

Queimadas Reference Satellite: A data analysis

Analysing data for choosing the next reference satellite for the Queimadas Program

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Agenda I

1 Introduction

2 Exploratory Data Analysis

1 Time Series

- NPP-375D
- NPP-375-PM
- AQUA M T
- NOAA 12

3 Forecast

4 Future work

5 References



Introduction



What would be the next reference satellite?

- What would be the next reference satellite [1, 2]?



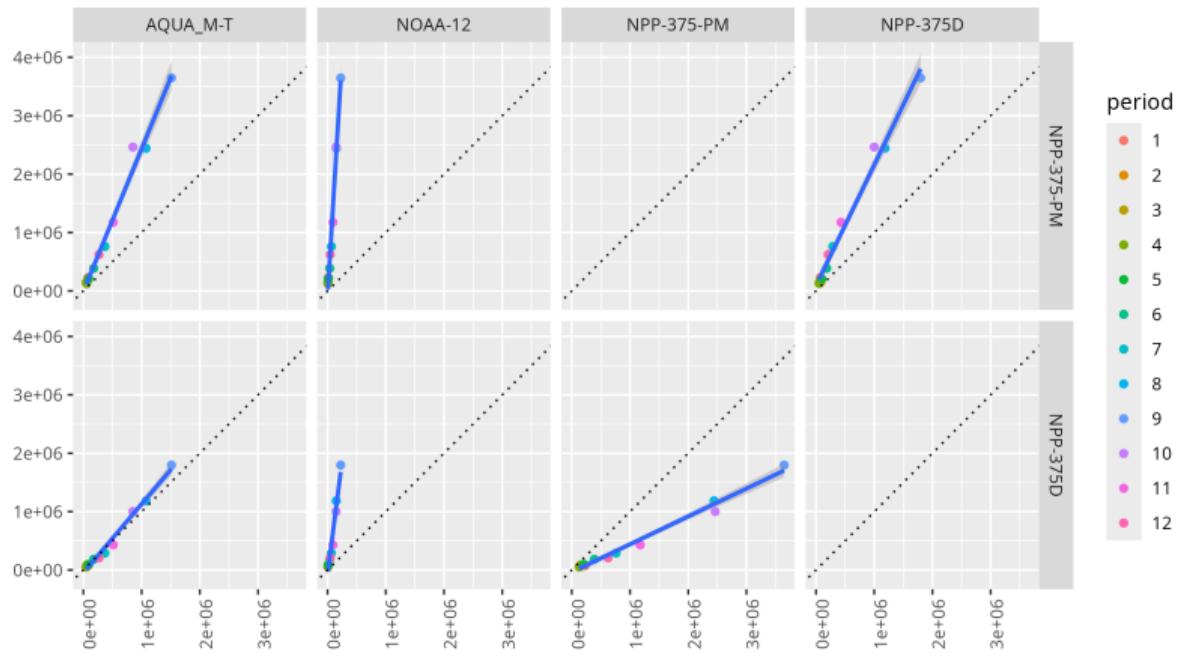
Online resources

- Queimadas portal.
- Queimadas FAQ.
- Source code
 - ▶ Code repository available [here](#).
 - ▶ Slides available [here](#).

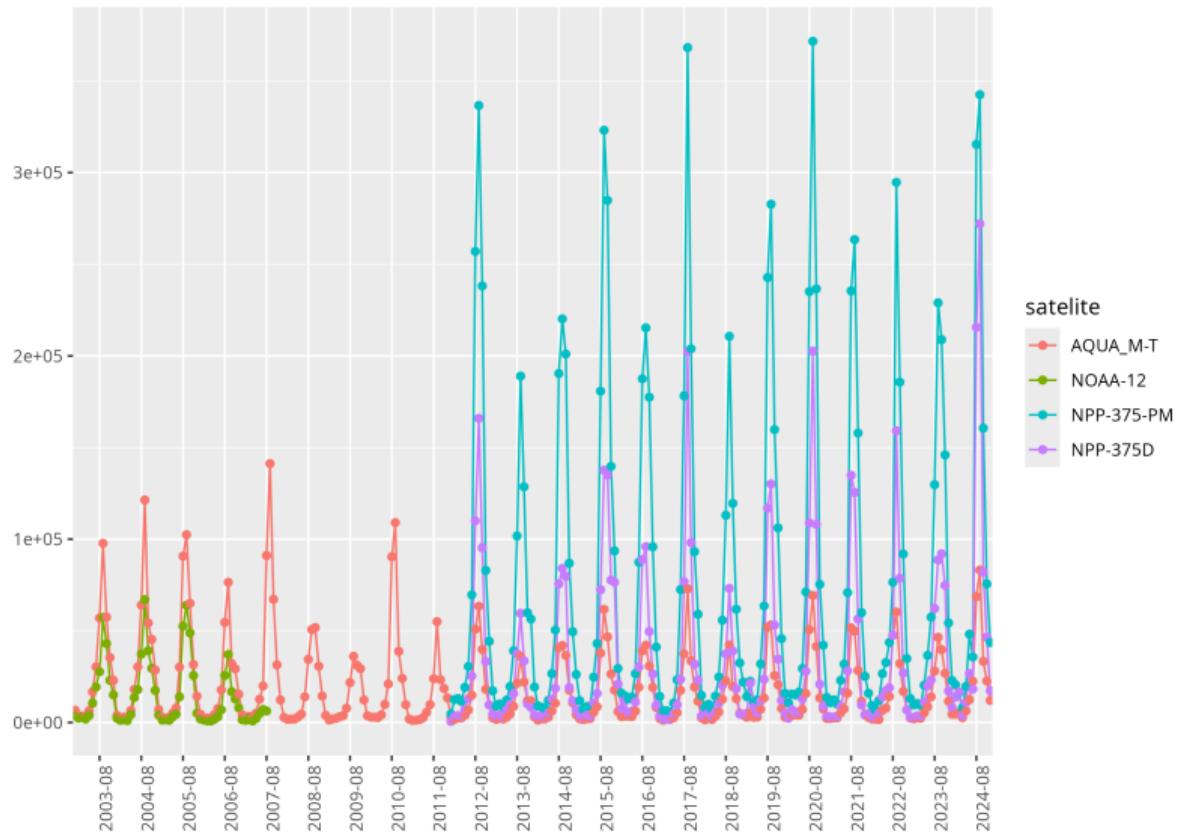


Exploratory Data Analysis

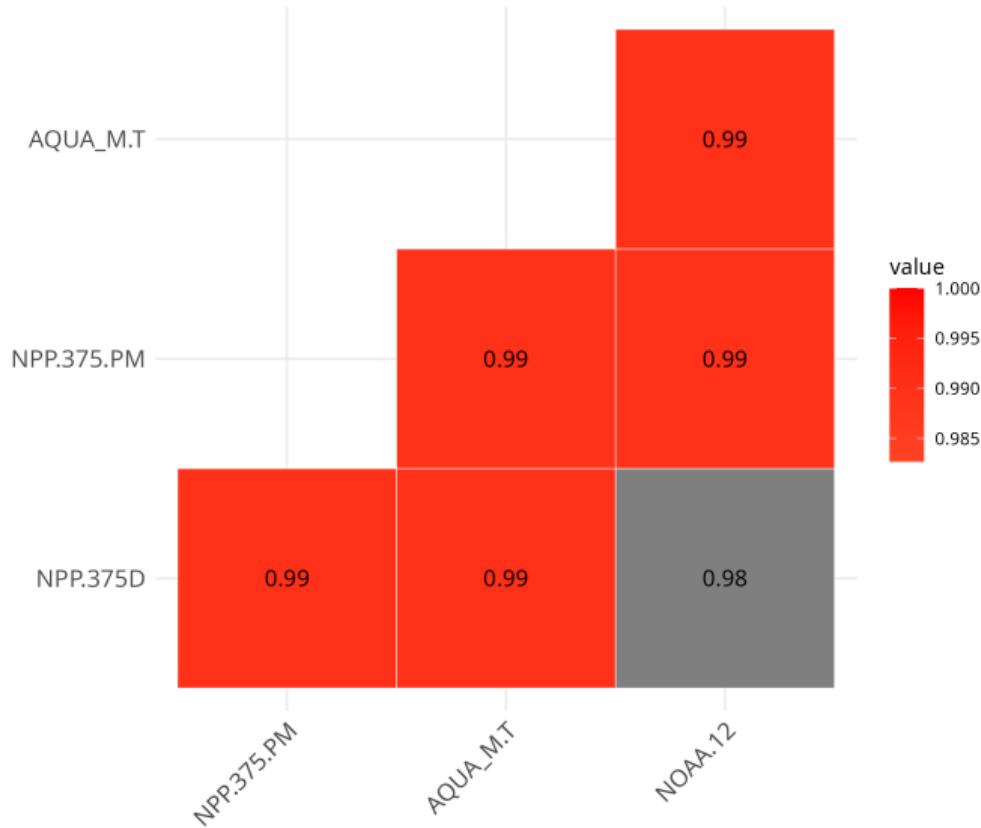
Brazilian fire foci aggregated by month (all years)



