



ΑΝΑΛΥΣΗ ΧΡΟΝΟΣΕΙΡΑΣ (ΚΑΙΡΟΣ)

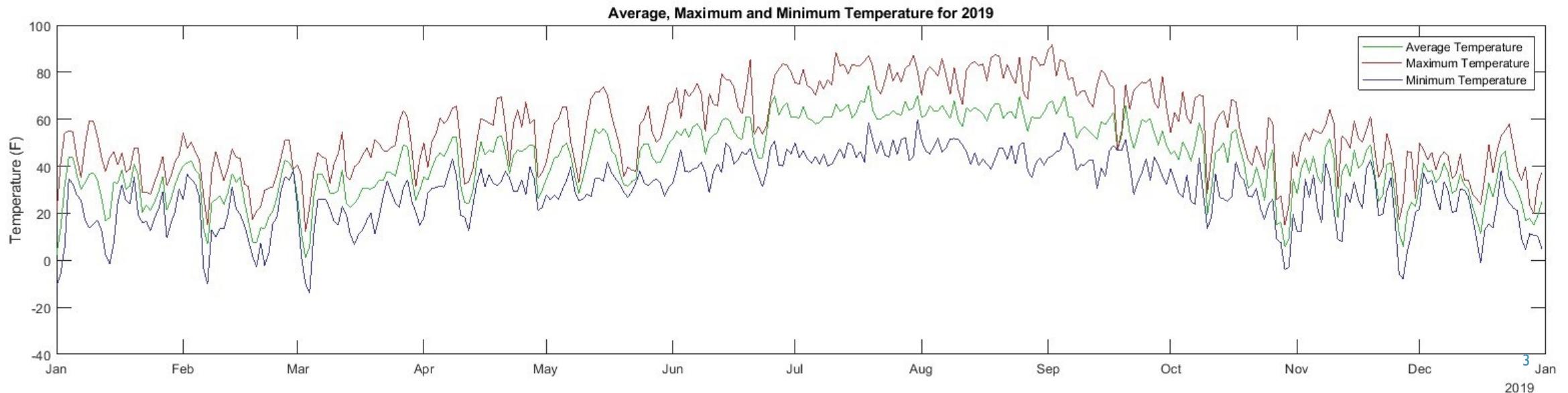
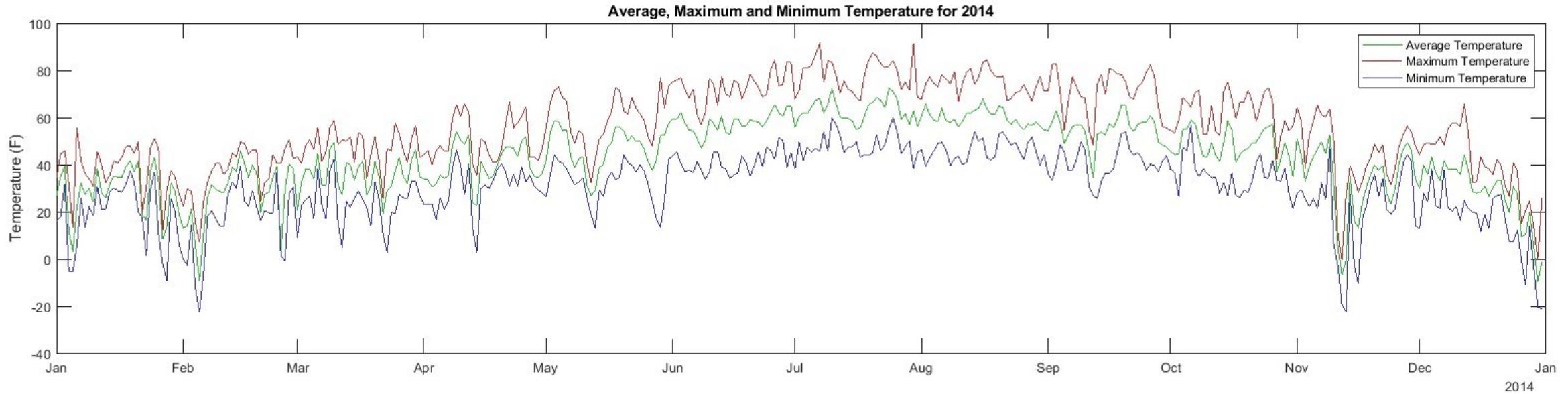
ΑΝΑΛΥΣΗ ΜΕΓΑΛΩΝ ΔΕΔΟΜΕΝΩΝ – ΠΡΟΗΓΜΕΝΑ ΣΥΣΤΗΜΑΤΑ ΥΠΟΛΟΓΙΣΤΩΝ ΚΑΙ ΕΠΙΚΟΙΝΩΝΙΩΝ (ΑΠΘ)

ΒΡΑΝΑ ΜΑΡΙΑ

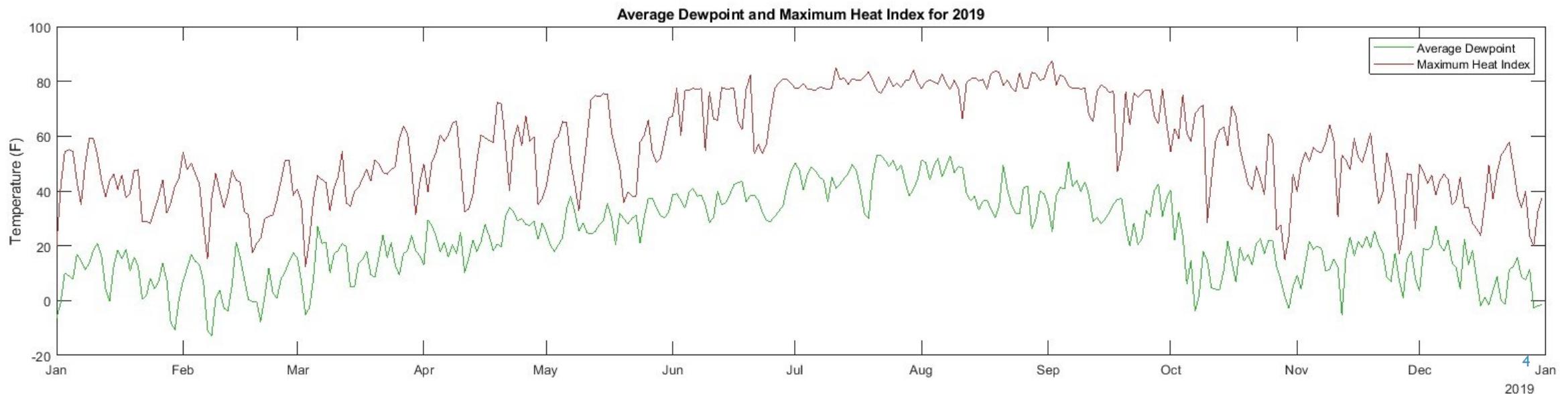
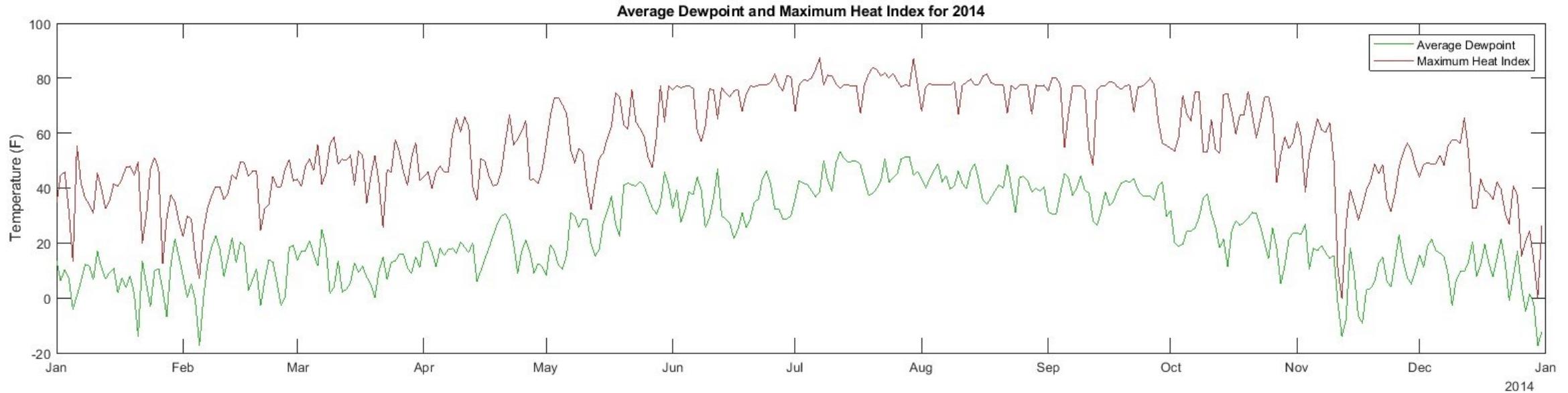
ΣΥΝΟΛΟ ΔΕΔΟΜΕΝΩΝ

- ★ Συνδυασμός δύο ξεχωριστών συνόλων δεδομένων
 - Weather analysis (<https://www.kaggle.com/datasets/mastmustu/weather-analysis?resource=download>)
 - Συλλογή δεδομένων από το EstesParkWeather.Net (https://www.estesparkweather.net/archive_reports.php)
 - Καθημερινοί δείκτες που αφορούν τον καιρό στο Estes Park, Colorado (2009-2020)
 - Sunspots (<https://www.kaggle.com/datasets/tavoglc/sunspots>)
 - Συλλογή δεδομένων από το WDC-SILSO, Royal Observatory of Belgium, Brussels (<https://www.sidc.be>)
 - Καθημερινές μετρήσεις που αφορούν τον αριθμό των ηλιακών κηλίδων (1818-2022)
- ★ Έτη ενδιαφέροντος {2014, 2019}

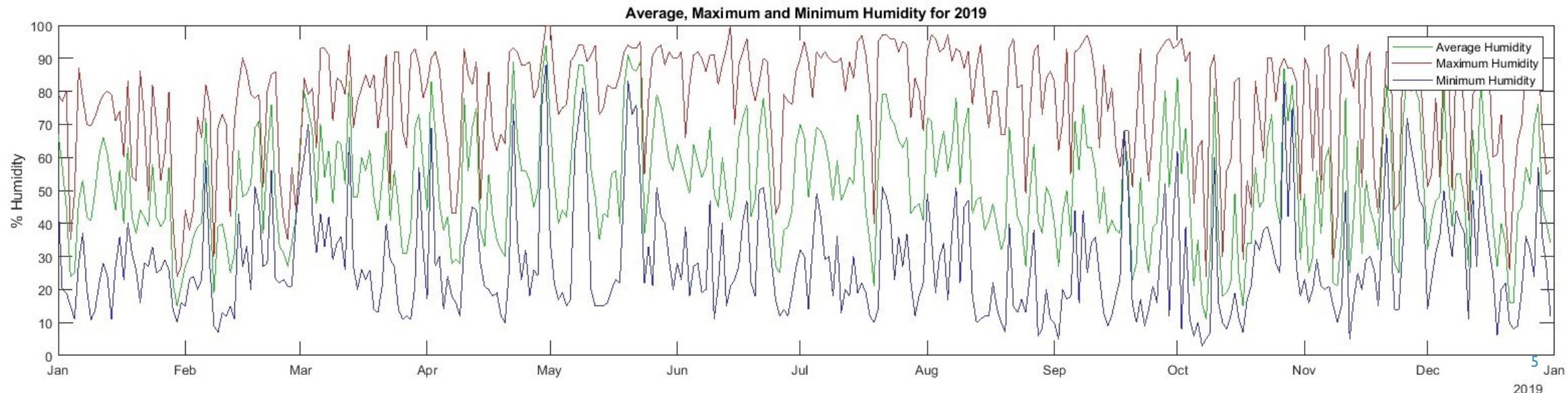
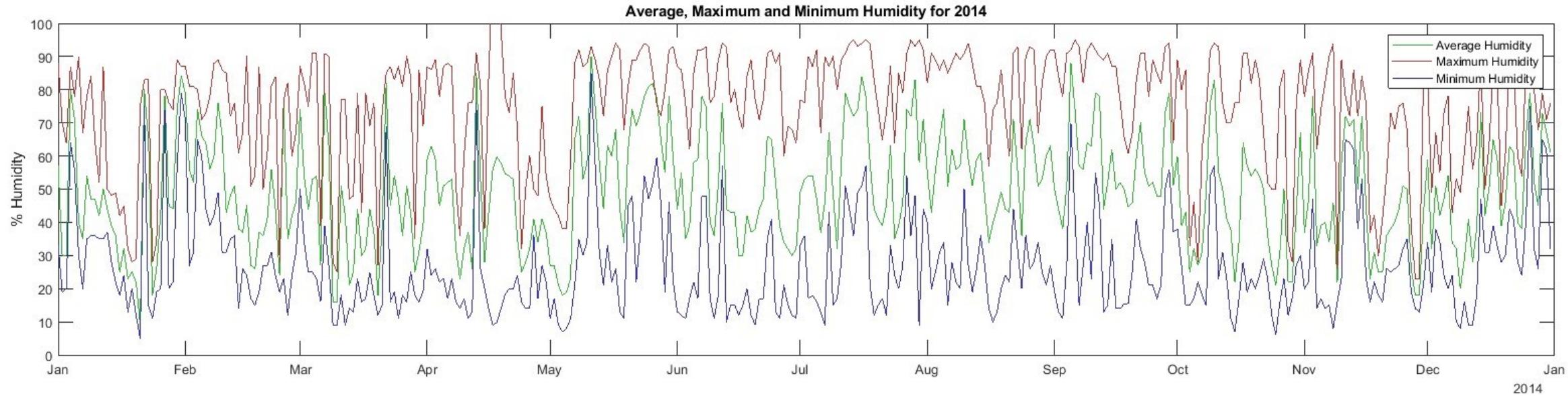
ΜΕΤΑΒΛΗΤΕΣ: AVERAGE, MINIMUM AND MAXIMUM TEMPERATURE



