EART60702:
Earth and Environmental Data Science

Project 2

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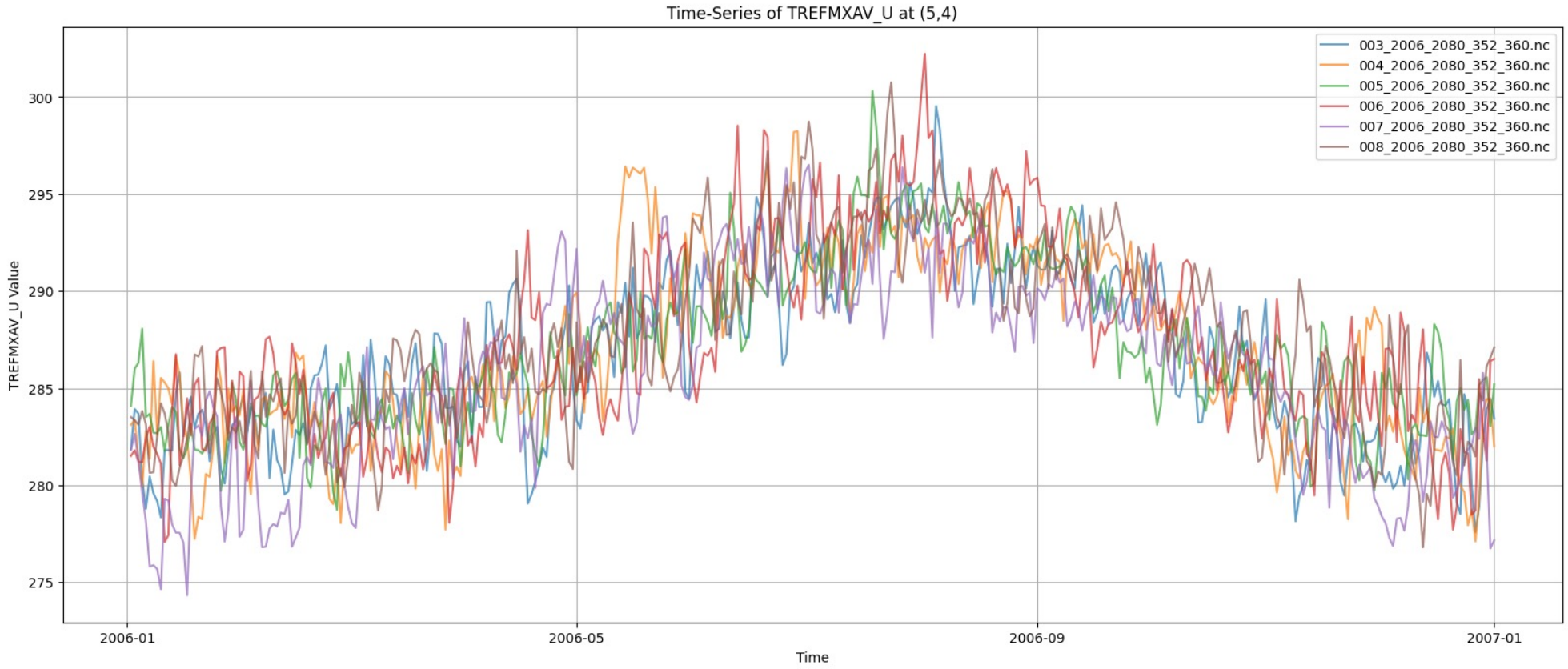
Data