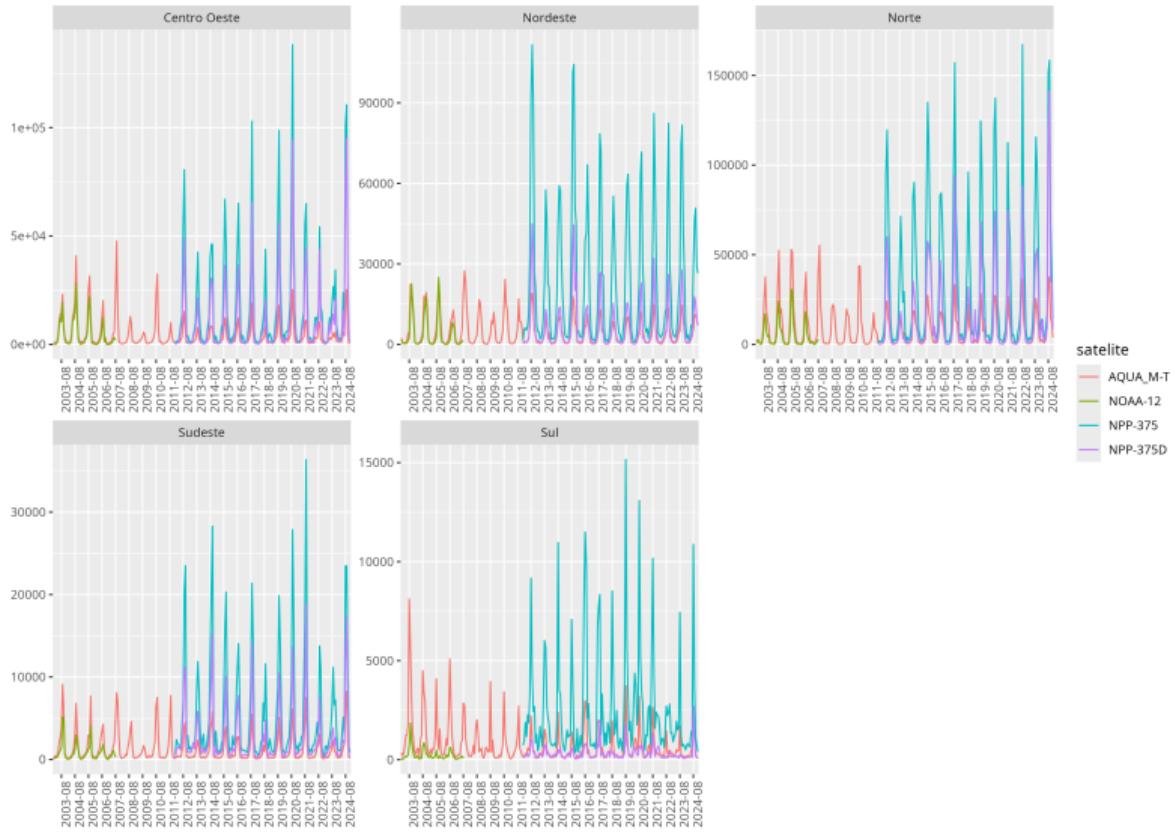
Brazilian fire foci aggregated by year and month



Correlation between fire foci from the reference satellites in Brazil



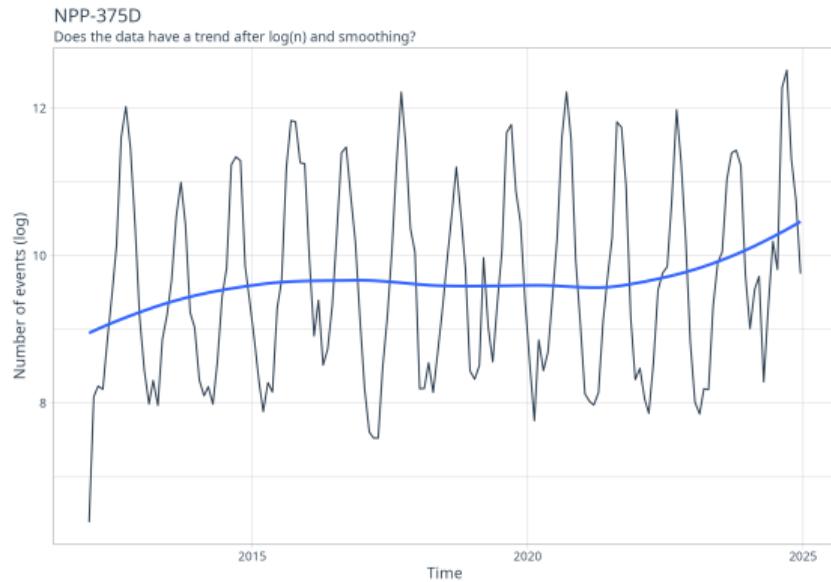
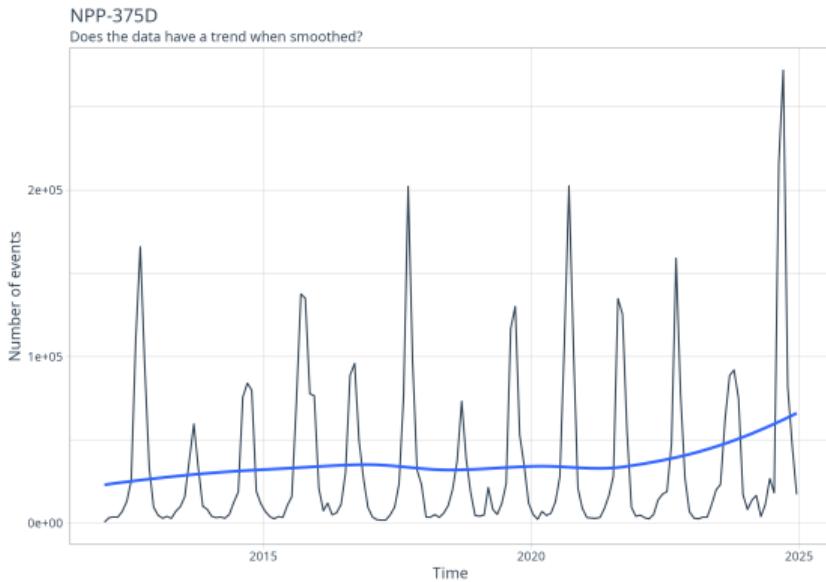
Brazilian regions by year and month



