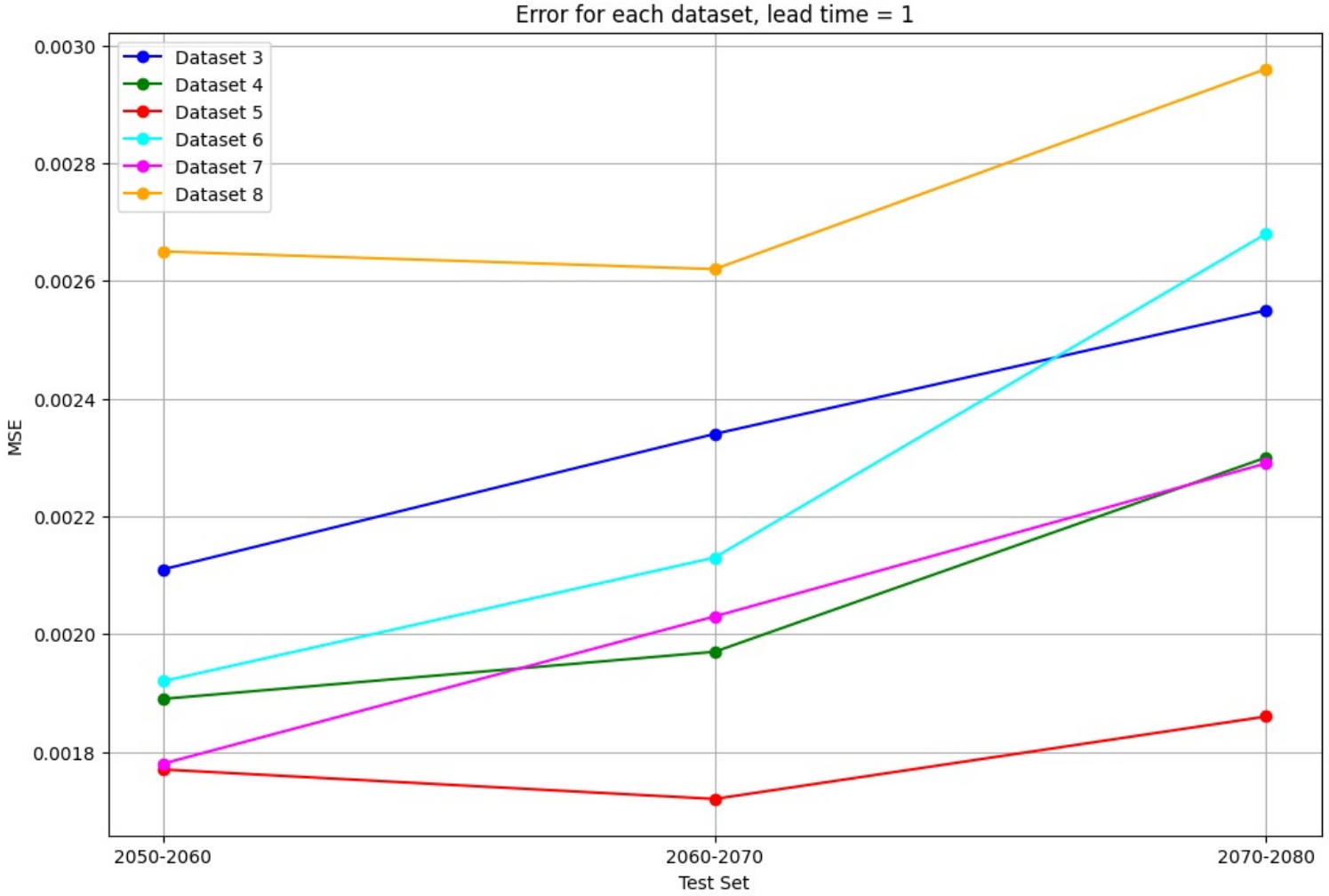


Linear Regression

DNN

- **Model Comparison**
- **DNN performs better than linear regression.**