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

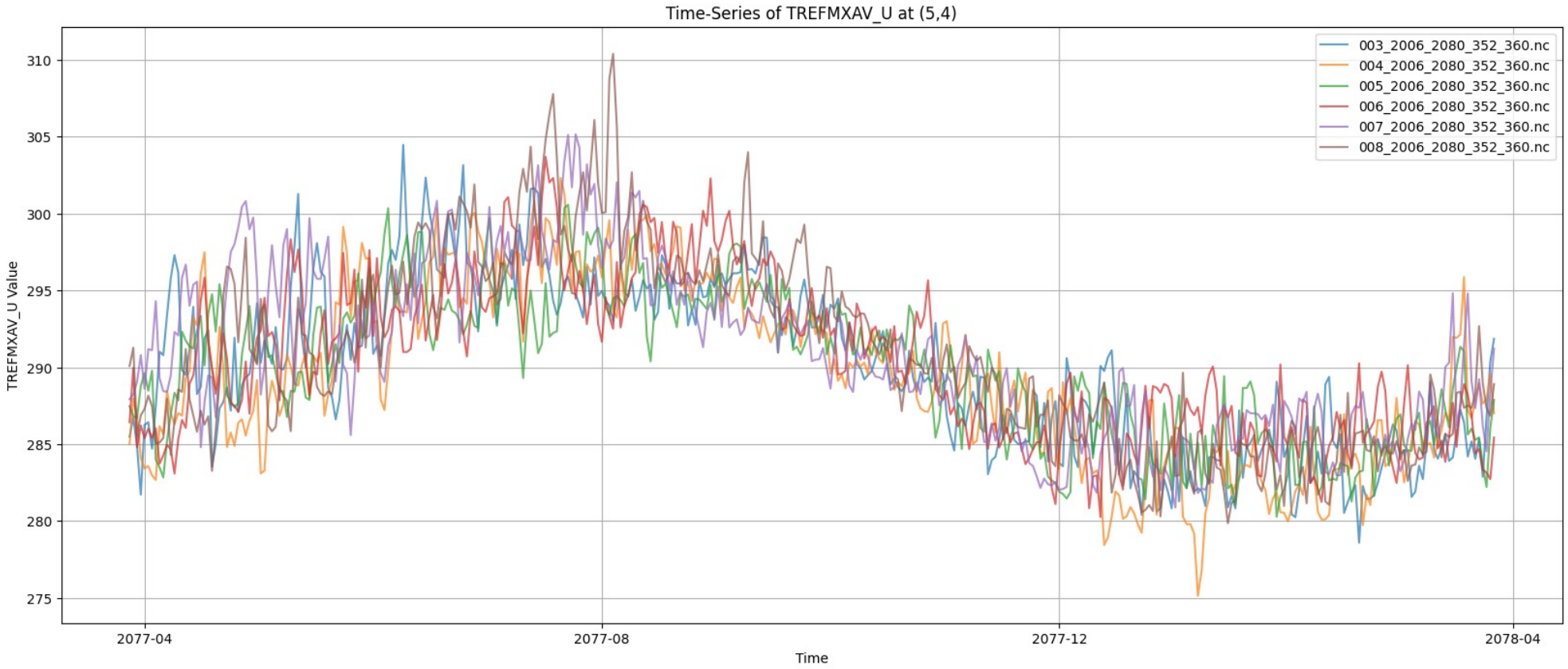
Data

2006

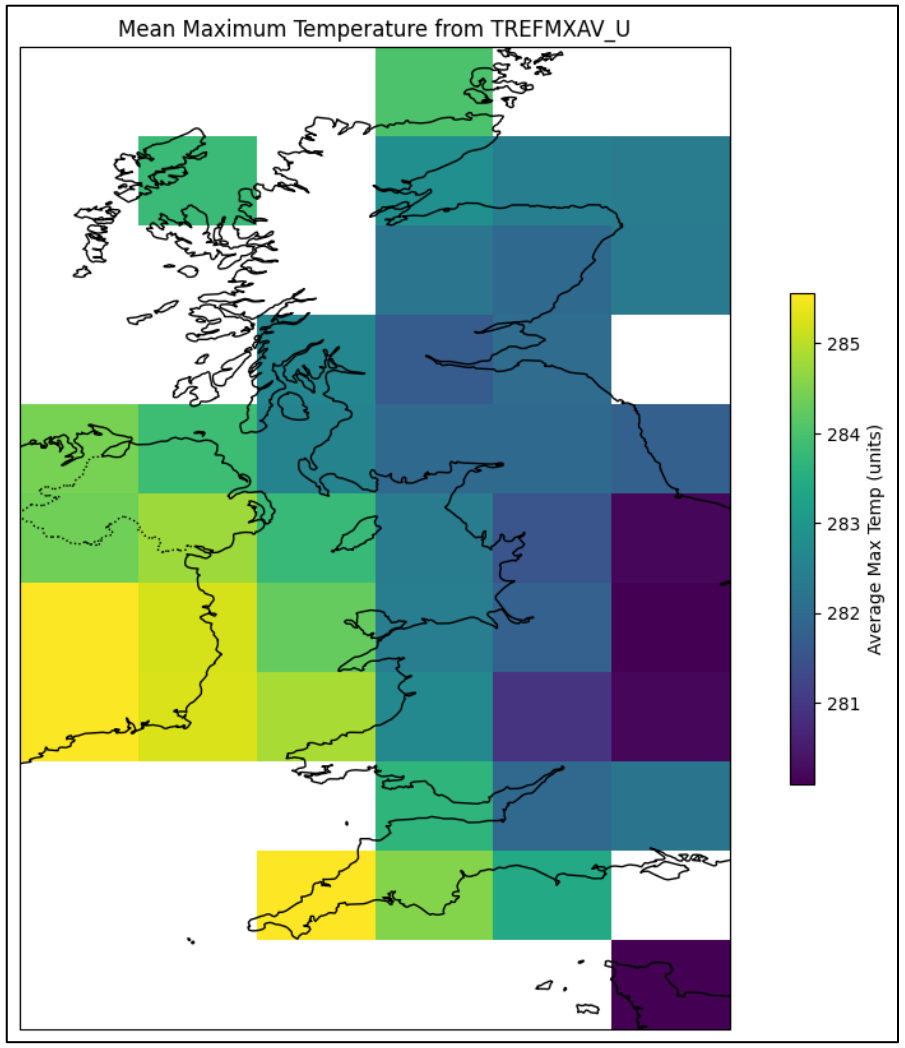

Time-Series of TREFMXAV_U at (5,4)
003_2006_2080_352_360.nc
004_2006_2080_352_360.nc
005_2006_2080_352_360.nc
006_2006_2080_352_360.nc
007_2006_2080_352_360.nc
008_2006_2080_352_360.nc
TREFMXAV_U Value
300
295
290
285
280
275
2006-01
2006-05
2006-09
2007-01
Time