NPP-375D



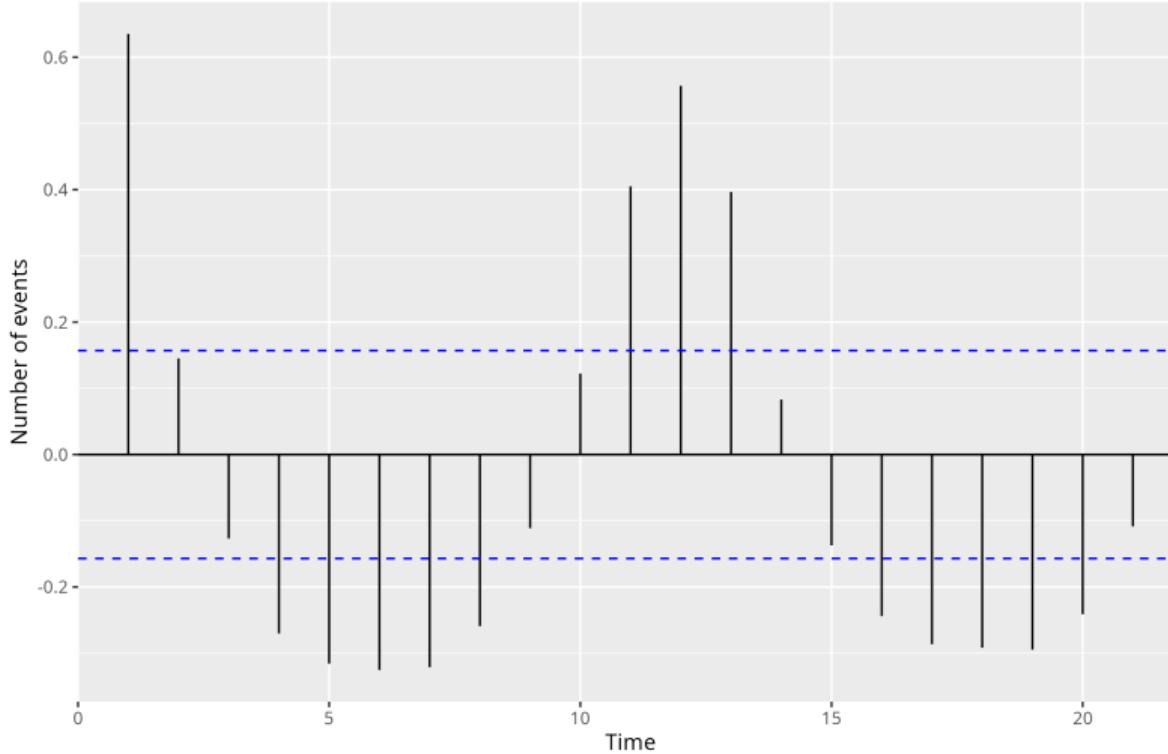
Time series trend (with smoothing)



Time series autocorrelation

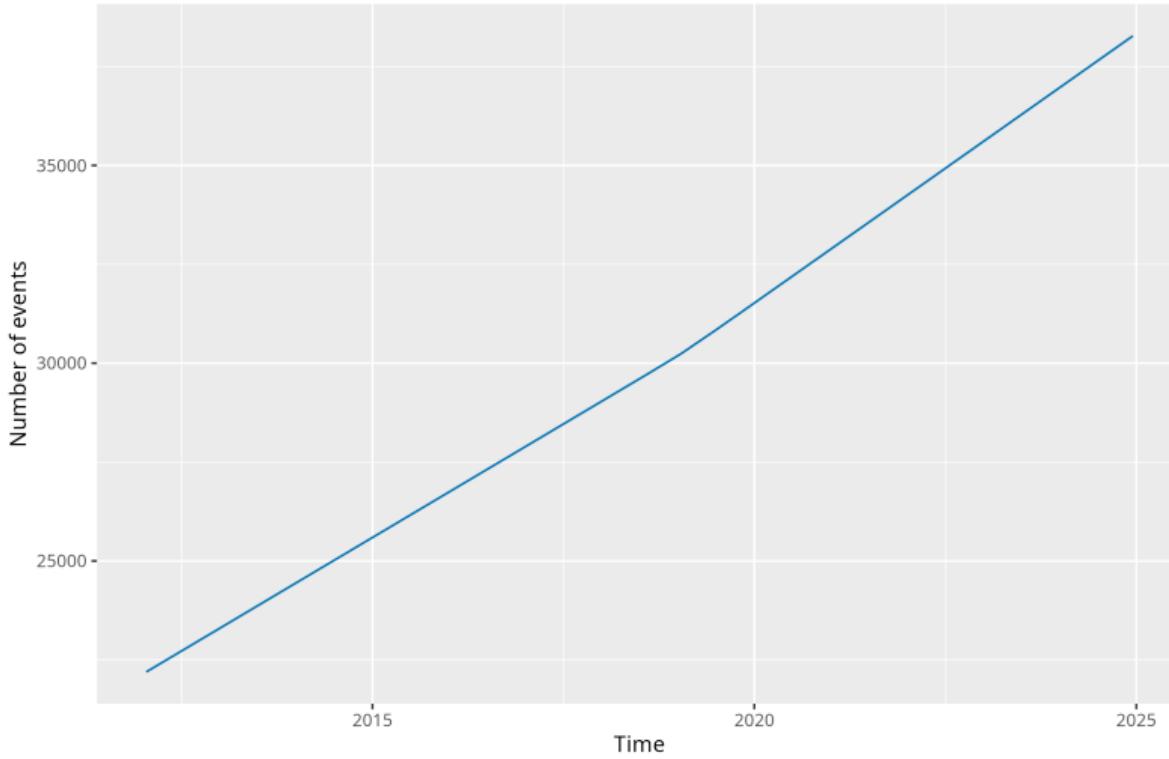
NPP-375D

Is the time series autocorrelated?



Time series trend

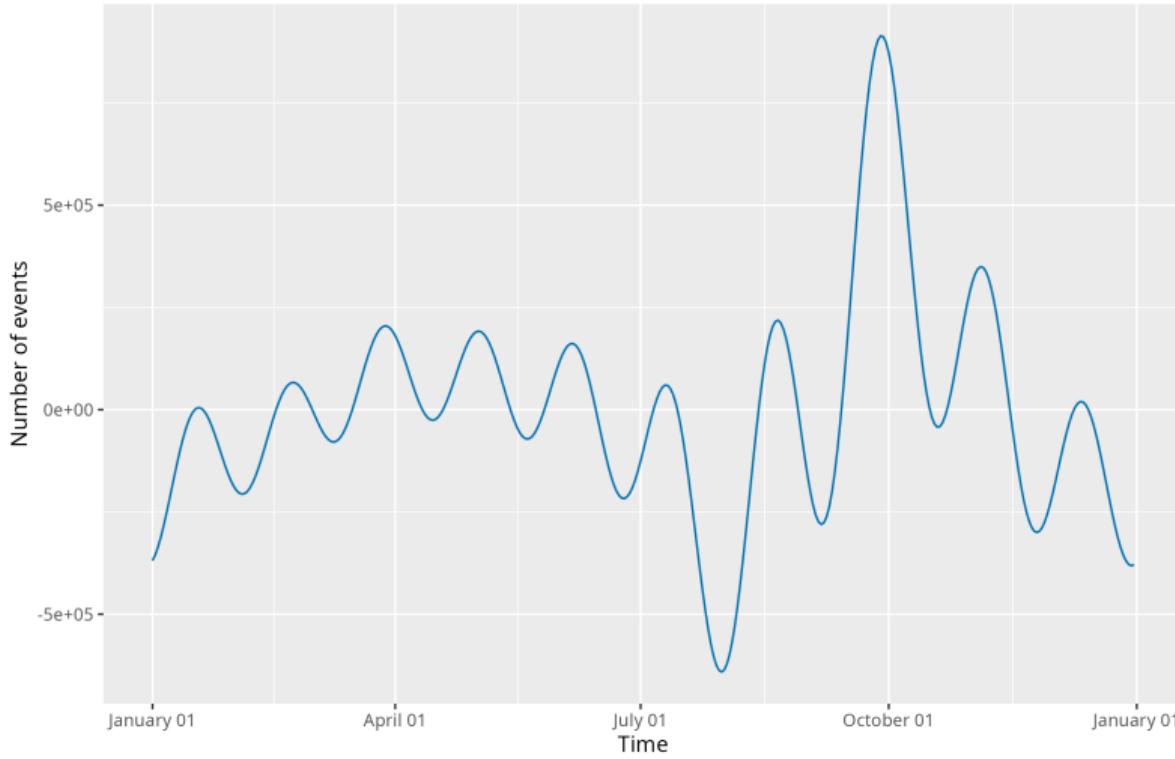
NPP-375D
Does the data have a trend?