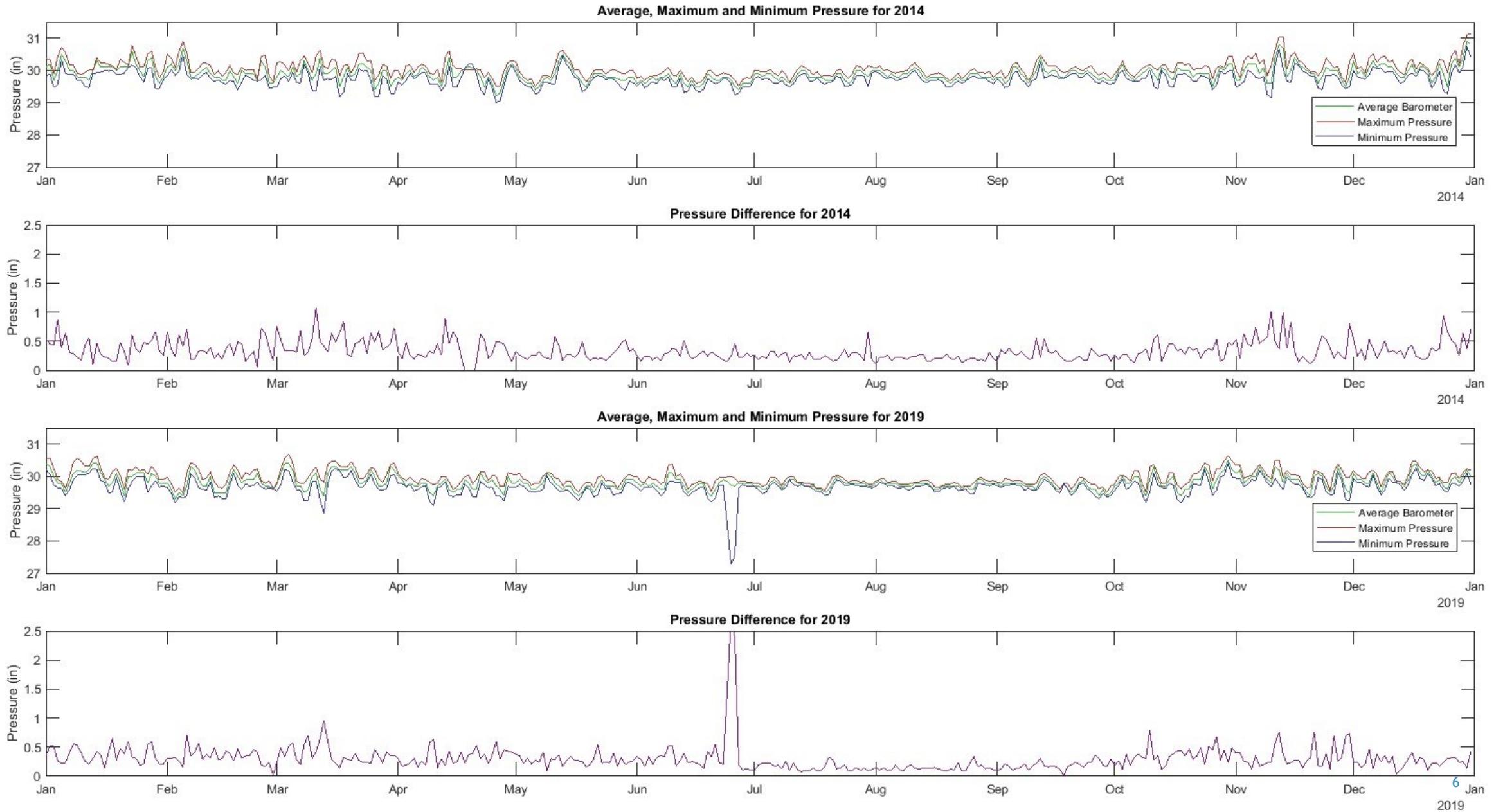
ΜΕΤΑΒΛΗΤΕΣ: AVERAGE DEWPOINT AND MAXIMUM HEAT INDEX



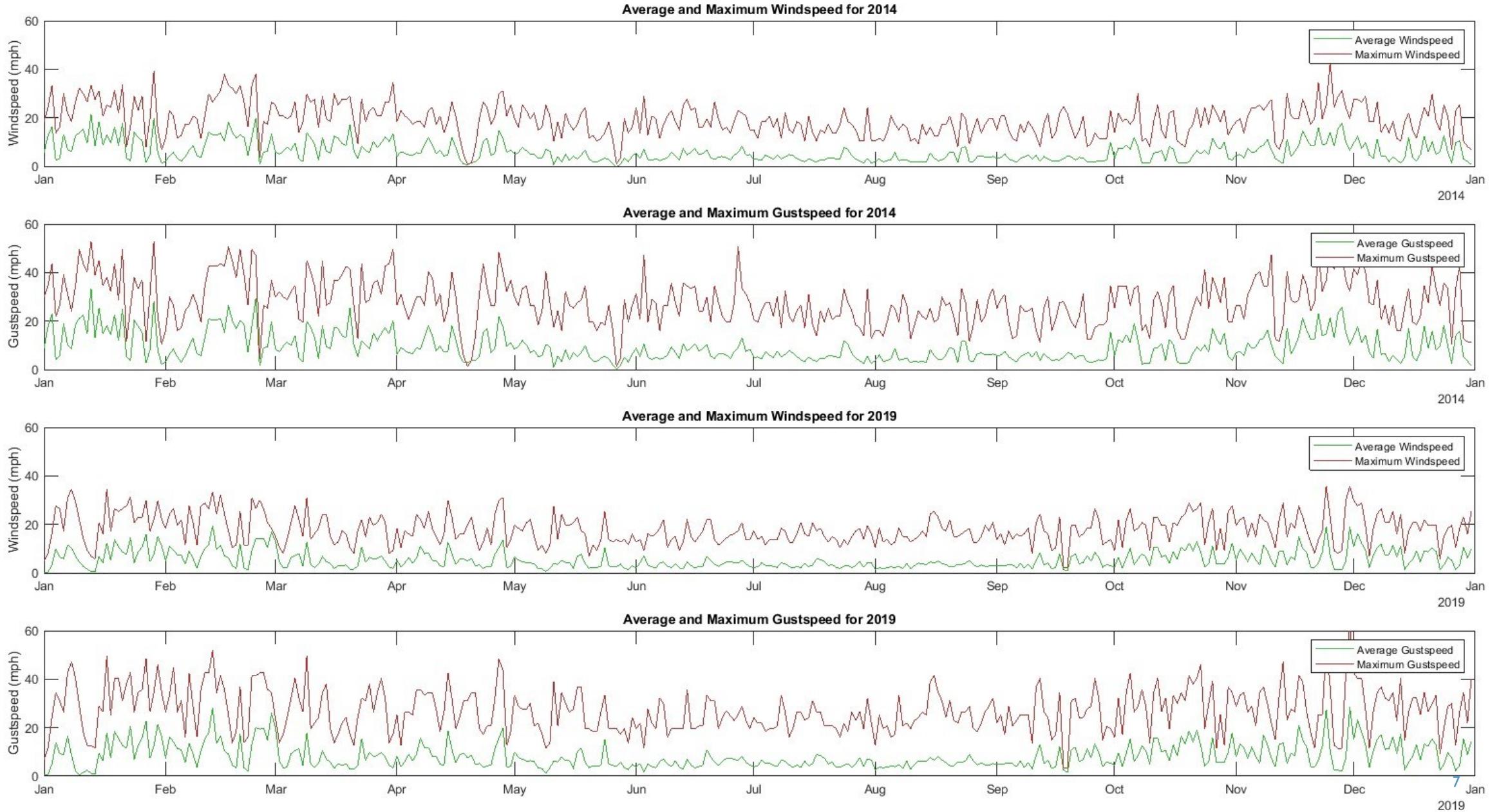
ΜΕΤΑΒΛΗΤΕΣ: AVERAGE MINIMUM AND MAXIMUM HUMIDITY



METABΛΗΤΕΣ: AVERAGE BAROMETER, MIN AND MAX PRESSURE

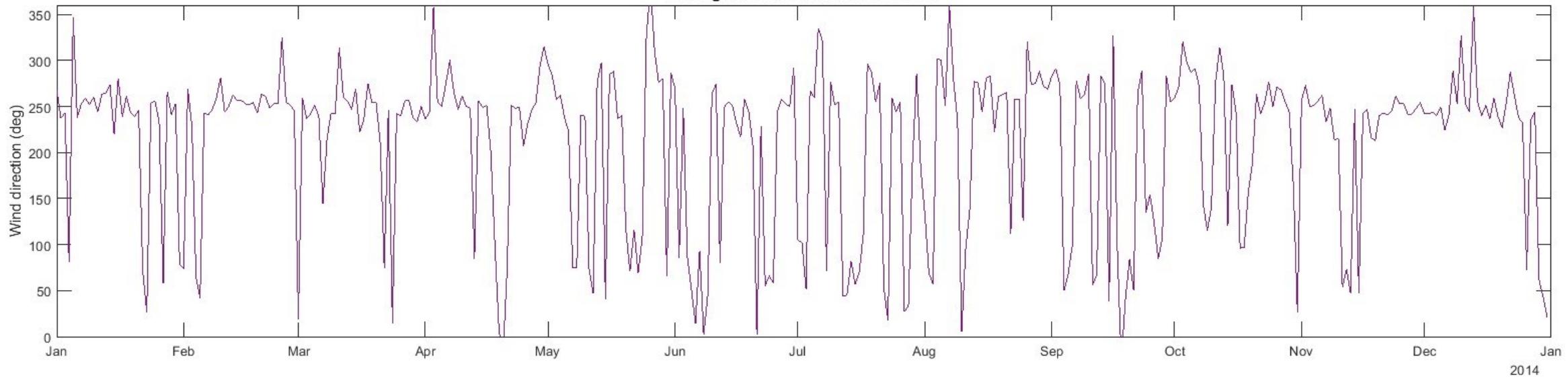


METABΛΗΤΕΣ: AVERAGE AND MAX WINDSPEED AND GUST SPEED

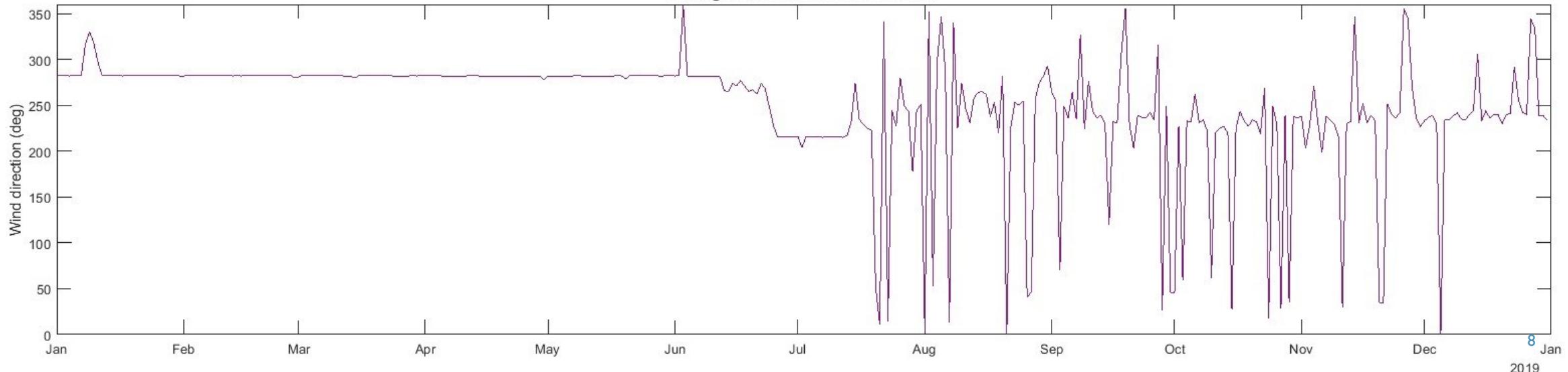


ΜΕΤΑΒΛΗΤΕΣ: AVERAGE DIRECTION OF THE WIND

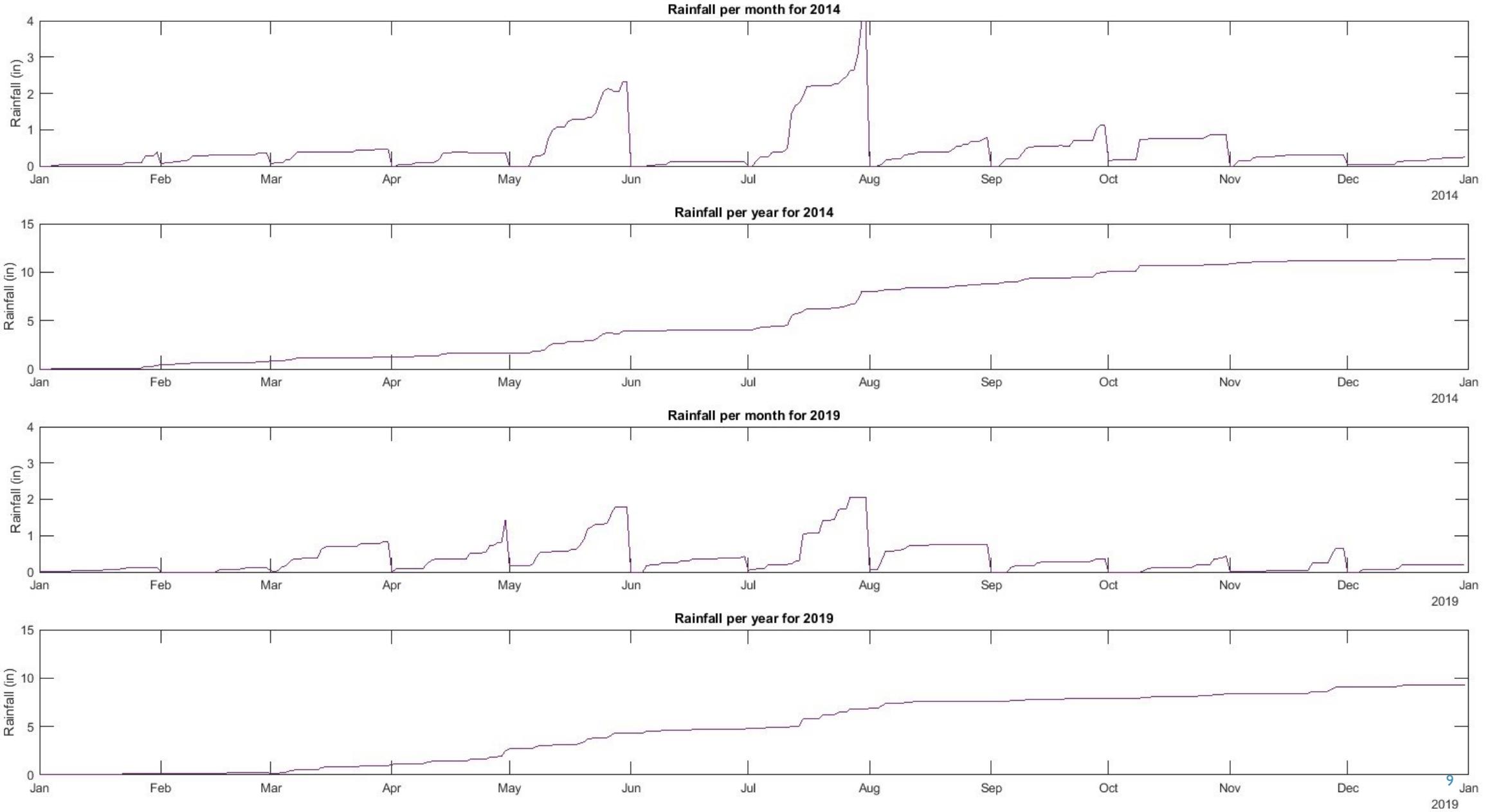
Average direction of the wind for 2014



Average direction of the wind for 2019

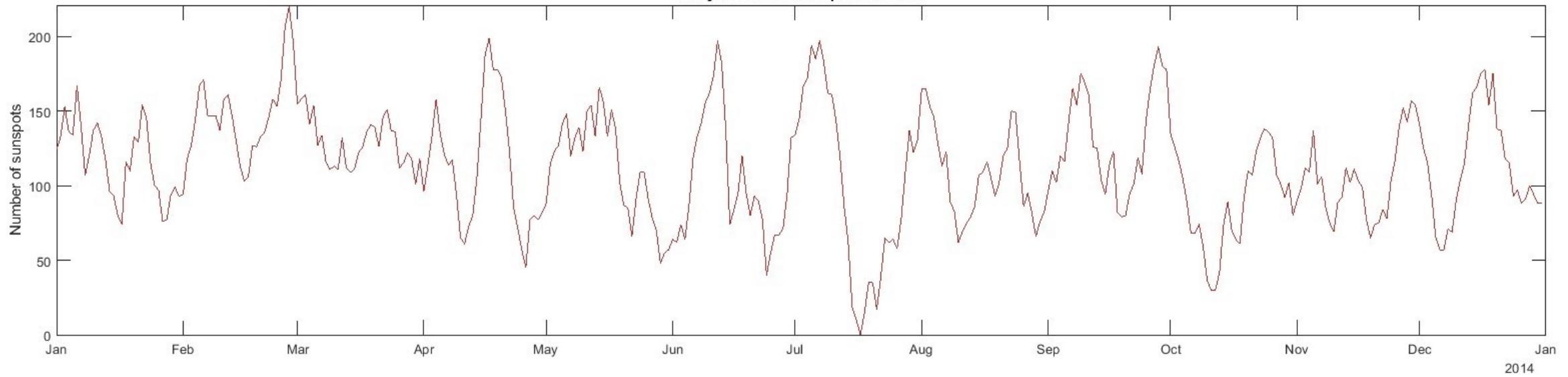