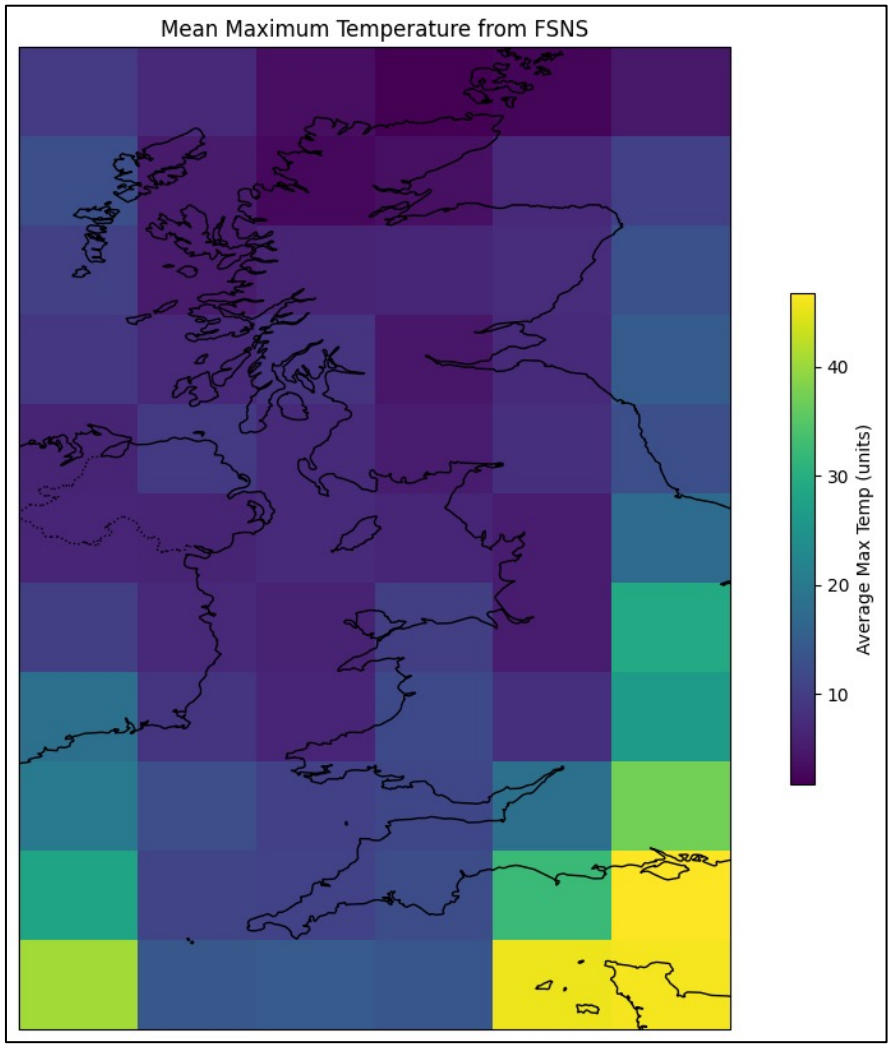
Data

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

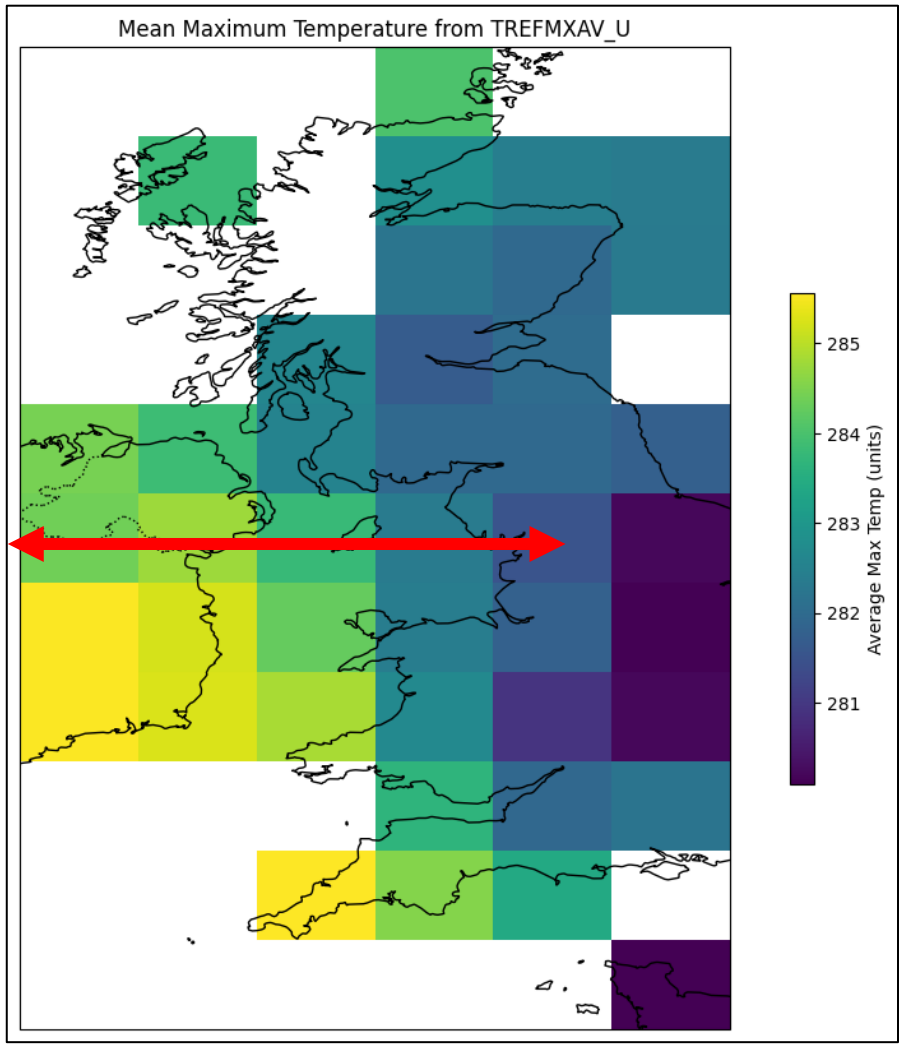