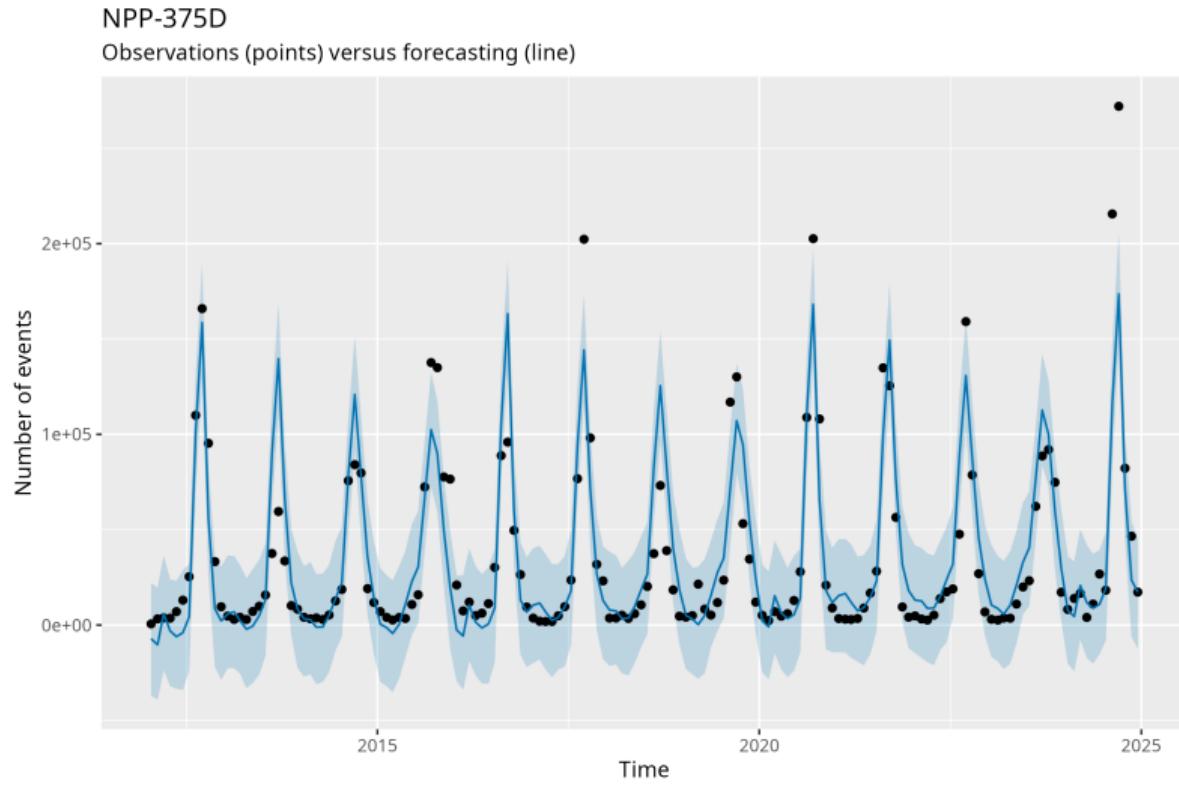
Time series seasonality

NPP-375D

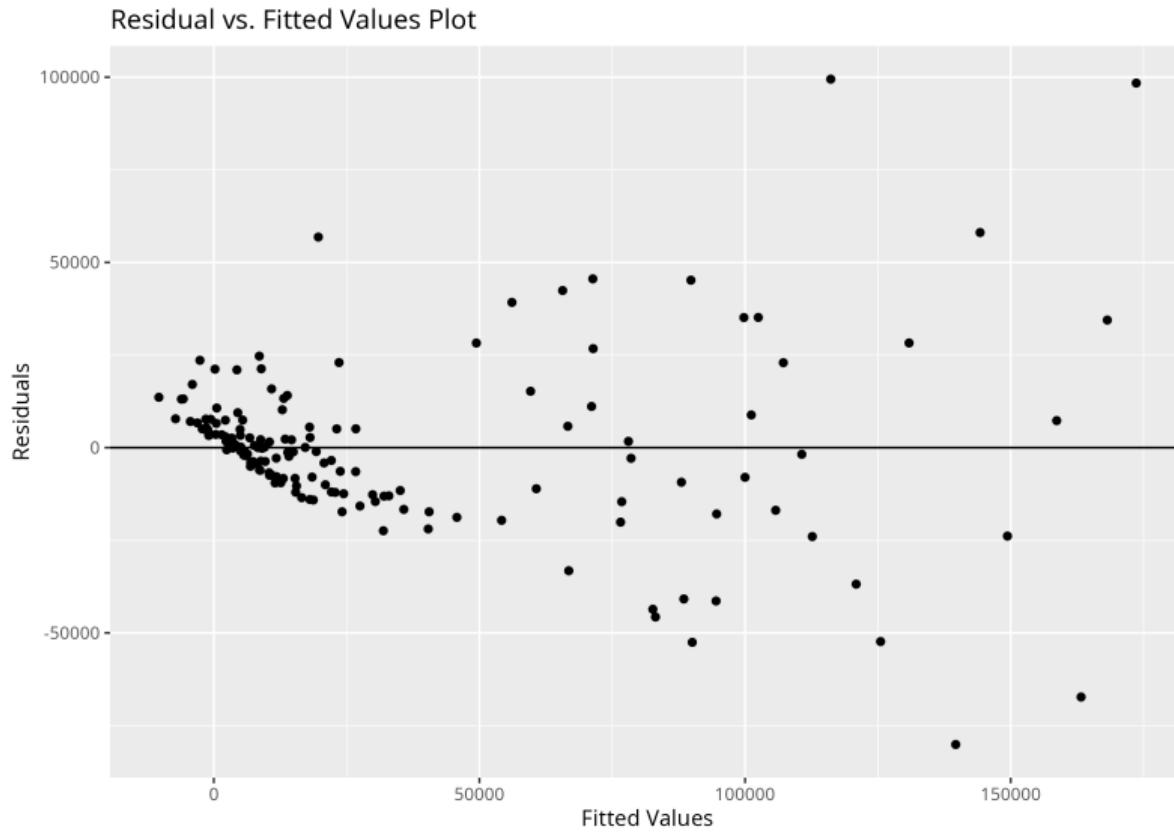
Does the data have a seasonality?