MΕΤΑΒΛΗΤΕΣ: RAINFALL FOR MONTH AND FOR YEAR

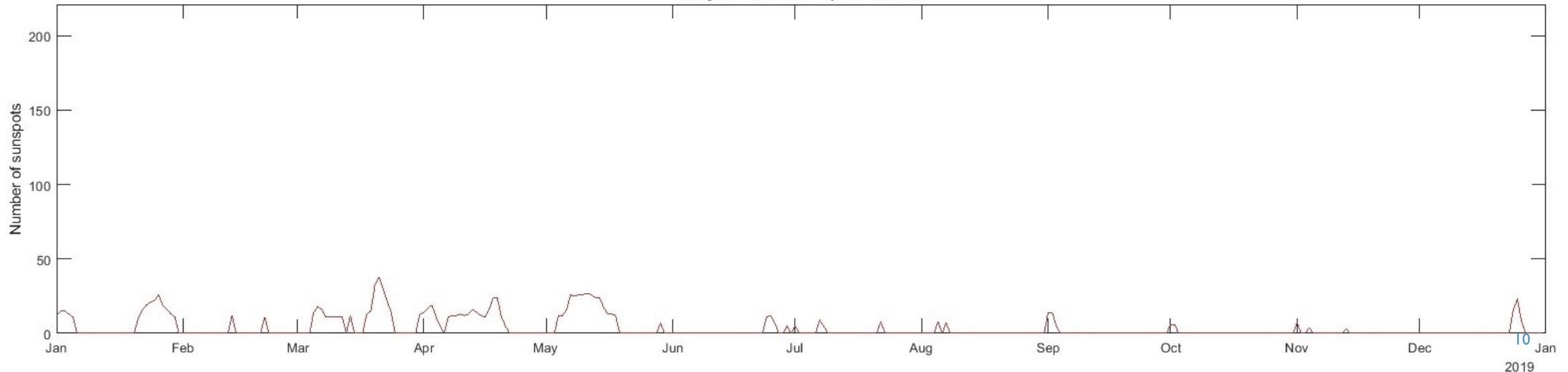


METΑΒΛΗΤΕΣ: DAILY SUNSPOTS

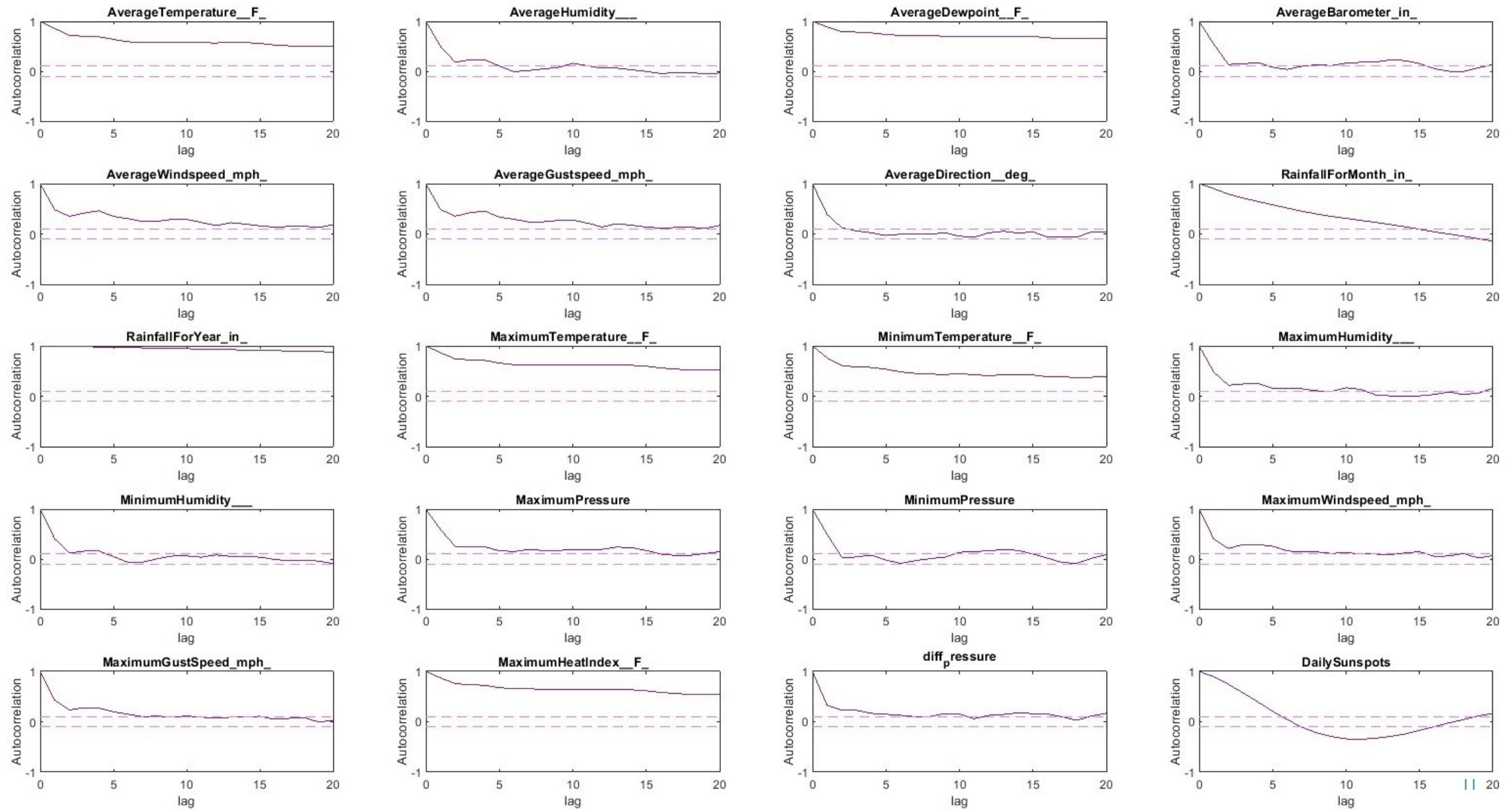
Daily number of sunspots for 2014



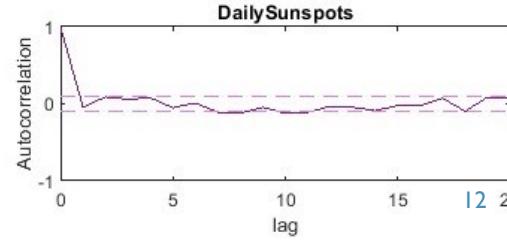
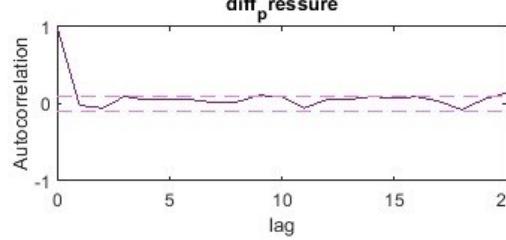
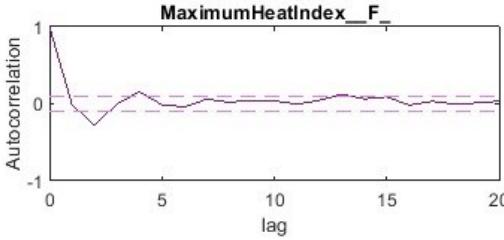
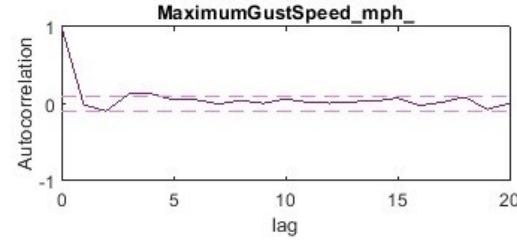
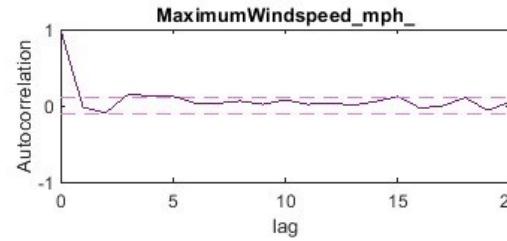
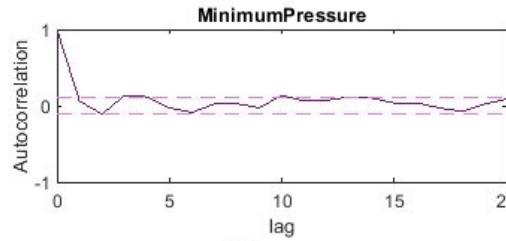
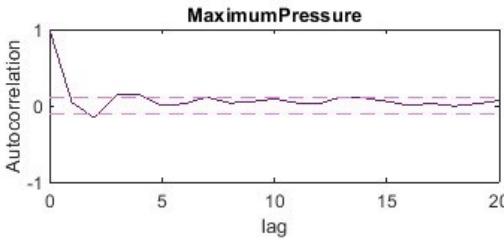
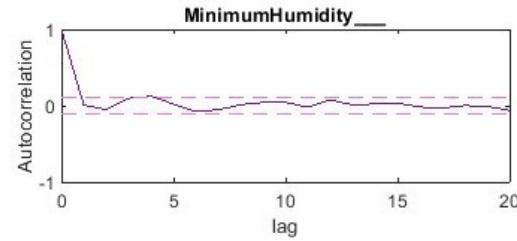
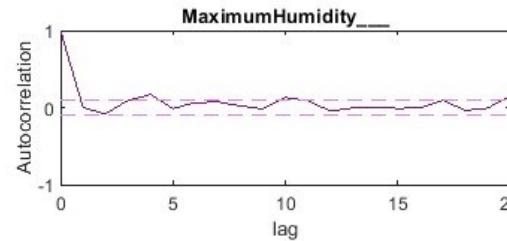
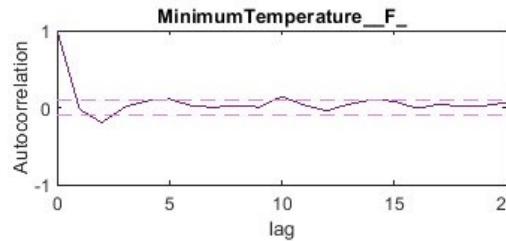