Data

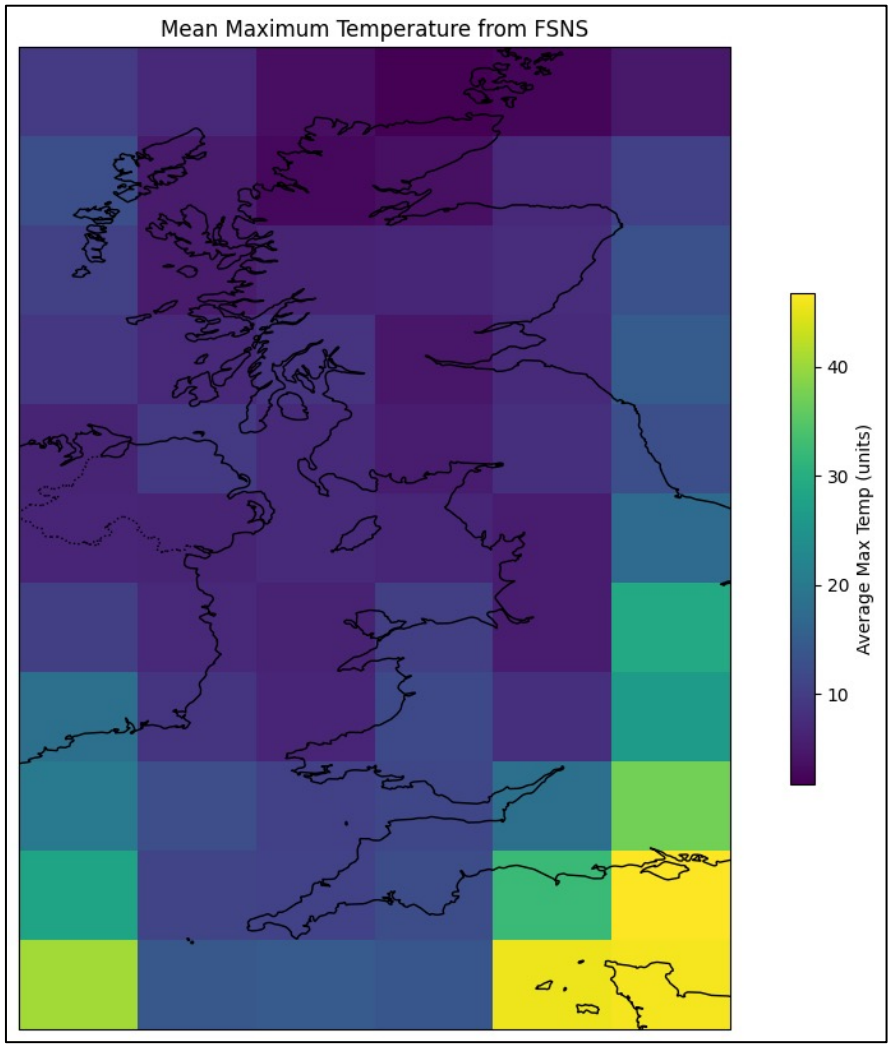

Mean Maximum Temperature from TREFMXAV_U
285
284
283
282
281
Average Max Temp (units)