Time series versus forecast



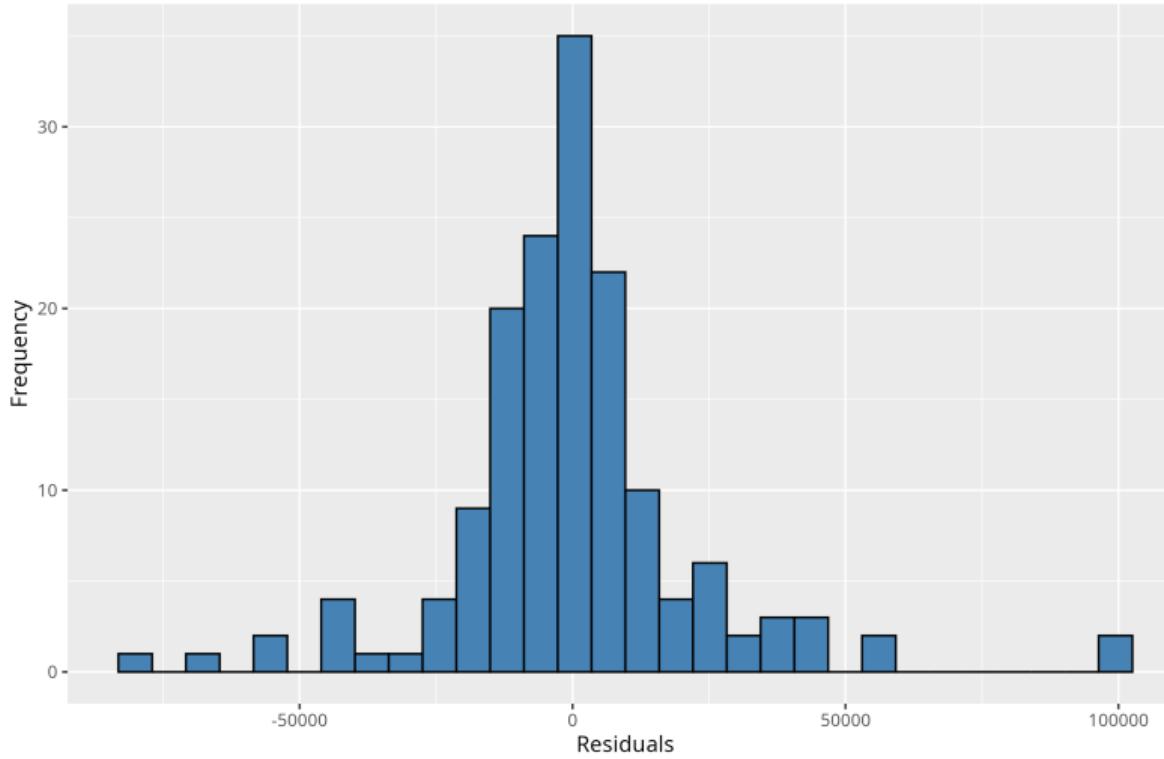
Time series versus forecast



Time series versus forecast

Histogram of Residuals

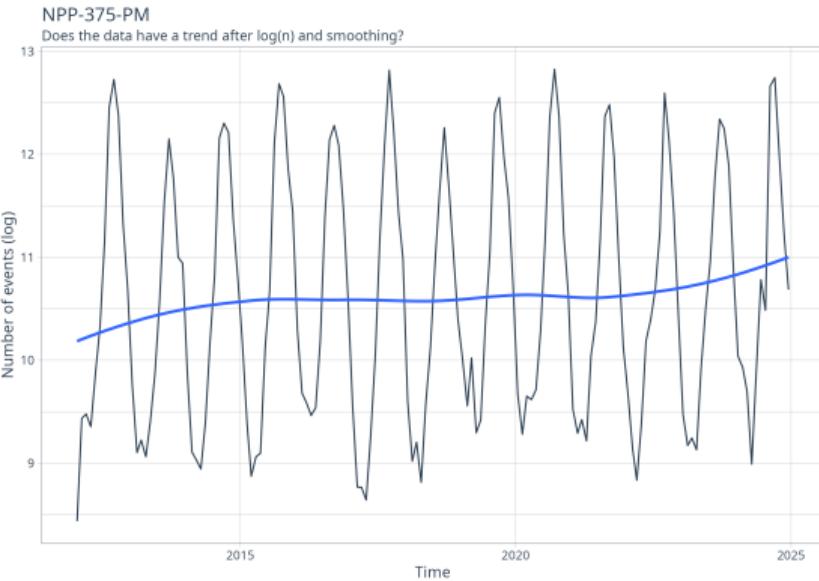
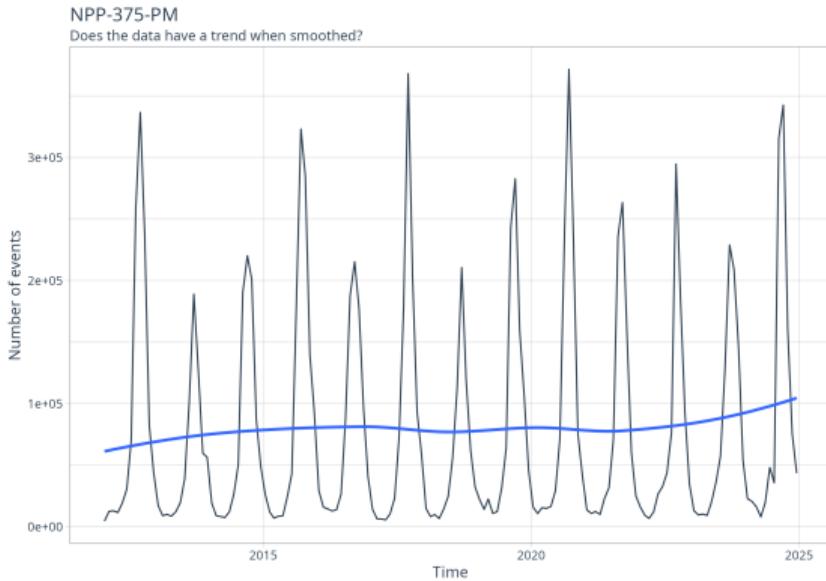
Do the residuals have a normal distribution?



NPP-375-PM



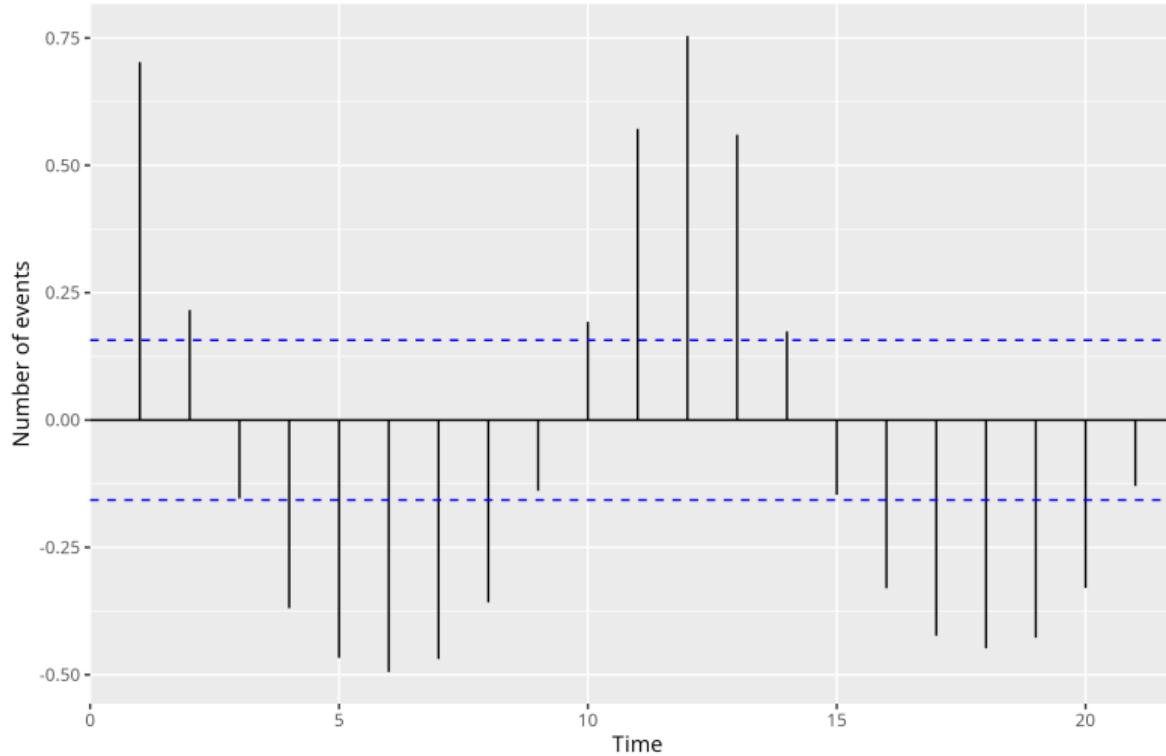
Time series trend (with smoothing)



Time series autocorrelation

NPP-375-PM

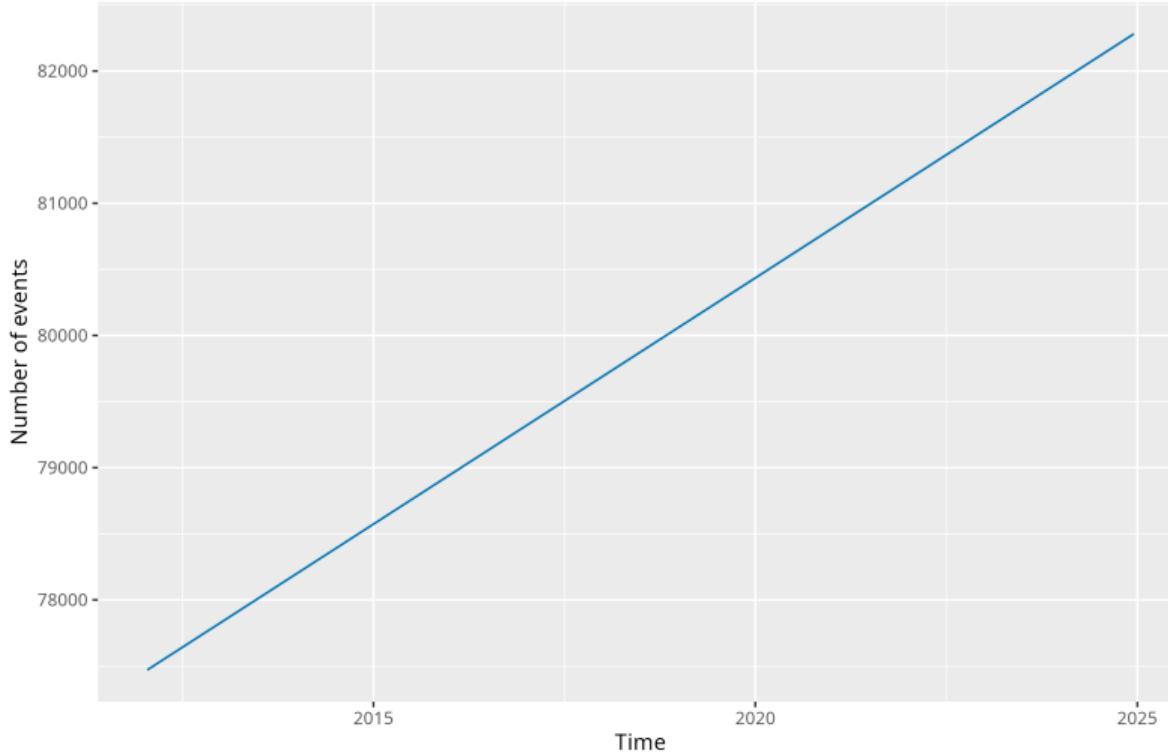
Is the time series autocorrelated?