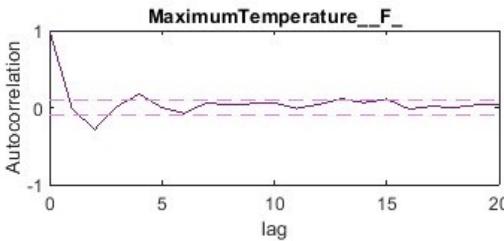
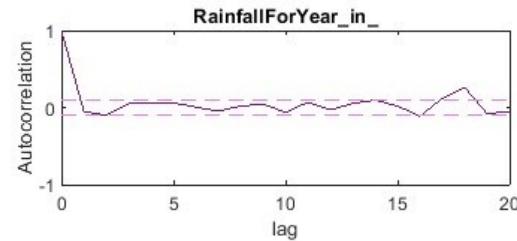
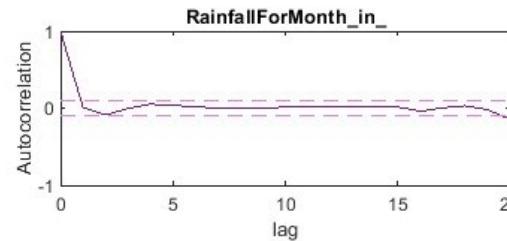
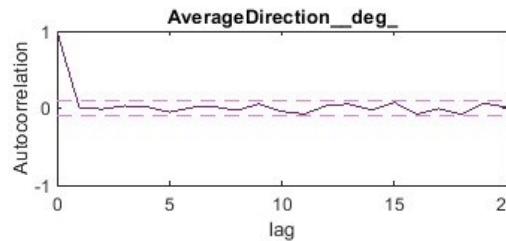
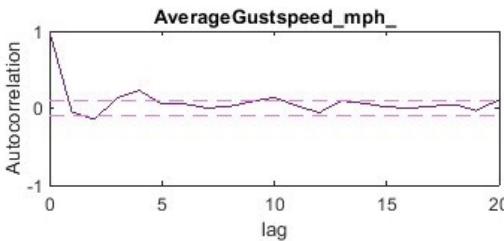
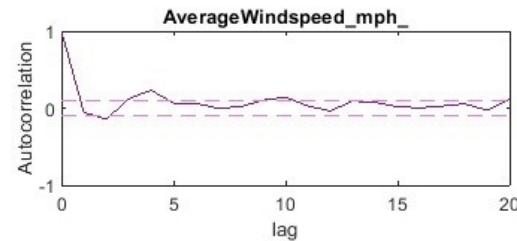
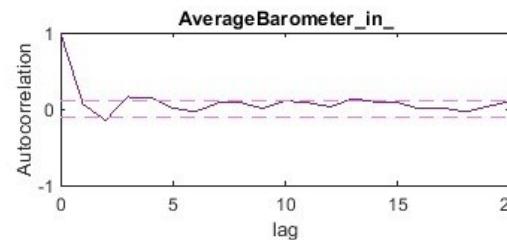
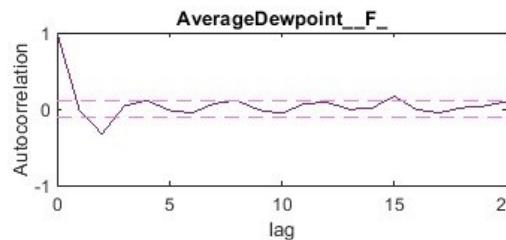
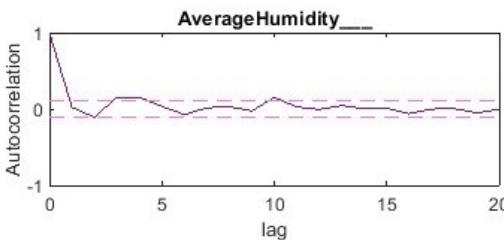
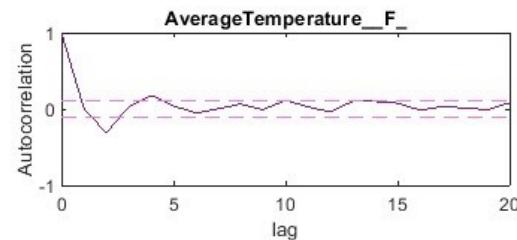
Daily number of sunspots for 2019



AUTOCORRELATION ΓΙΑ ΜΕΤΑΒΛΗΤΕΣ 2014

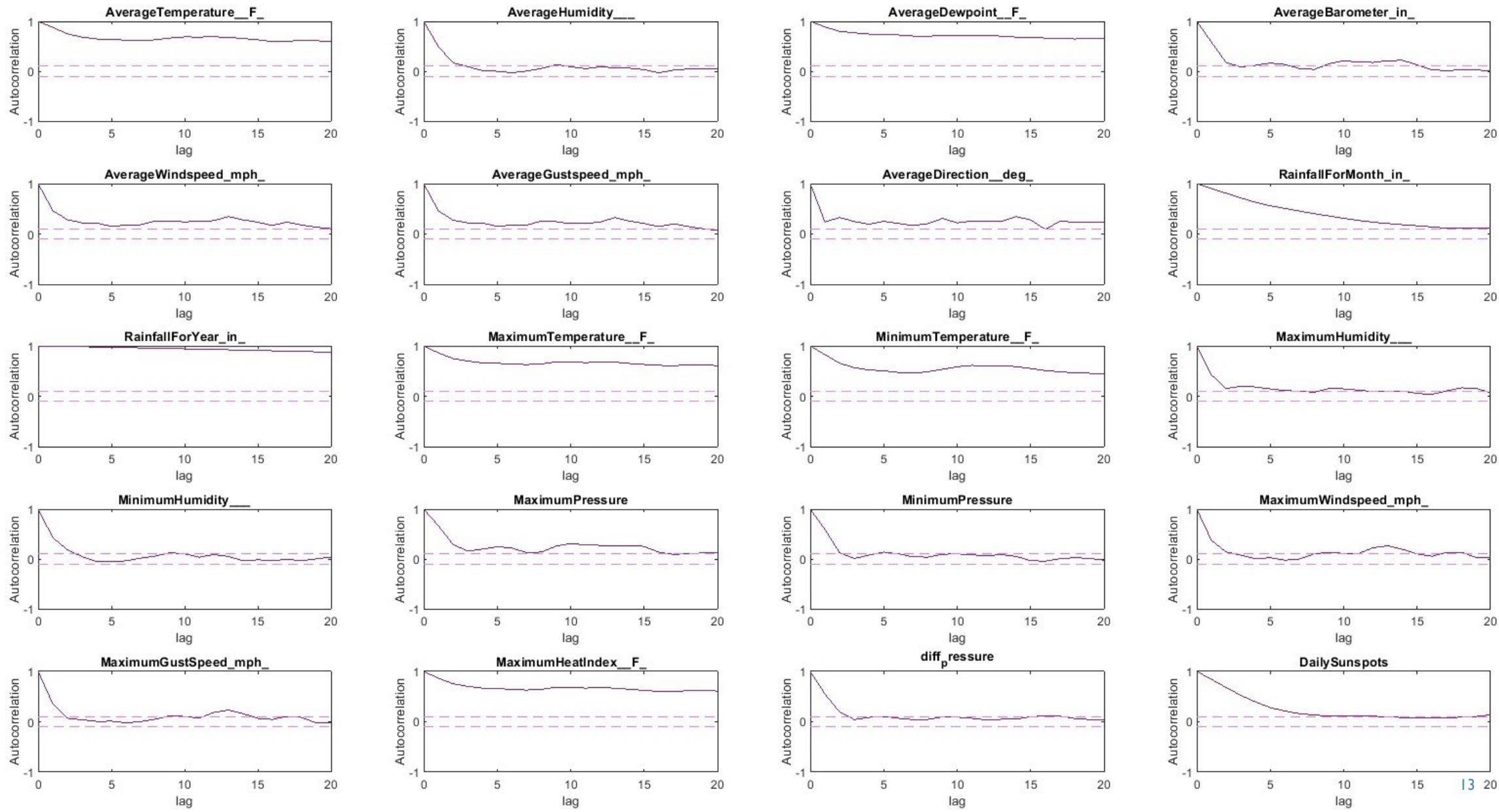


AUTOCORRELATION ΓΙΑ ΜΕΤΑΒΛΗΤΕΣ 2014 ΜΕΤΑ ΑΠΟ WHITE NOISE (P=2)