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

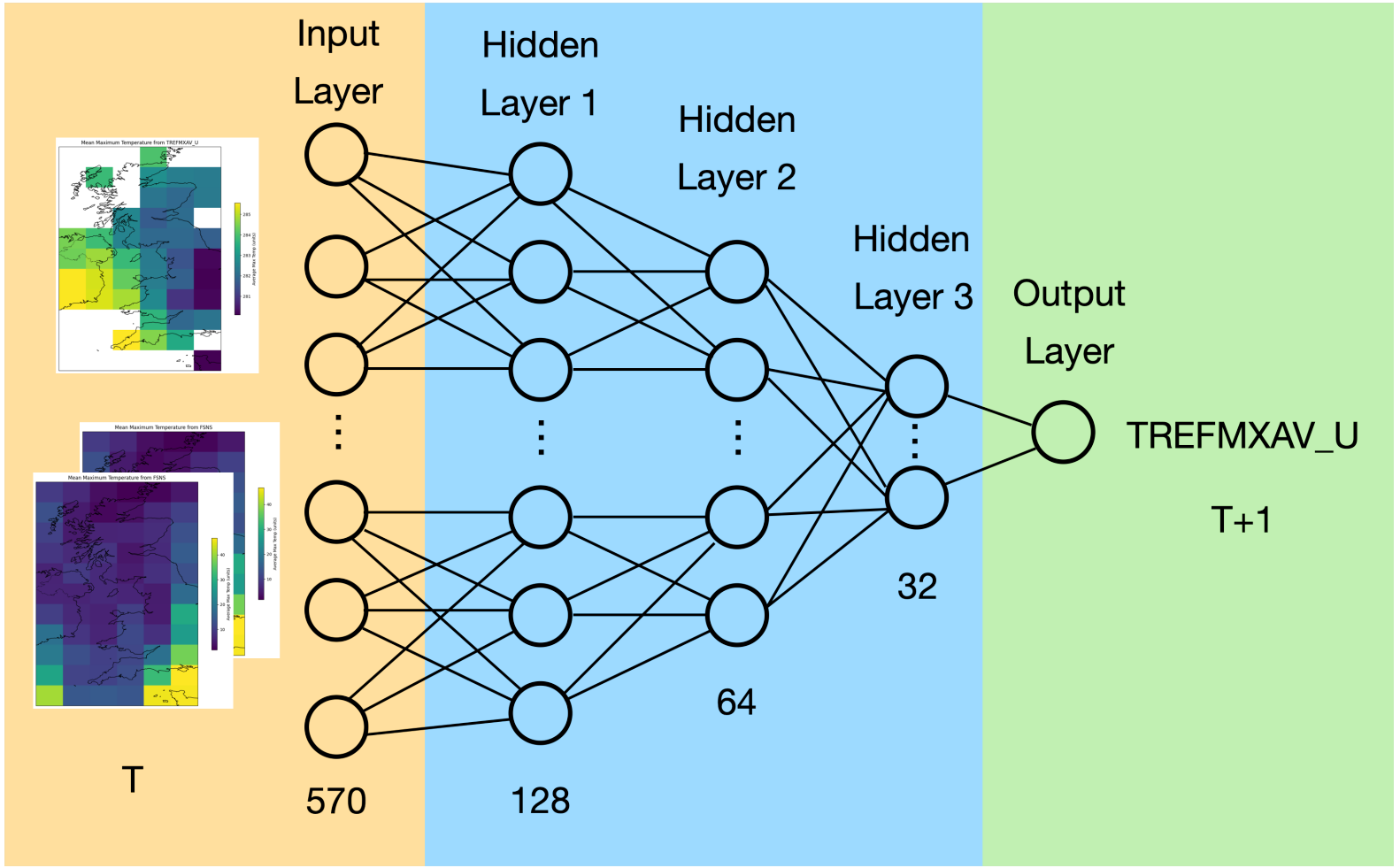
Data

~1 day

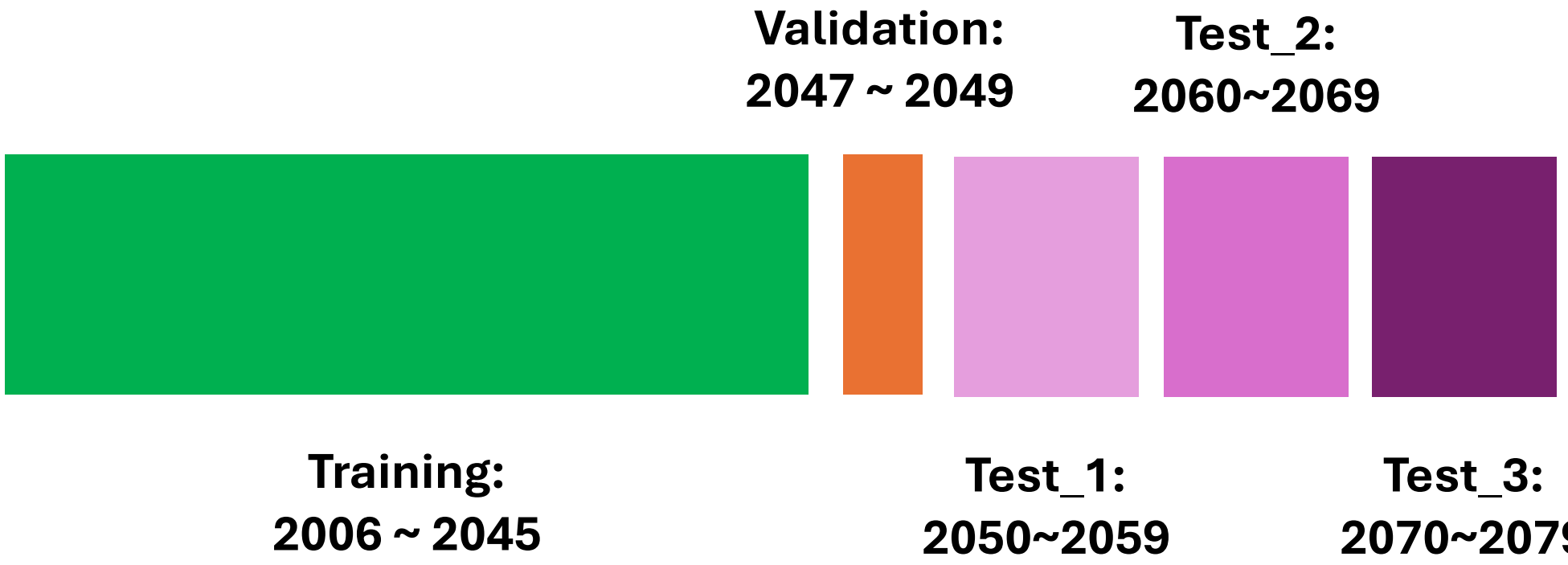

Mean Maximum Temperature from TREFMXAV_U
285
284
283
282
281
Average Max Temp (units)