Time series trend

NPP-375-PM

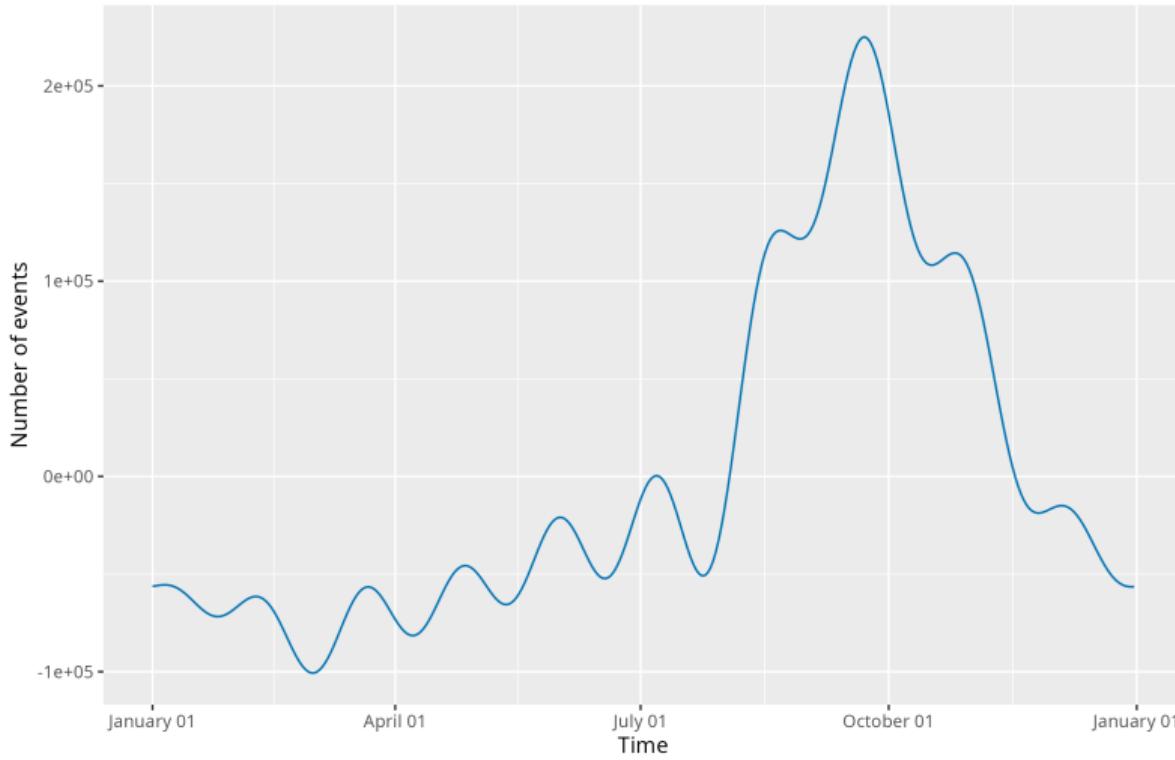
Does the data have a trend?



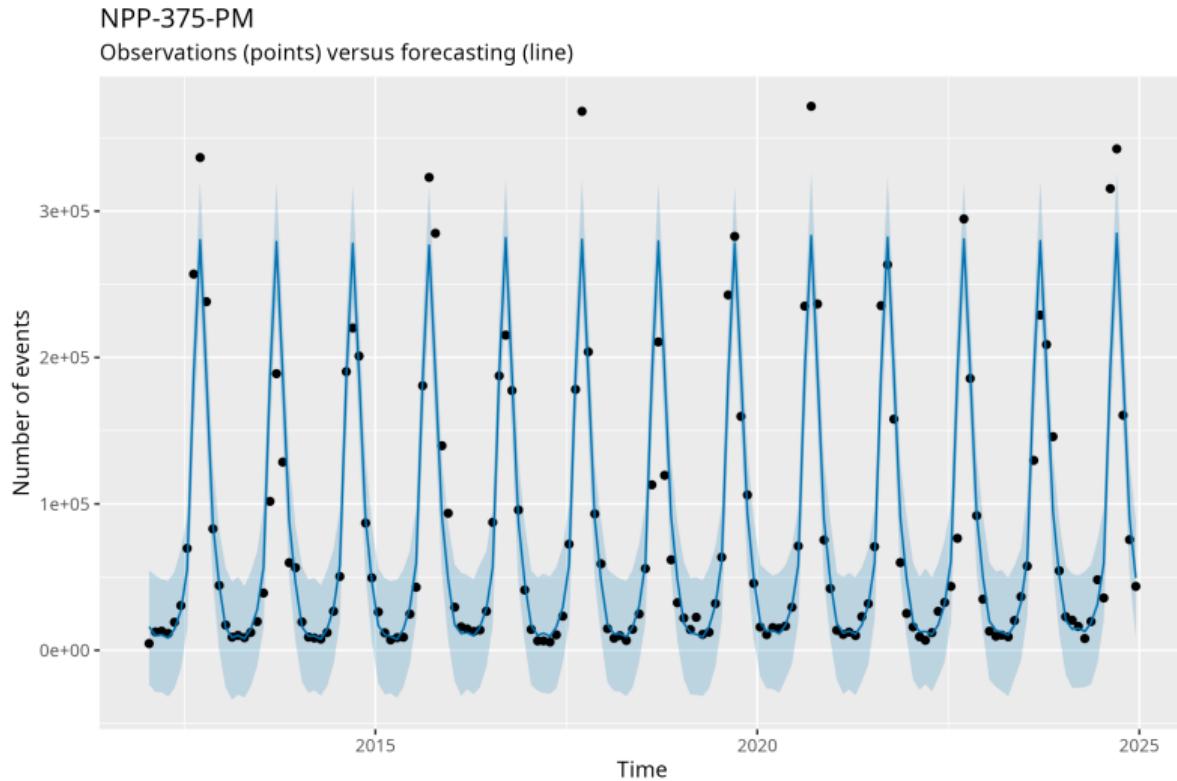
Time series seasonality

NPP-375-PM

Does the data have a seasonality?