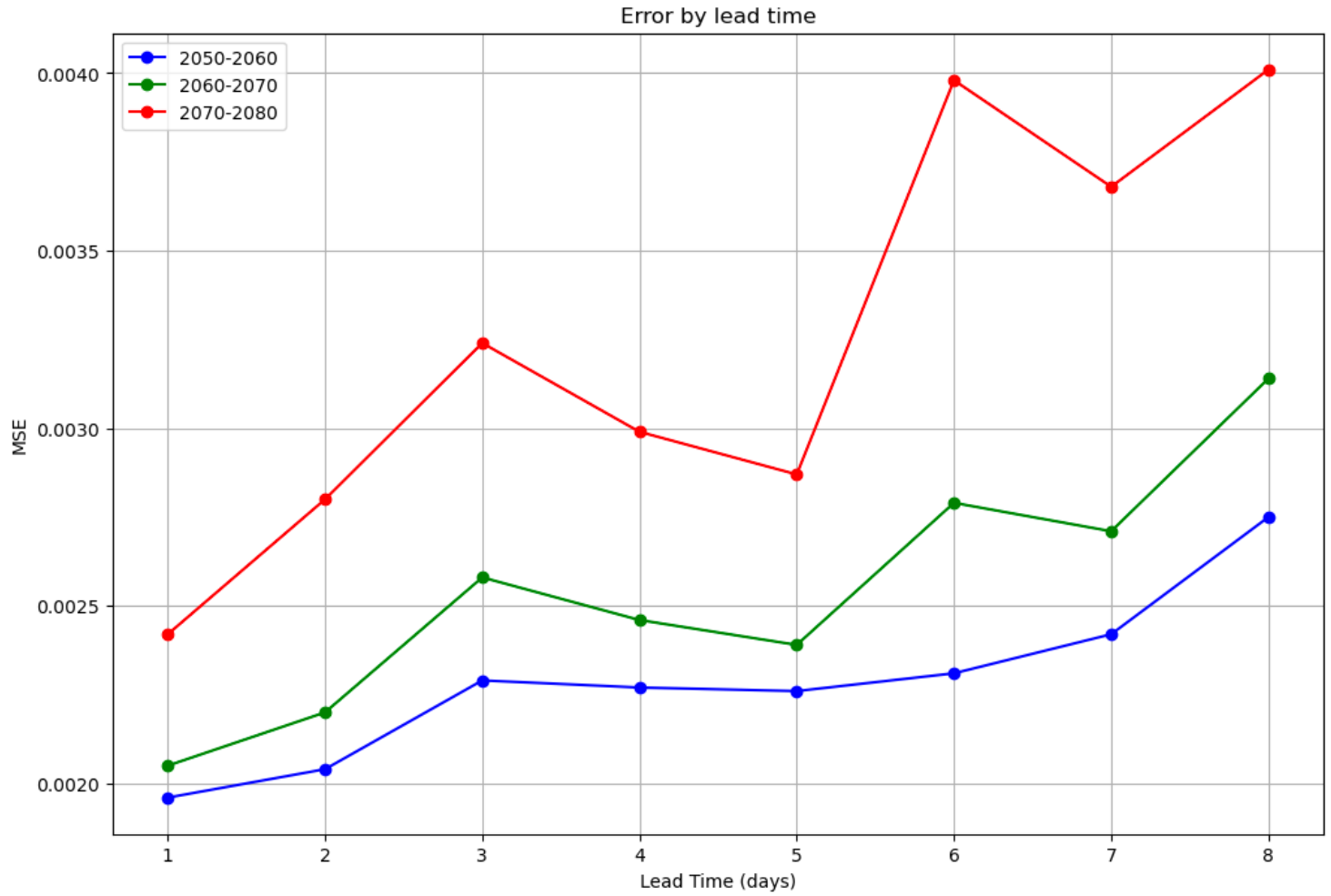
Result - Forecast



Each member is different.

Generally, it is harder to predict in a more future climate.