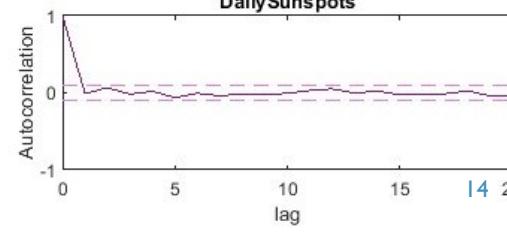
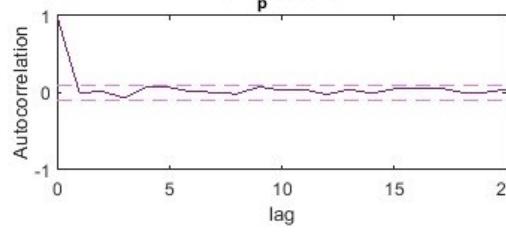
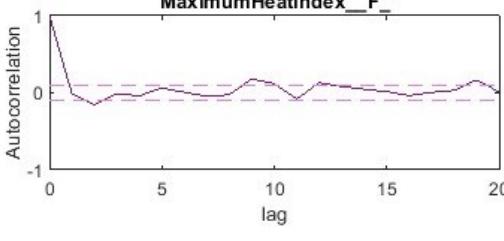
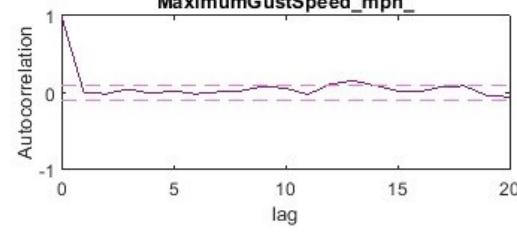
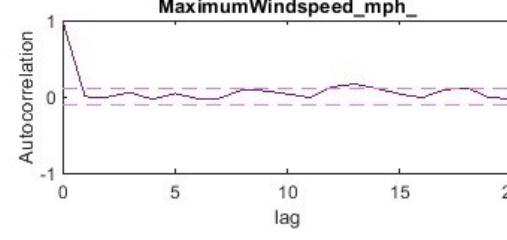
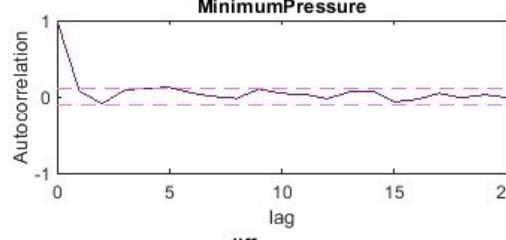
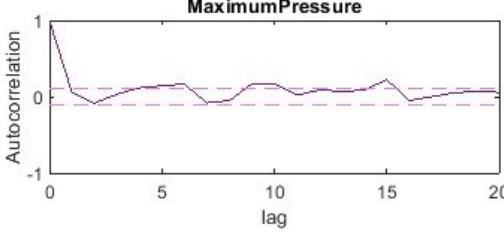
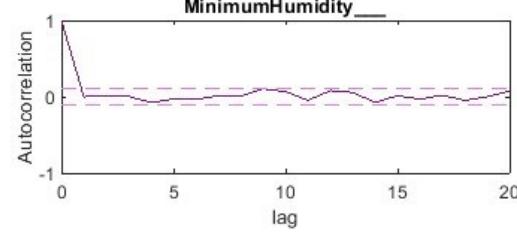
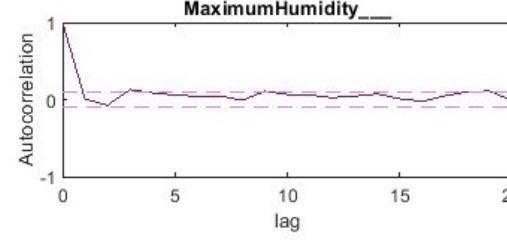
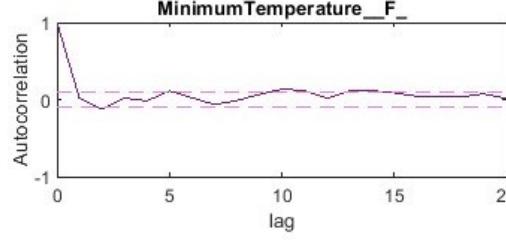
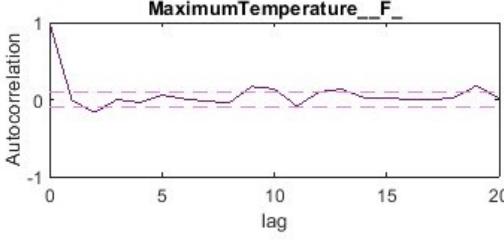
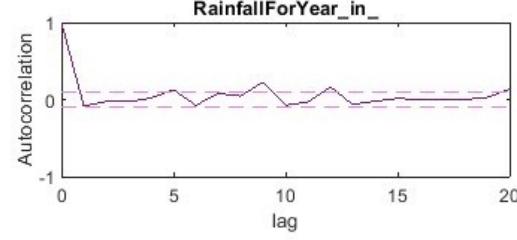
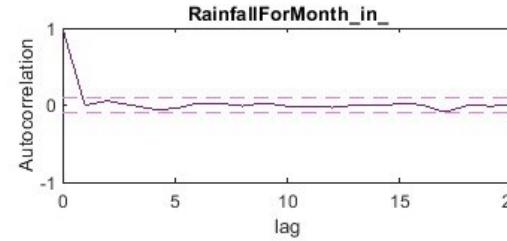
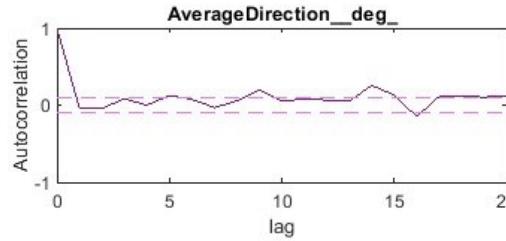
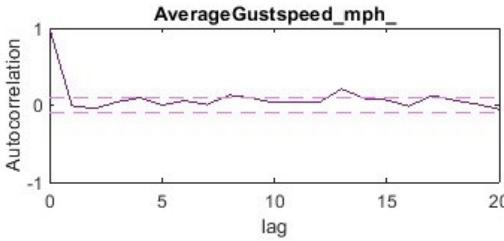
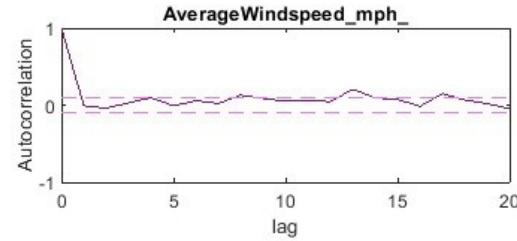
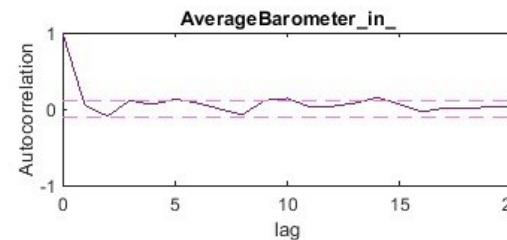
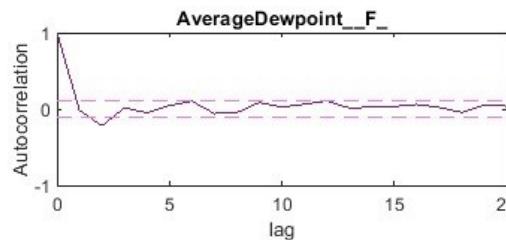
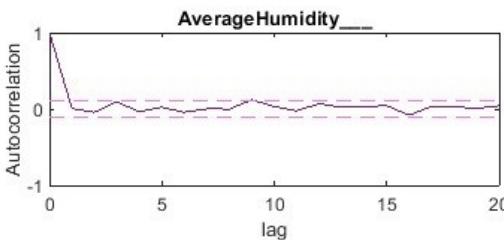
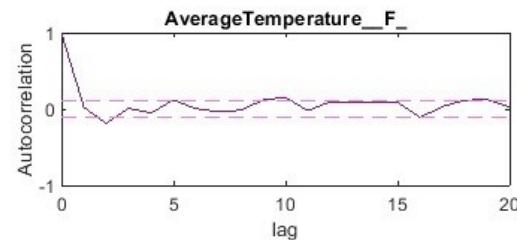


12

AUTOCORRELATION ΓΙΑ ΜΕΤΑΒΛΗΤΕΣ 2019



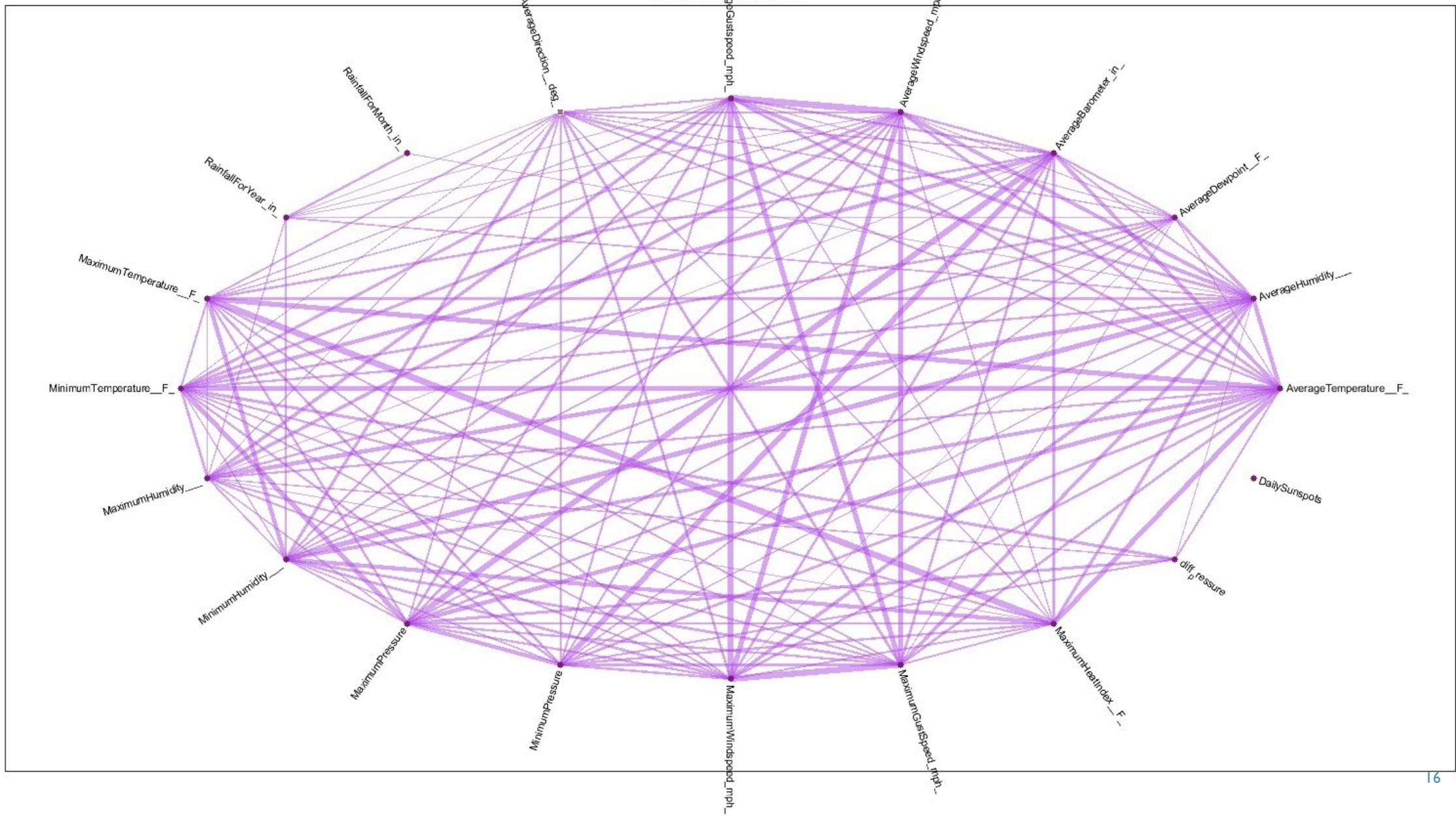
AUTOCORRELATION ΓΙΑ ΜΕΤΑΒΛΗΤΕΣ 2019 ΜΕΤΑ ΑΠΟ WHITE NOISE (P=2)



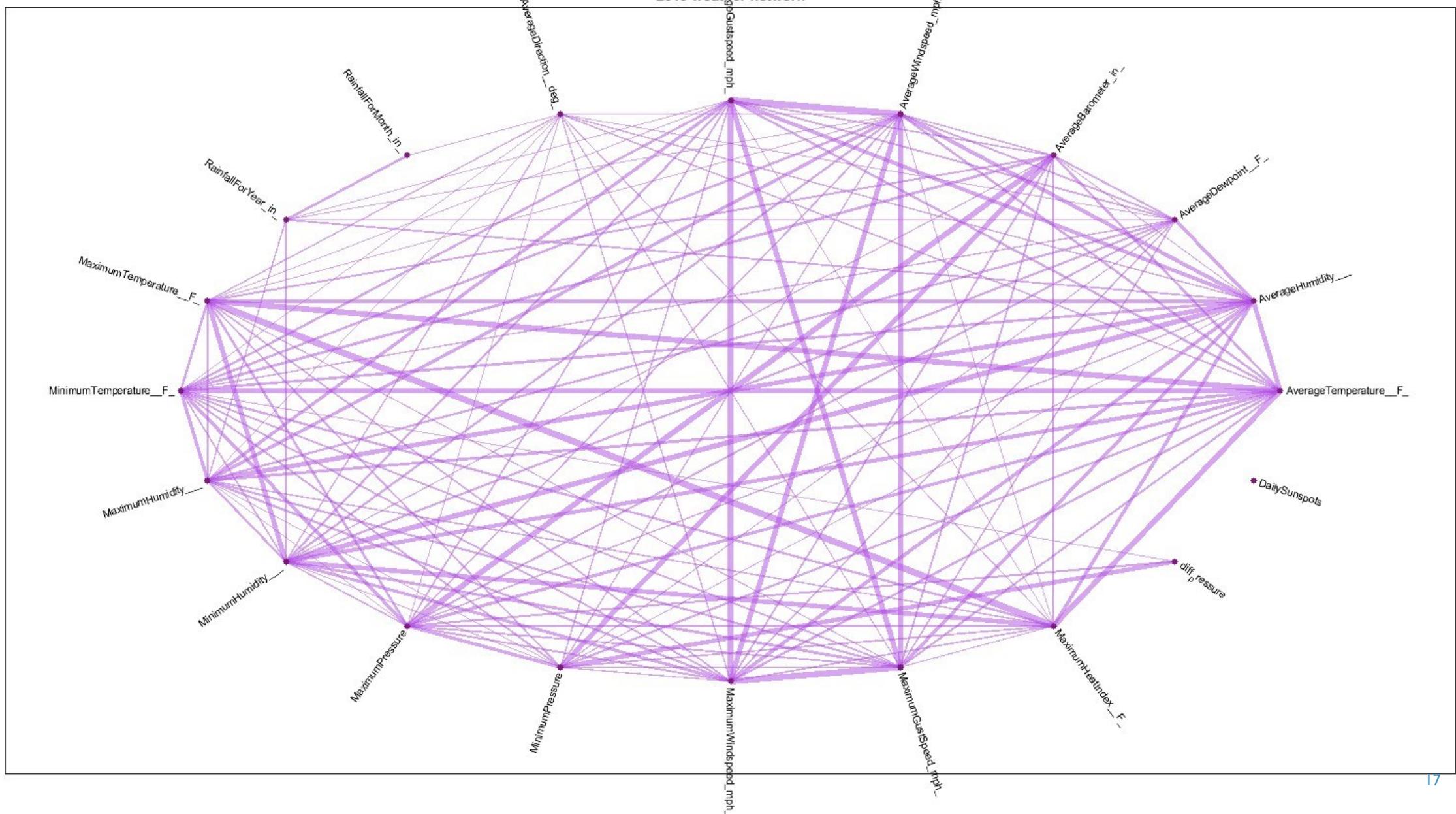
$\Delta|KTYA$

- ★ Cross-Correlation Network ($\alpha=0.05$)
- ★ Granger Causality Network ($\alpha=0.05$)
- ★ Conditional Granger Causality Network ($\alpha= 0.05$)