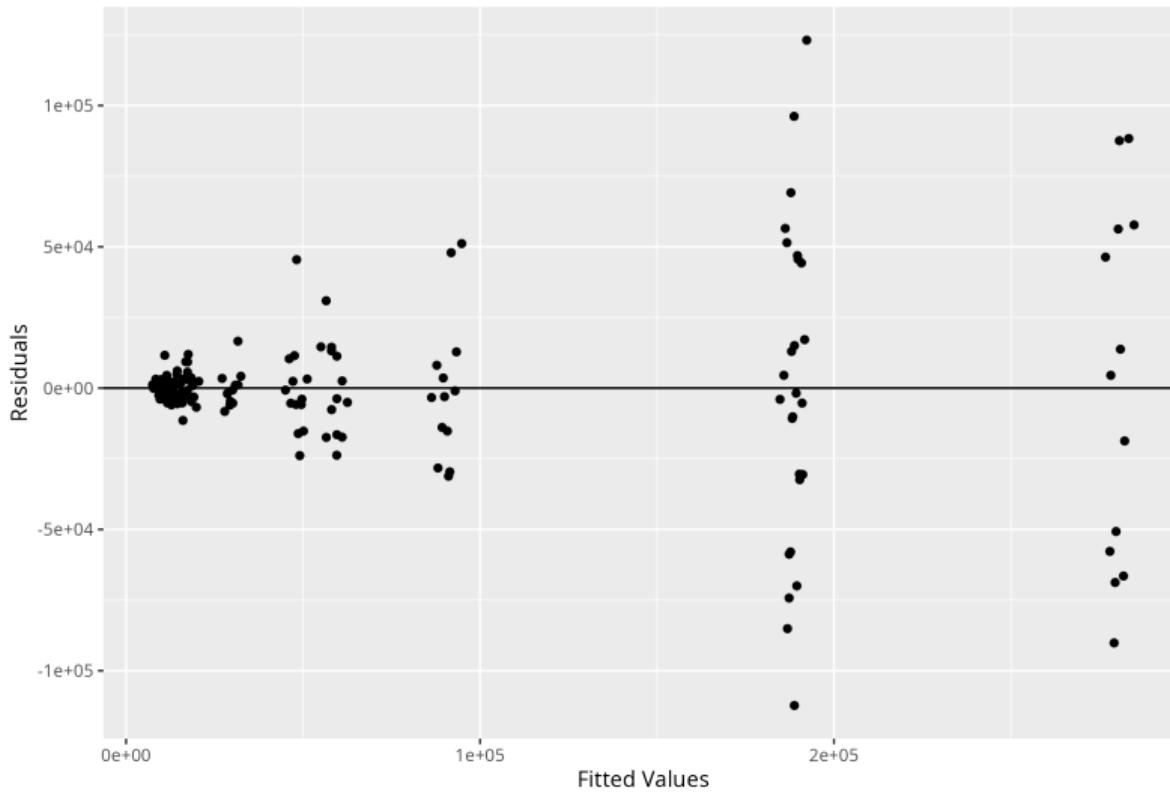


Time series versus forecast

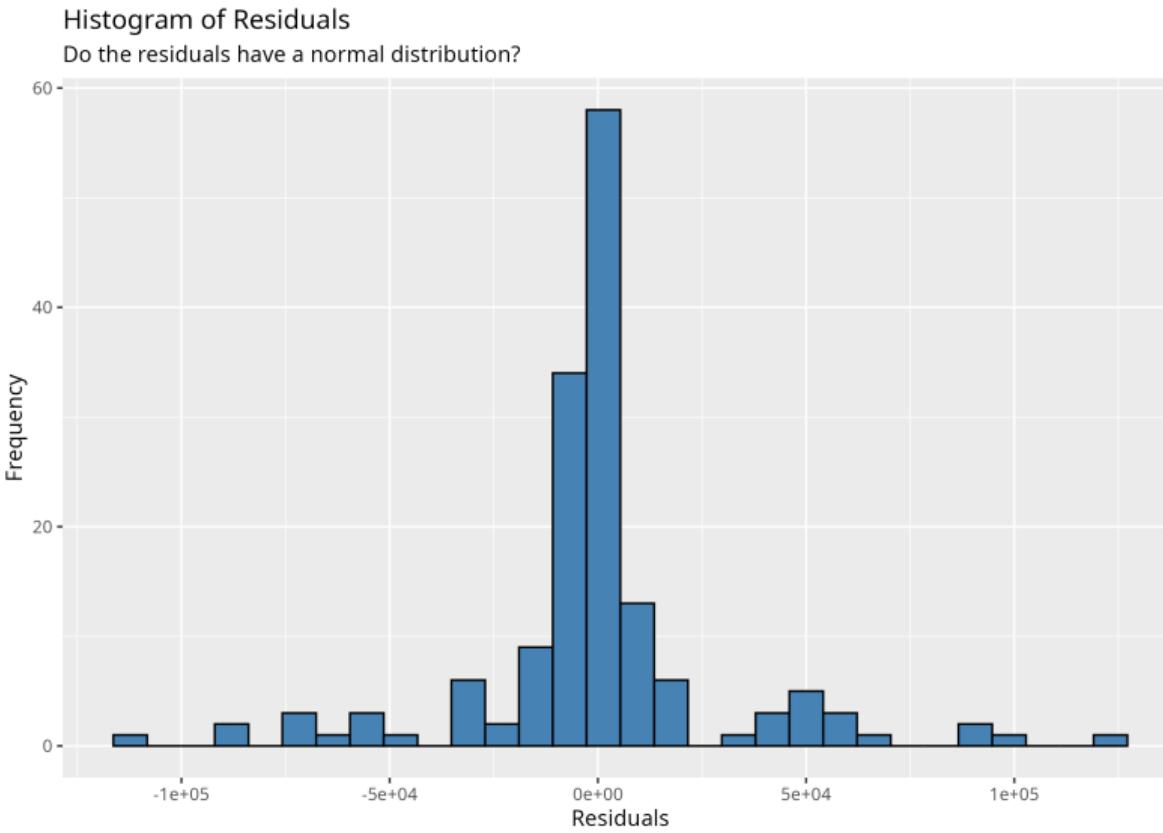


Time series versus forecast

Residual vs. Fitted Values Plot



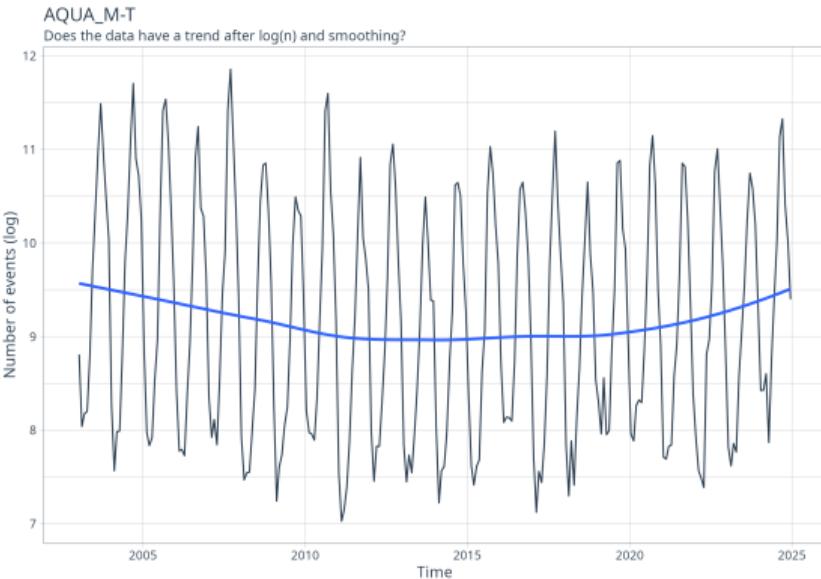
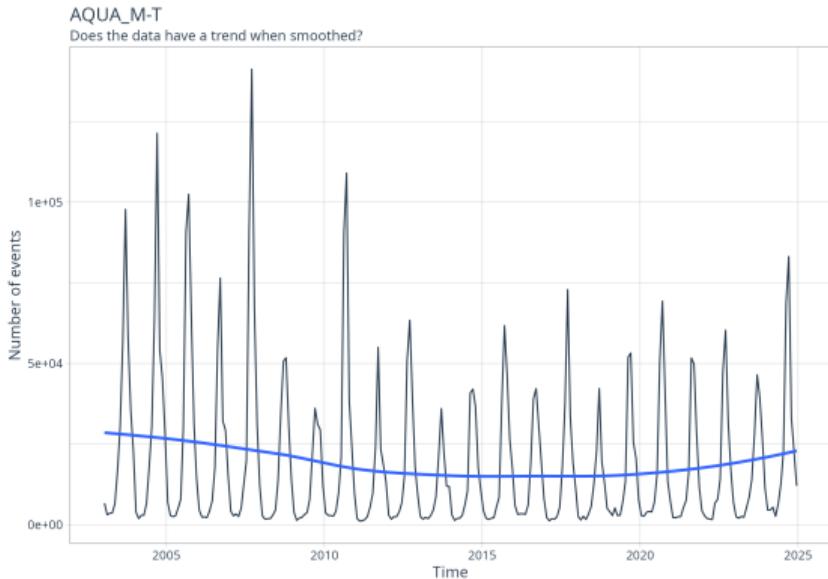
Time series versus forecast