Result - Forecast



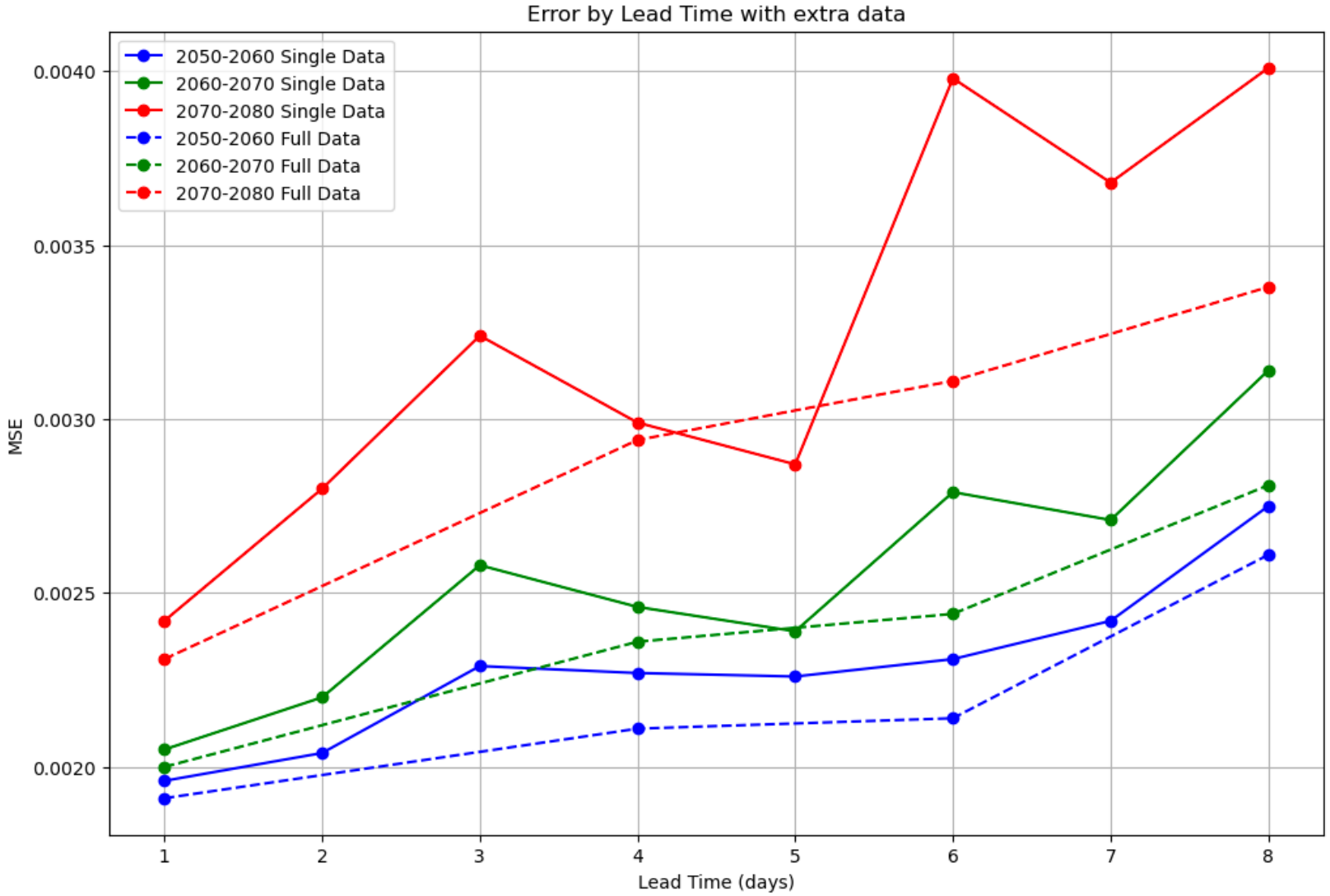
2070-2080

2060-2070

2050-2060

Error grows as leadtime gets longer.
Harder to predict in a more future climate.

Result - Forecast



2070-2080

2060-2070

2050-2060

Using multiple members for training helps (Dashed lines).

Conclusion

- DNN approach works for TREFMXAV_U estimation and prediction.
- Each ensemble member shows different prediction and performance.
- Using data from multiple members helps the performance.
- Lower performance for more future climate than nearer future.