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

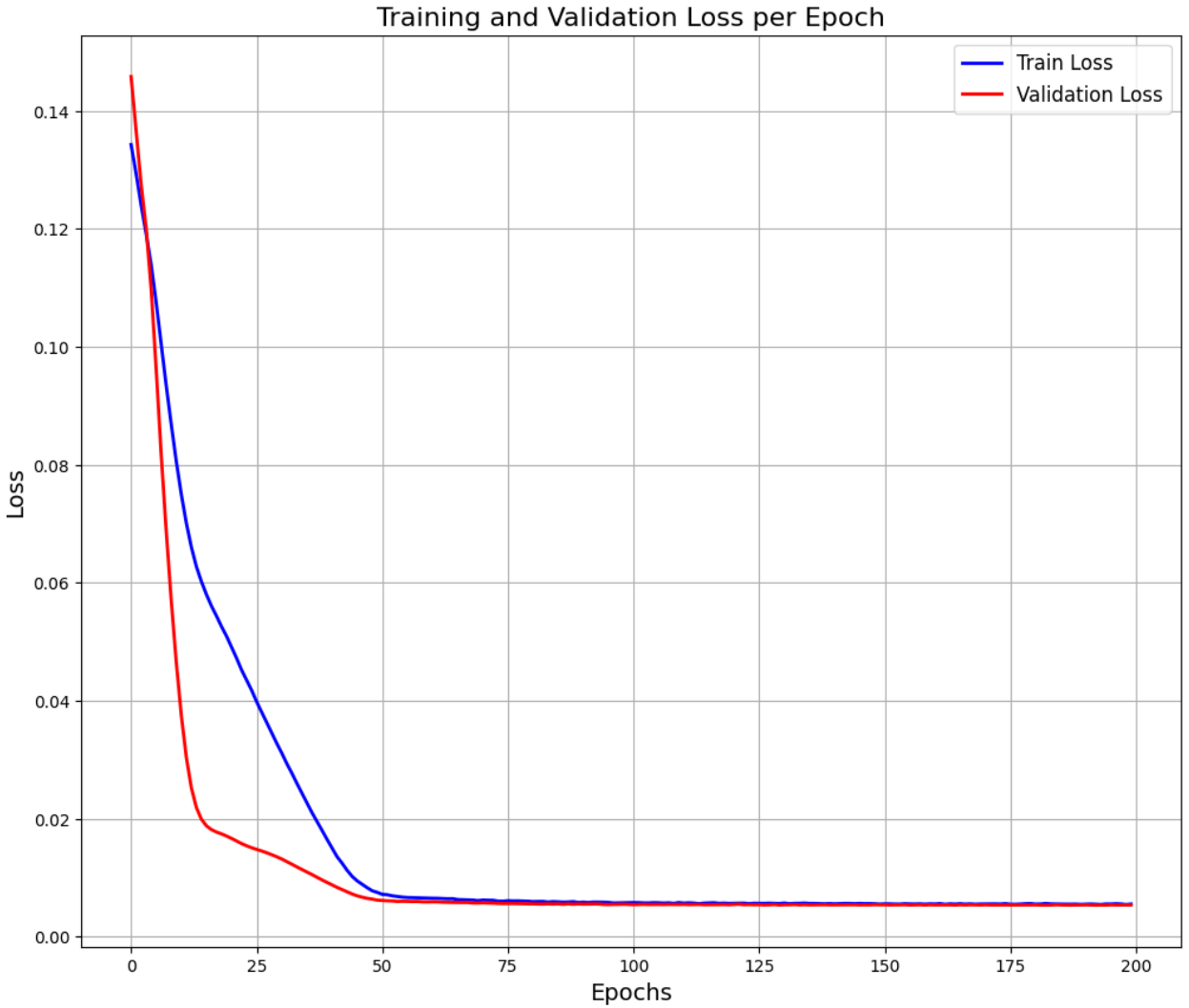
Model - DNN


Input
Layer
Hidden
Layer 1
Hidden
Layer 2
Hidden
Layer 3
Output
Layer
TREFMXAV_U
T+1
T
570
128
64
32