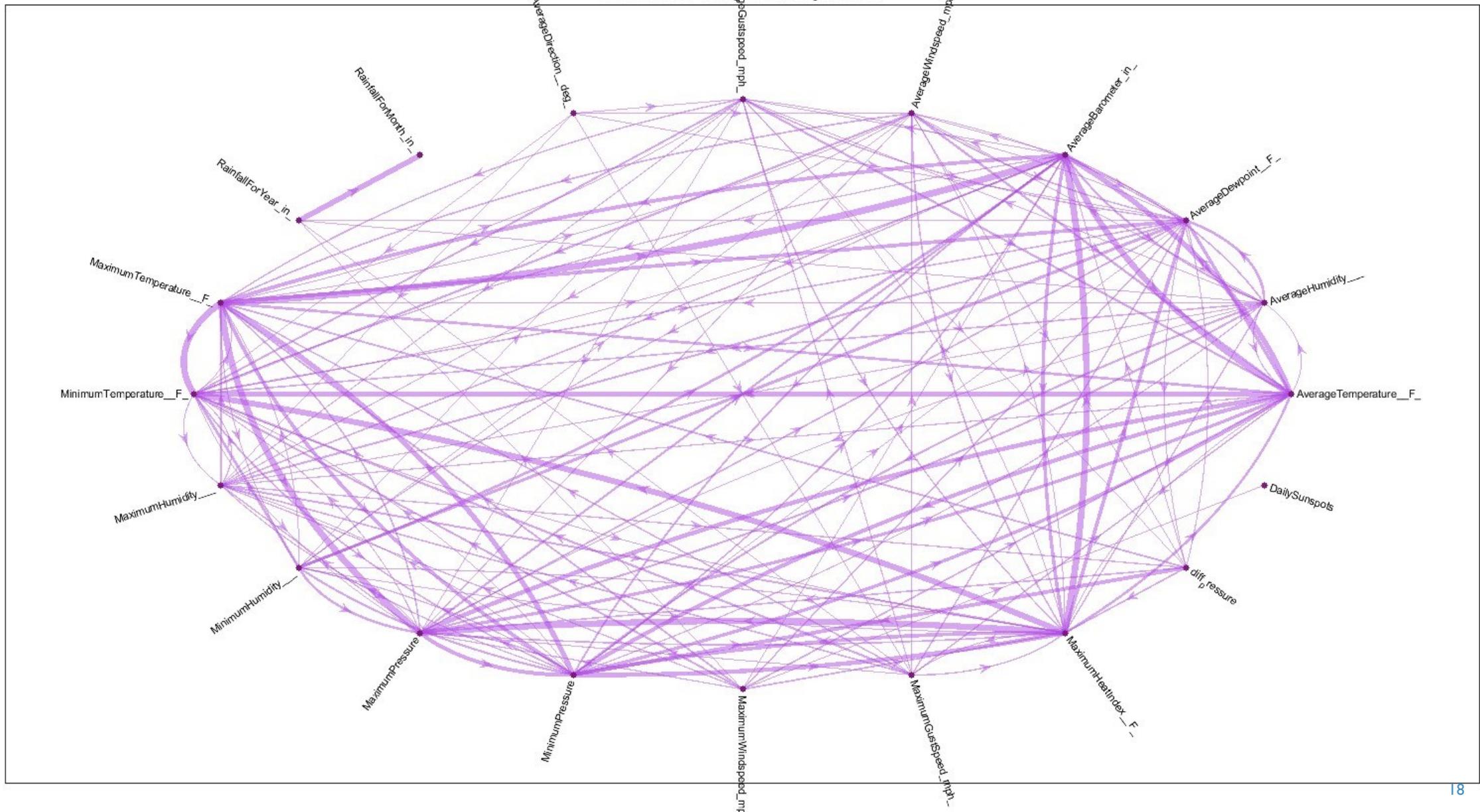
2014 weather network



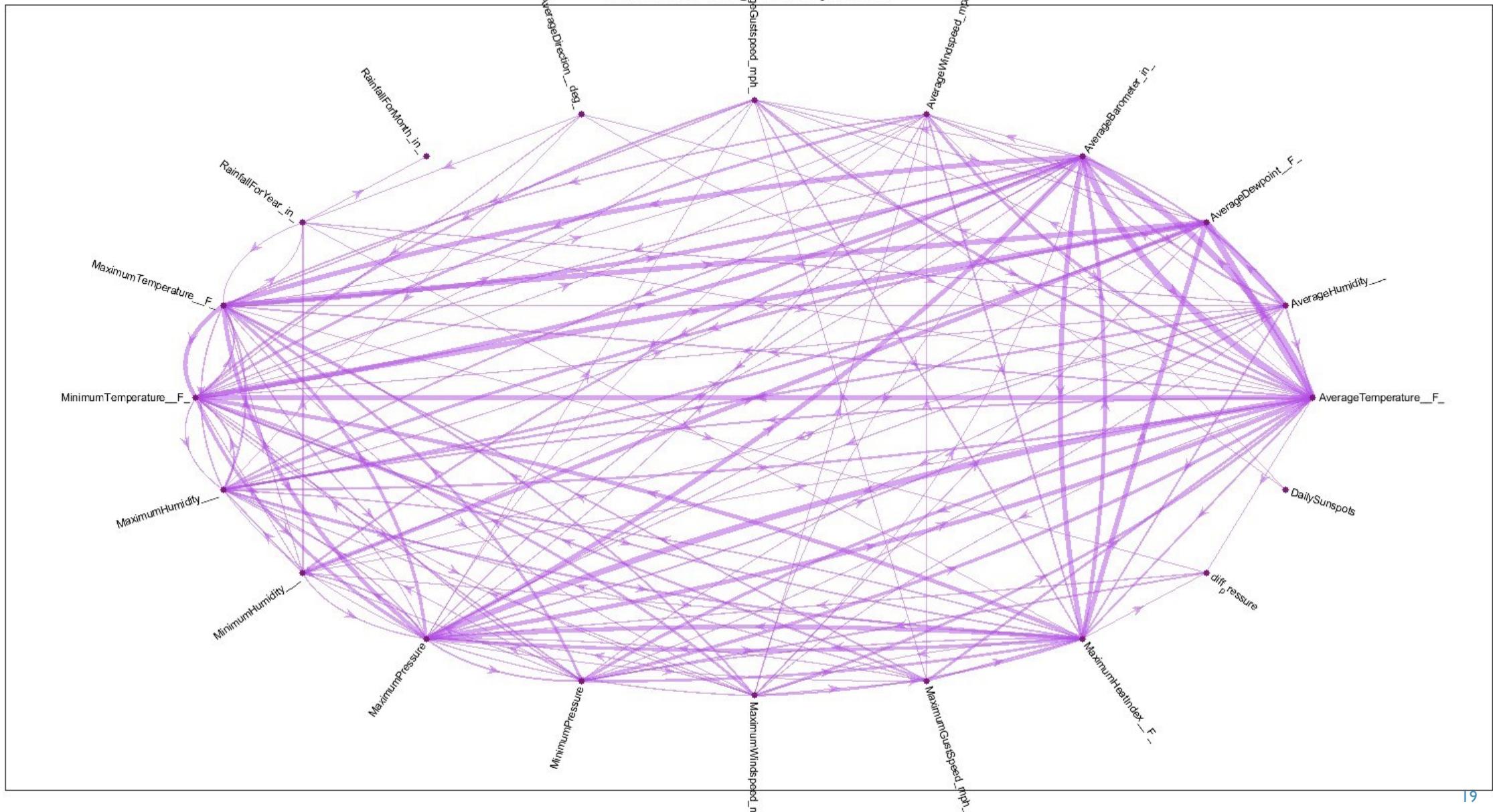
2019 weather network



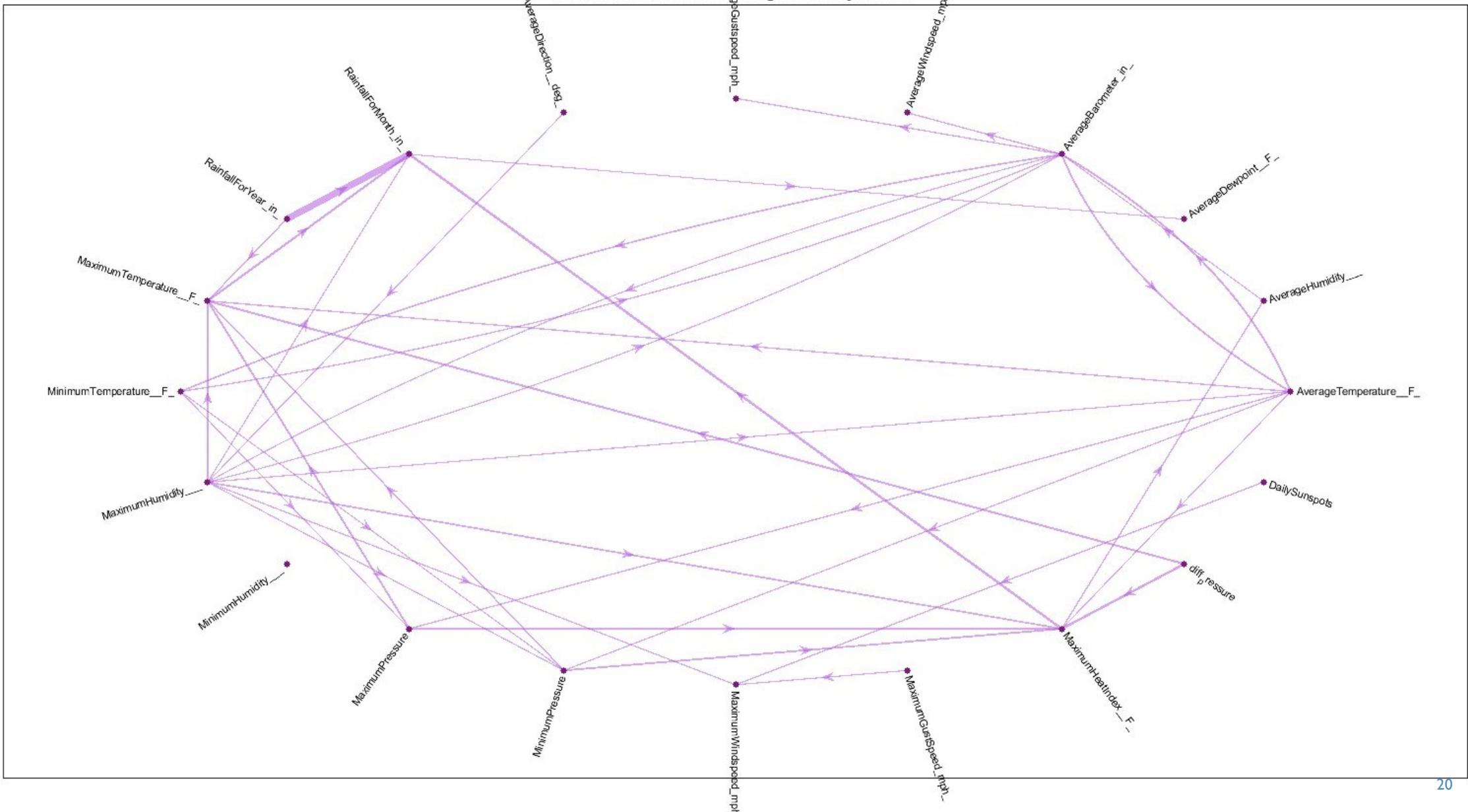
2014 weather Granger causality network



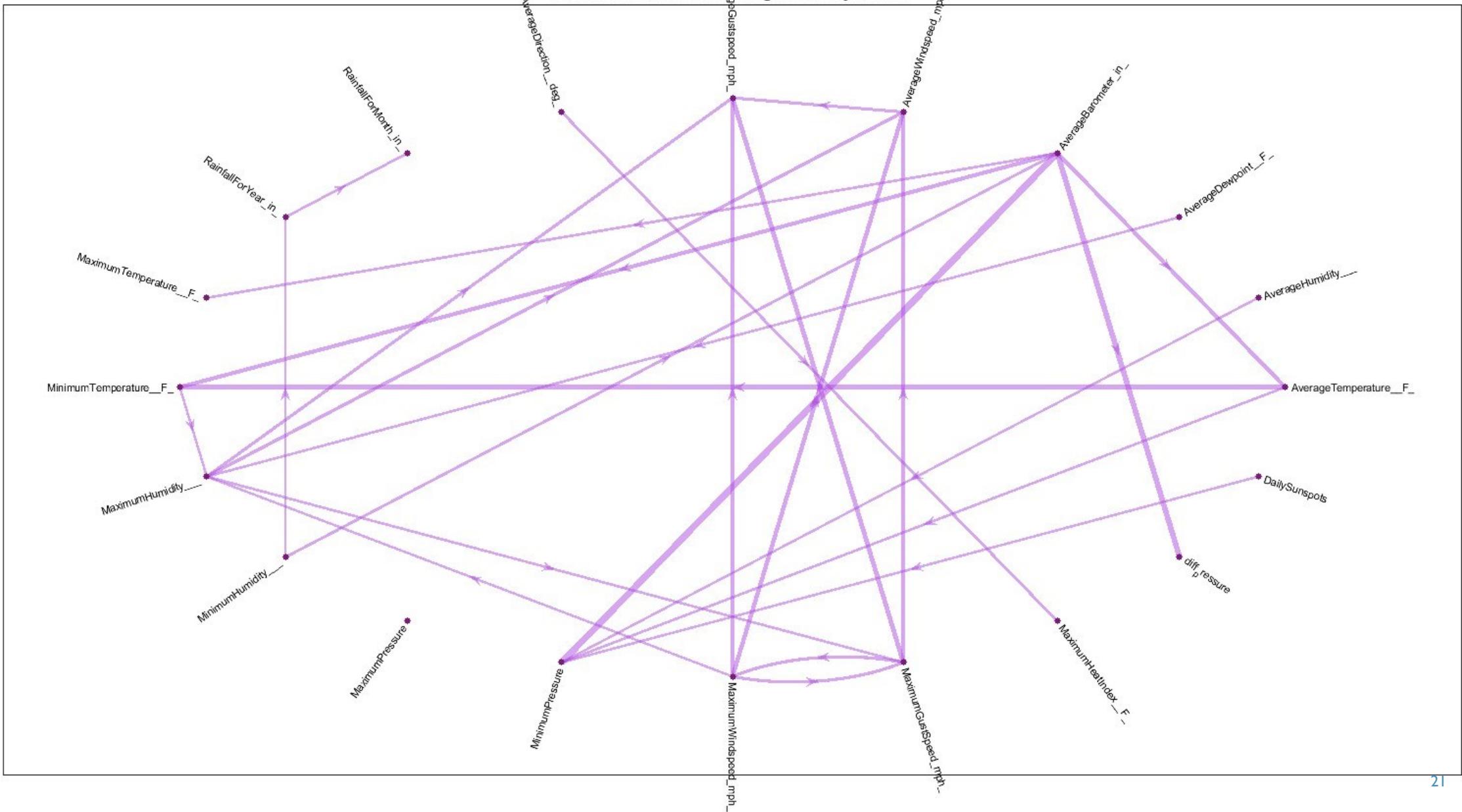
2019 weather Granger causality network



2014 weather conditional Granger causality network



2019 weather conditional Granger causality network