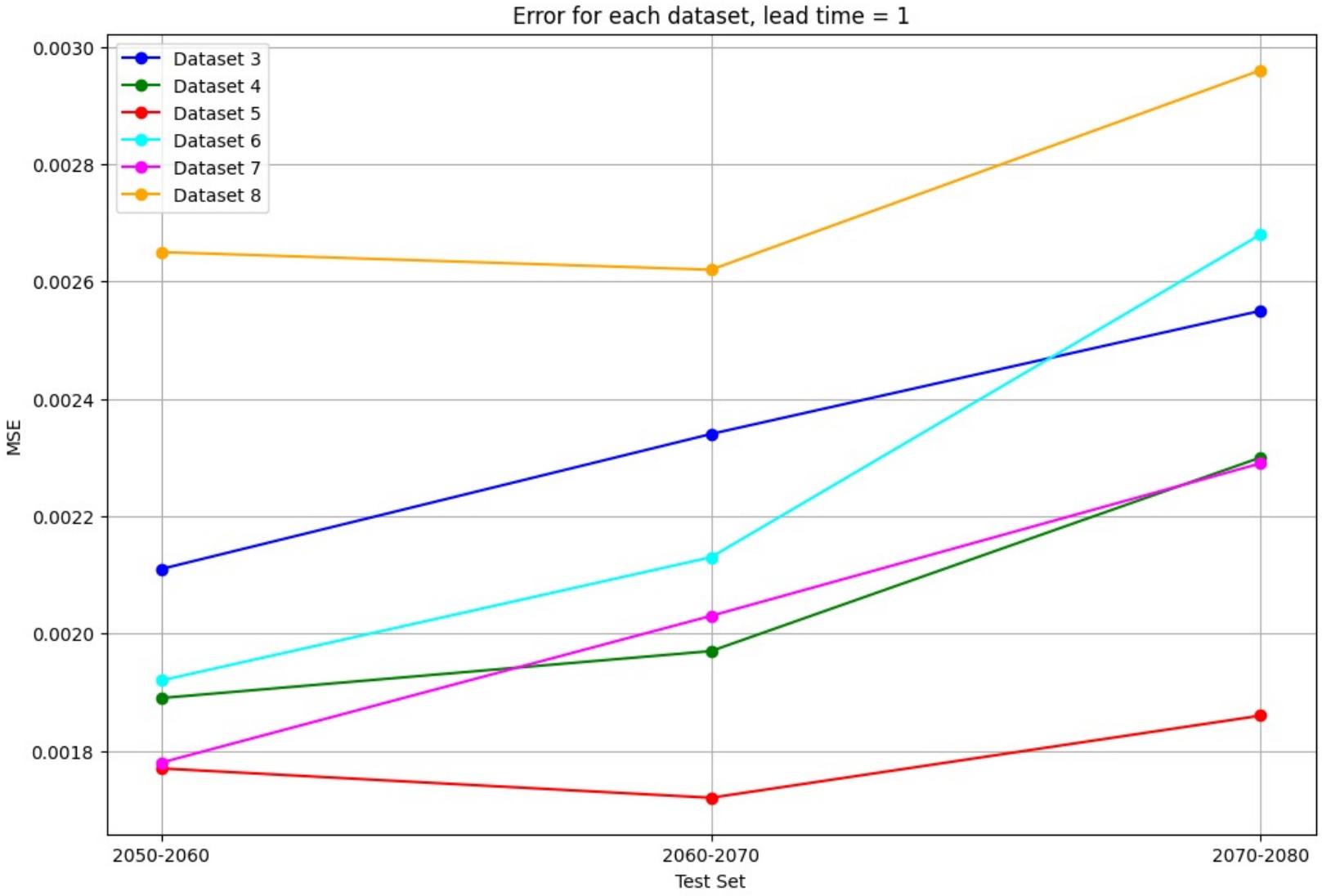
Train


Validation:
2047 ~ 2049
Test_2:
2060~2069
Training:
2006 ~ 2045
Test_1:
2050~2059
Test_3:
2070~2079