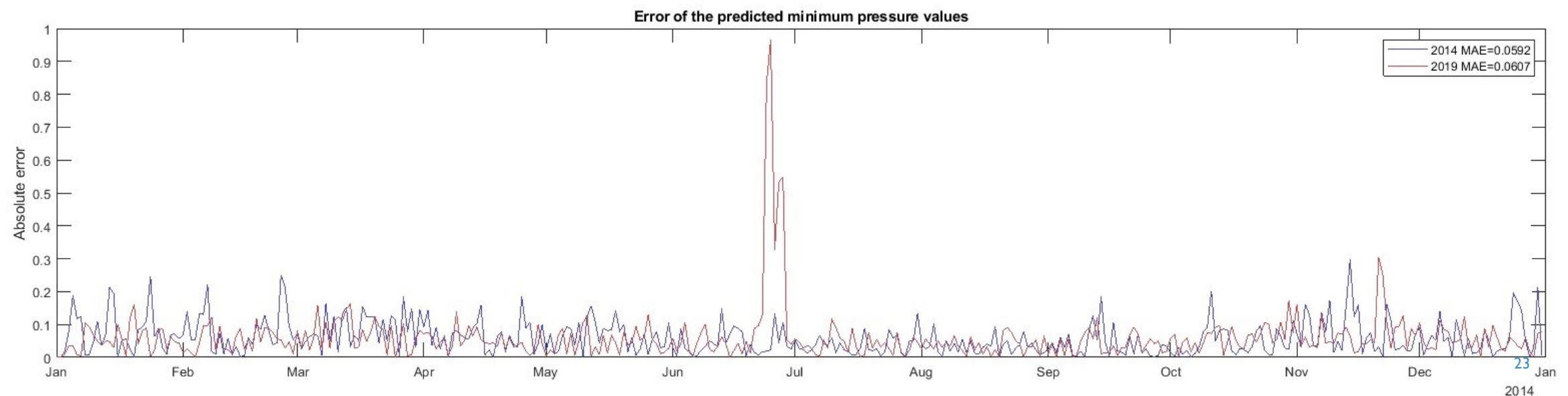
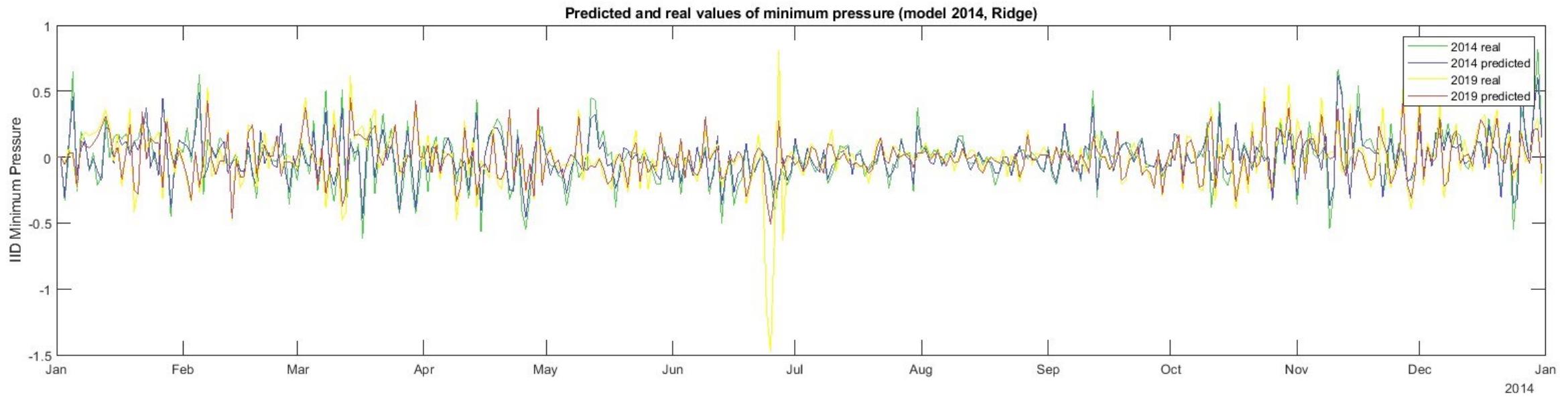


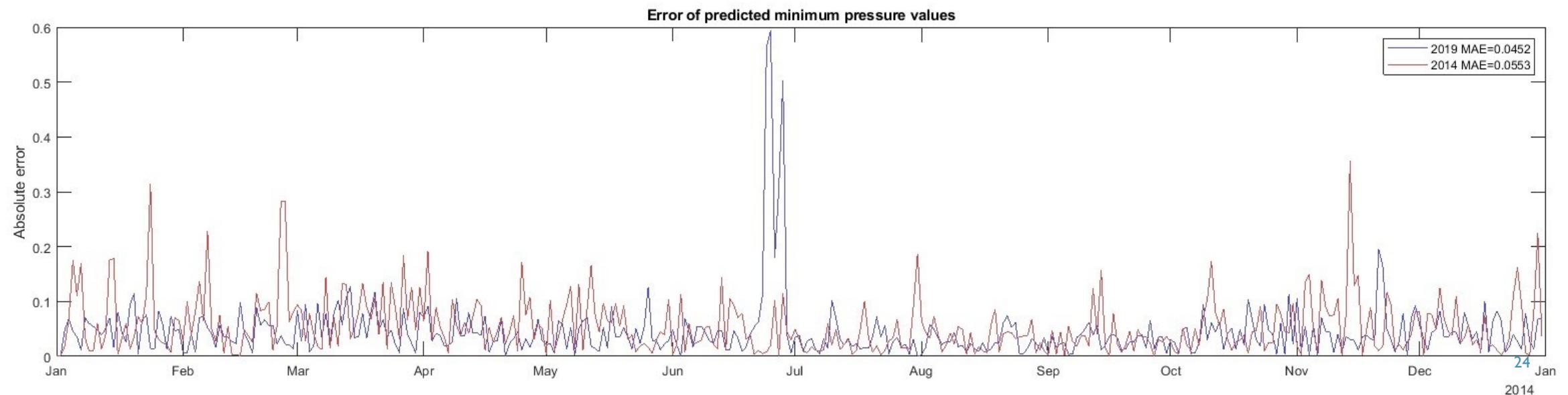
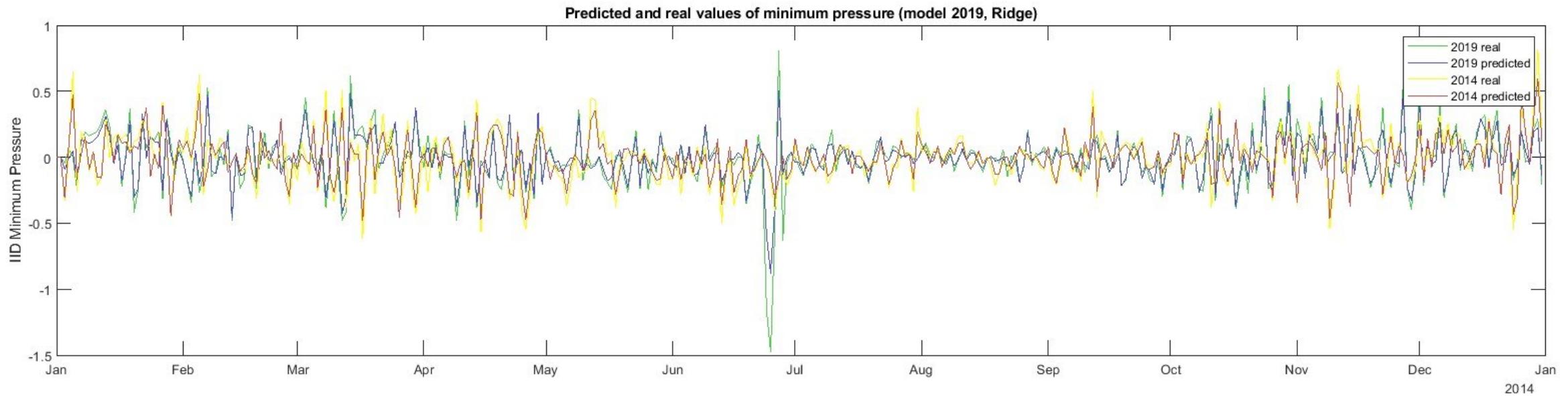
REGRESSION - ΕΞΑΡΤΗΜΕΝΗ ΜΕΤΑΒΛΗΤΗ: ΕΛΑΧΙΣΤΗ ΠΙΕΣΗ

Χωρίς μείωση διάστασης

- ★ Regression με Ridge

- Fitting στα δεδομένα του 2014
- Fitting στα δεδομένα του 2014

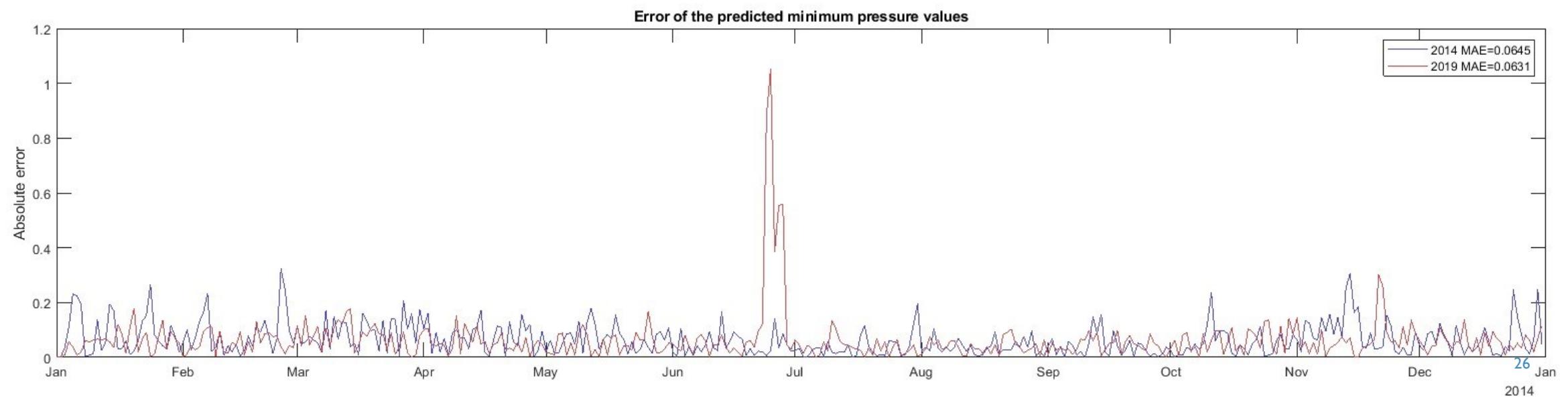
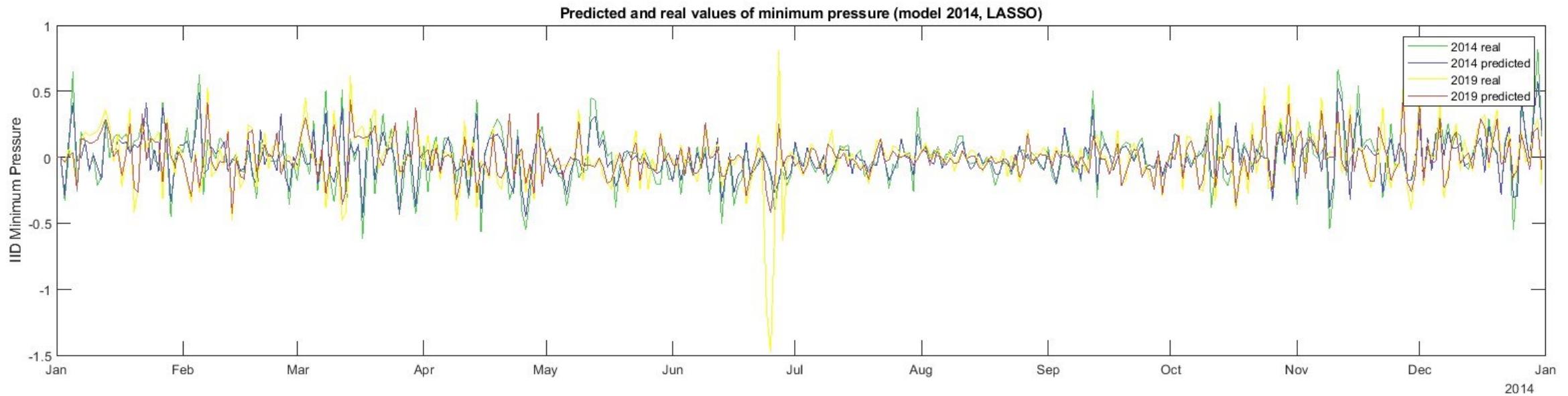


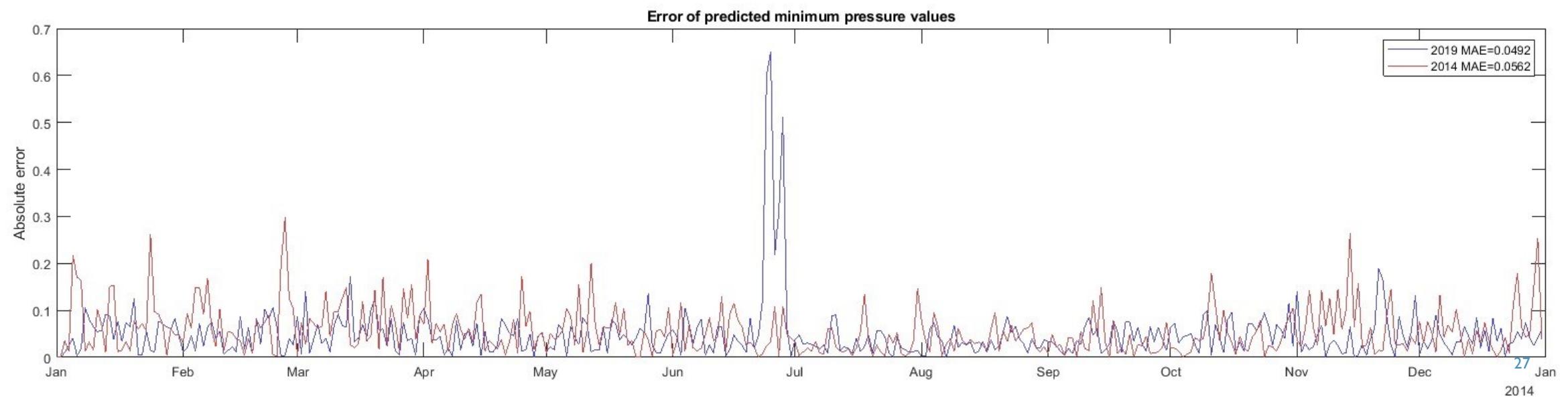
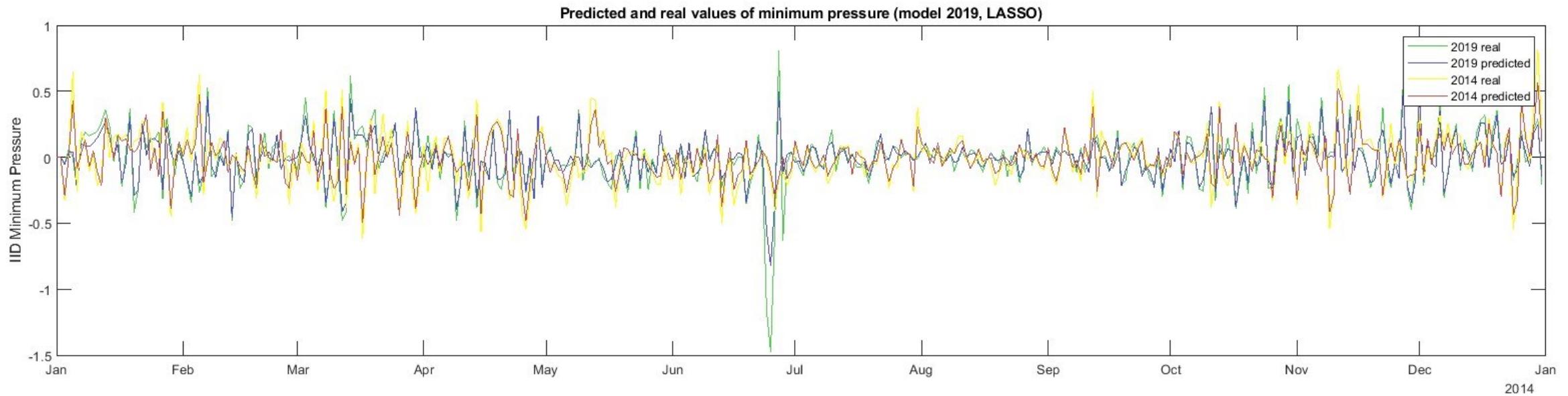


REGRESSION - ΕΞΑΡΤΗΜΕΝΗ ΜΕΤΑΒΛΗΤΗ: ΕΛΑΧΙΣΤΗ ΠΙΕΣΗ

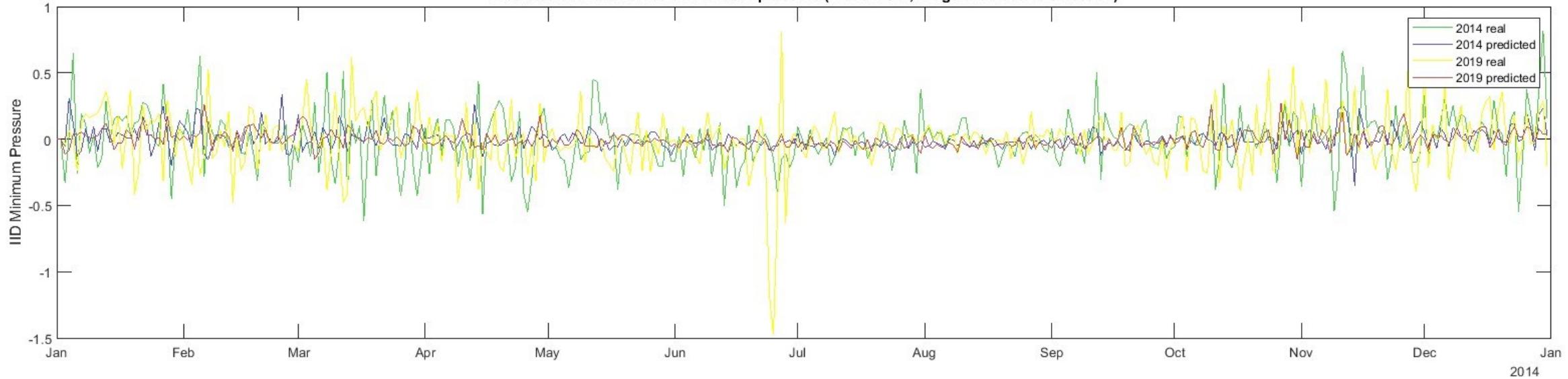
Με μείωση διάστασης

- ★ Regression με LASSO
 - Fitting στα δεδομένα του 2014, εξάρτηση από : **Average Barometer, Pressure Difference**
 - Fitting στα δεδομένα του 2019, εξάρτηση από: **Average Barometer, Maximum Pressure, Pressure Difference**
- ★ Regression με Ridge και επιλογή εξαρτήσεων από Granger Causality
 - Fitting στα δεδομένα του 2014, εξάρτηση από :
Minimum Temperature, Maximum Humidity, Average Temperature
 - Fitting στα δεδομένα του 2019, εξάρτηση από:
Average Barometer, Average Humidity, Average Temperature, Daily Sunspots

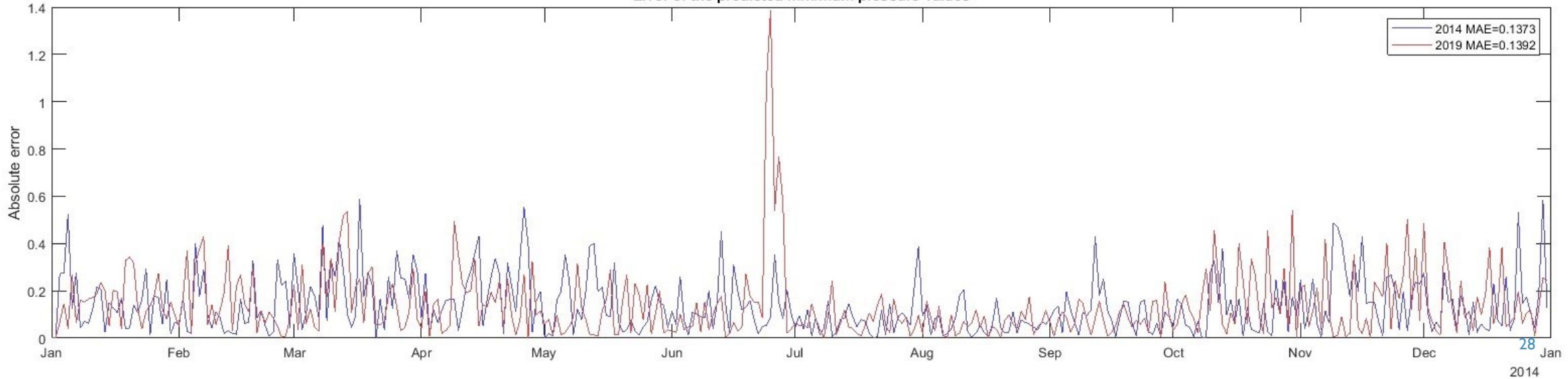


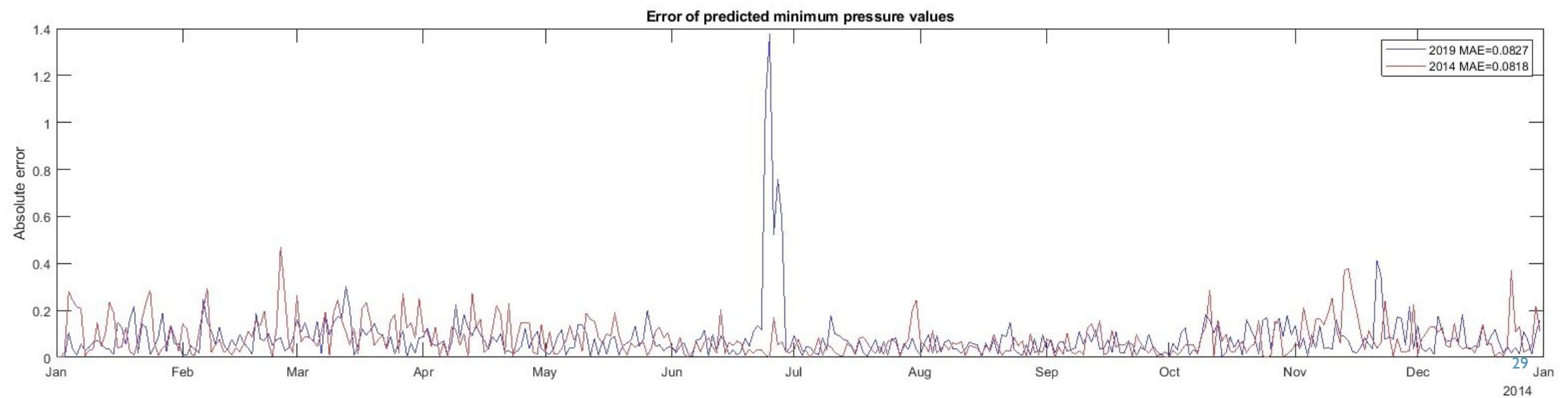
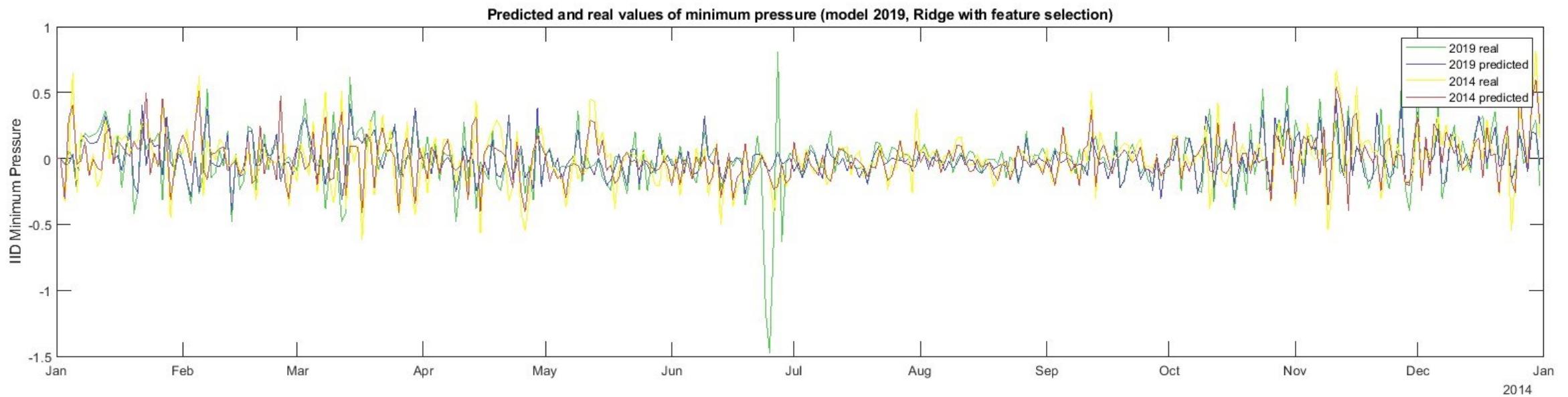


Predicted and real values of minimum pressure (model 2014, Ridge with feature selection)



Error of the predicted minimum pressure values





ΣΥΝΟΨΗ

Χωρίς feature selection

- ★ Ridge 2014
 - ★ MAE_2014=0.0592
 - ★ MAE_2019=0.0607
- ★ Ridge 2019
 - ★ MAE_2014=0.0553
 - ★ MAE_2019=0.0452

Με feature selection

- ★ LASSO 2014
 - ★ MAE_2014=0.0645
 - ★ MAE_2019=0.0631
 - ★ LASSO 2019
 - ★ MAE_2014=0.0562
 - ★ MAE_2019=0.0492
- ★ Ridge 2014
 - ★ MAE_2014=0.1373
 - ★ MAE_2019=0.1392
 - ★ Ridge 2019
 - ★ MAE_2014=0.0818
 - ★ MAE_2019=0.0827



THANK YOU