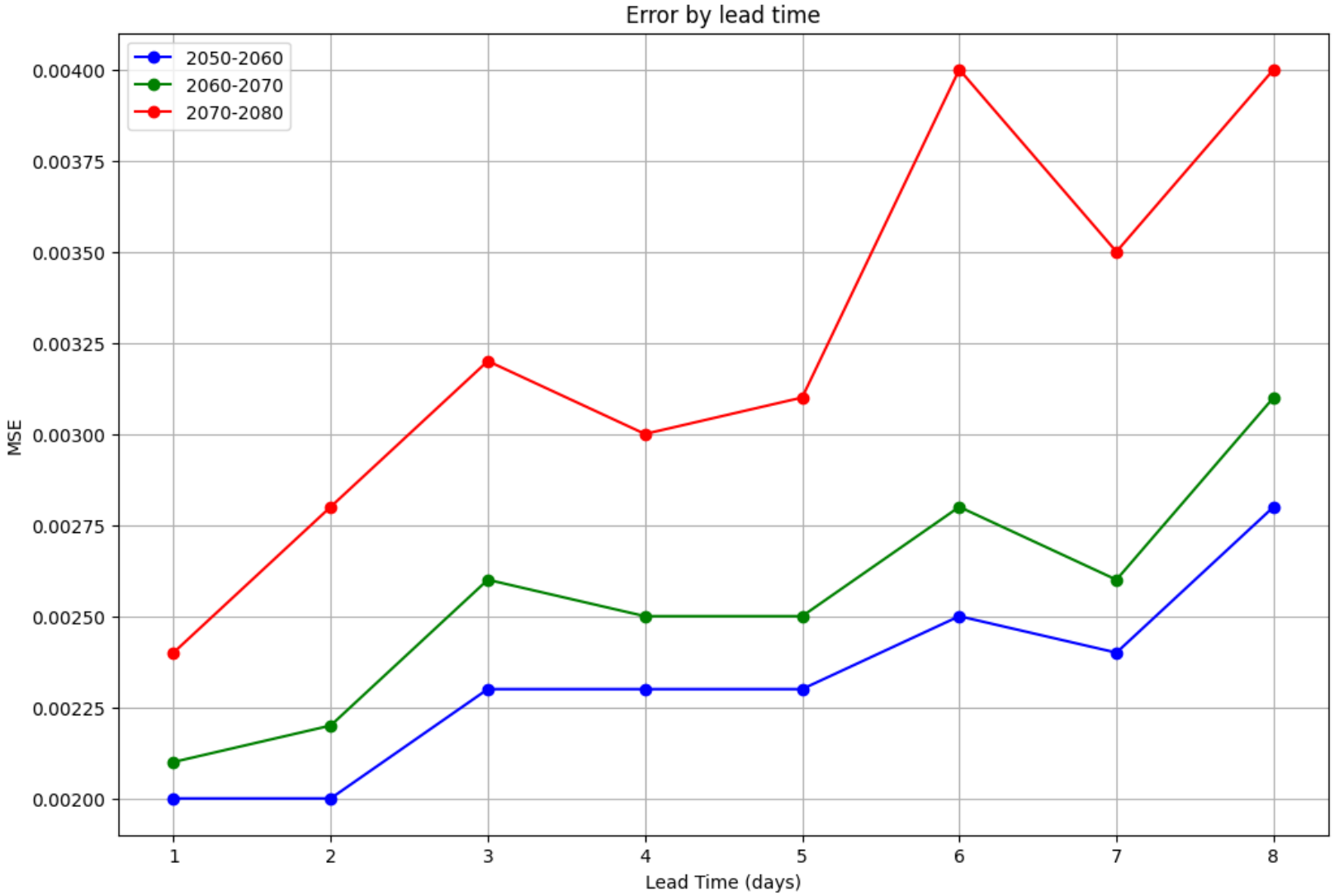
Train


Training and Validation Loss per Epoch
Train Loss
Validation Loss
Loss
Epochs
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0
25
50
75
100
125
150
175
200

Result - 1


Error for each dataset, lead time = 1
Dataset 3
Dataset 4
Dataset 5
Dataset 6
Dataset 7
Dataset 8
0.0030
0.0028
0.0026
0.0024
0.0022
0.0020
0.0018
MSE
2050-2060
2060-2070
2070-2080
Test Set

Result - 2

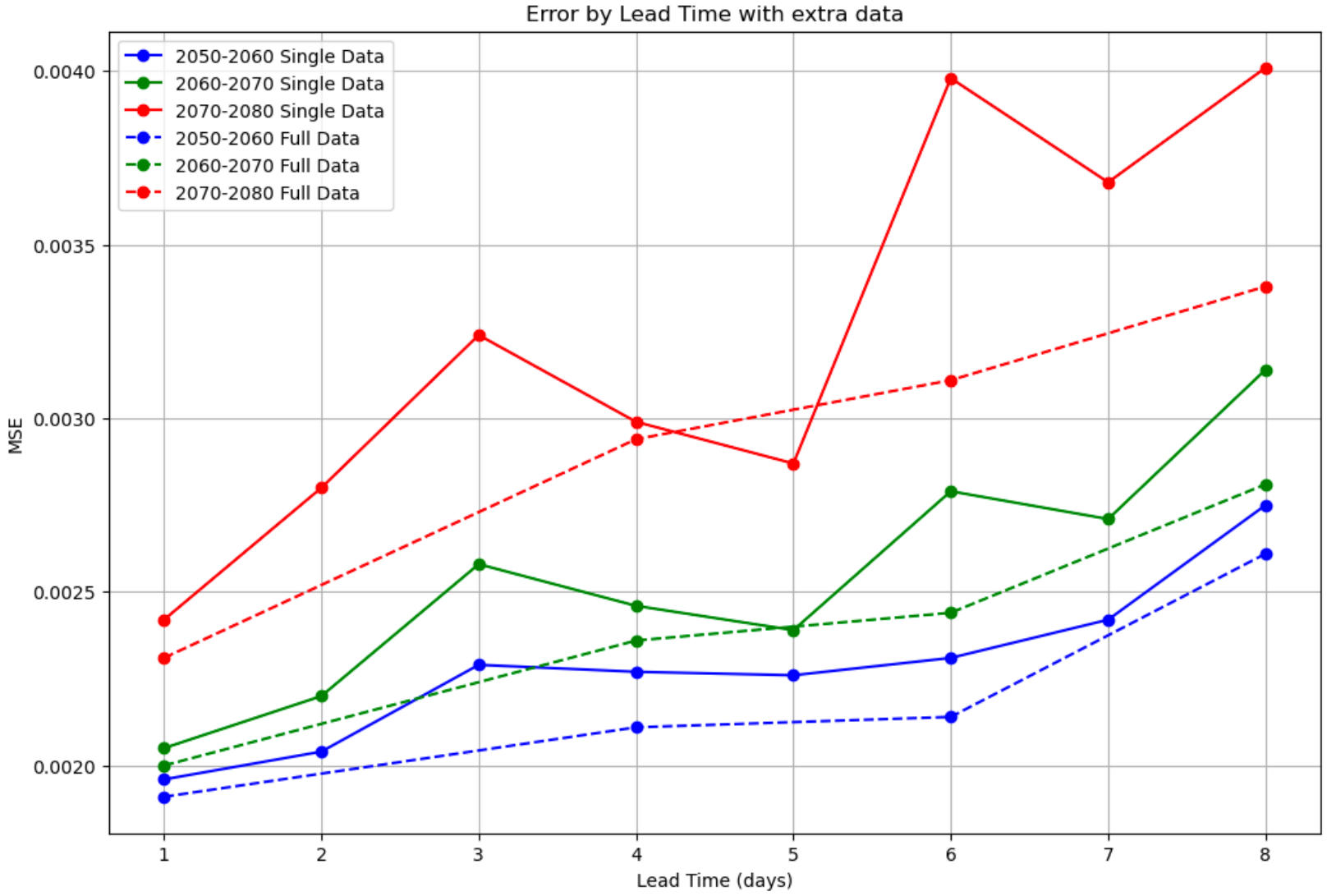


2070-2080

2060-2070

2050-2060

Result - 3



2070-2080

2060-2070

2050-2060

Conclusion

- DNN approach works for TREFMXAV_U prediction
- Each ensemble member shows different prediction
- Lower performance for future climate
- Use of multiple scenarios for training was helpful