AQUA M T



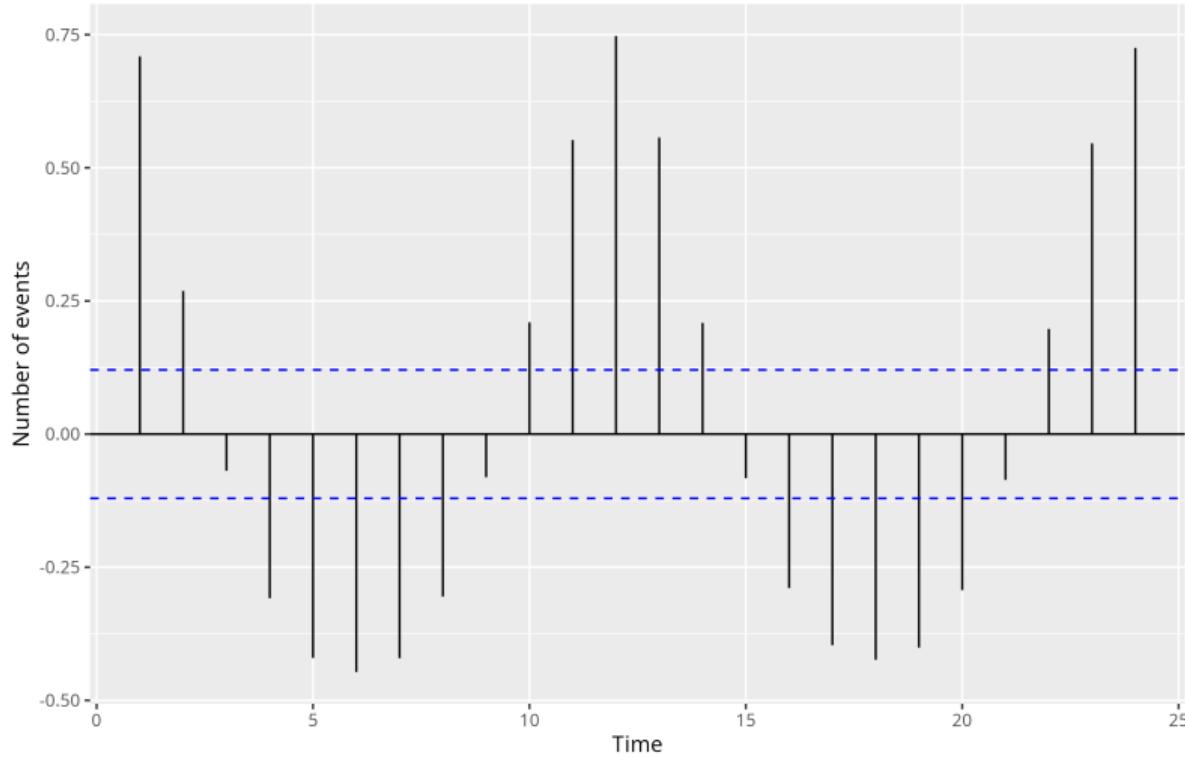
Time series trend (with smoothing)



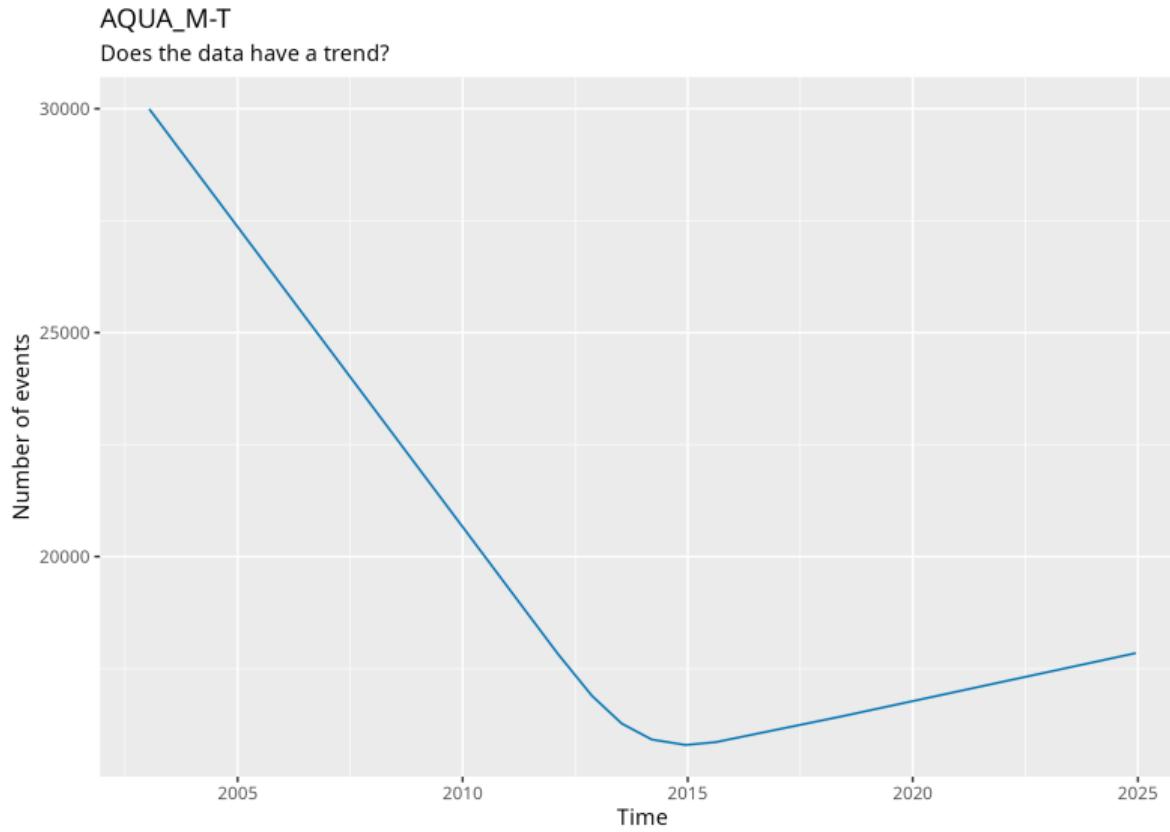
Time series autocorrelation

AQUA_M-T

Is the time series autocorrelated?



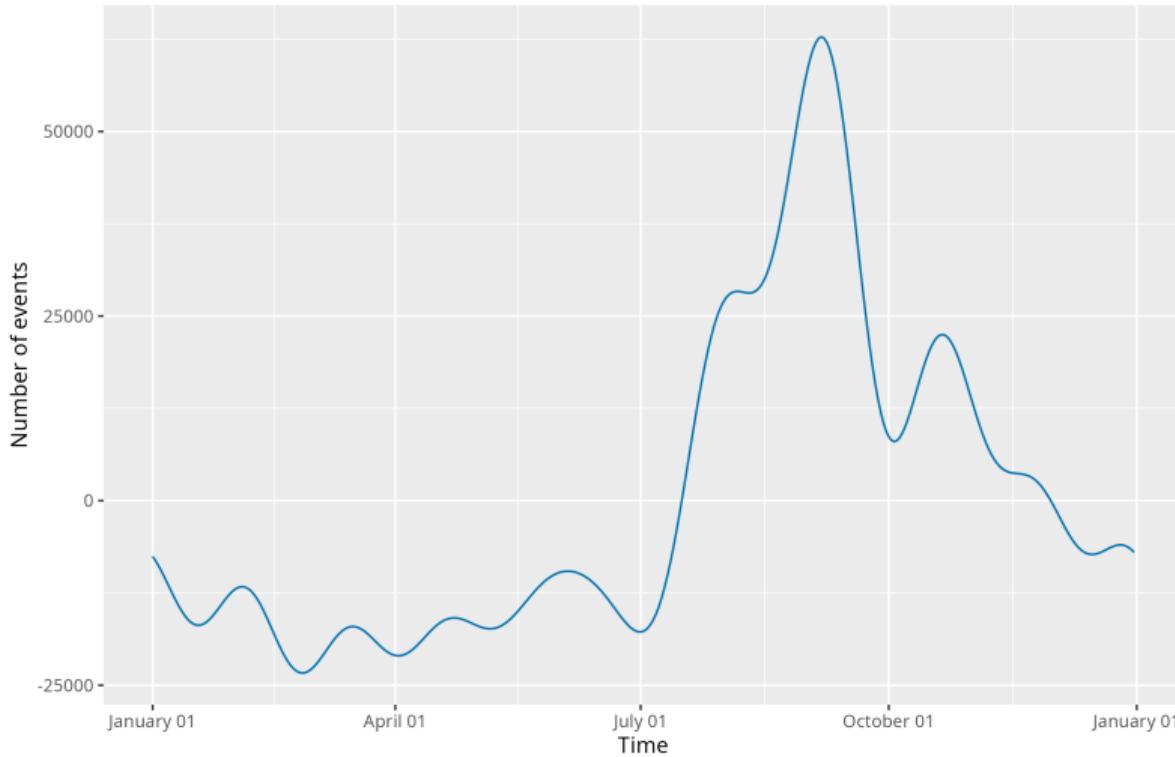
Time series trend



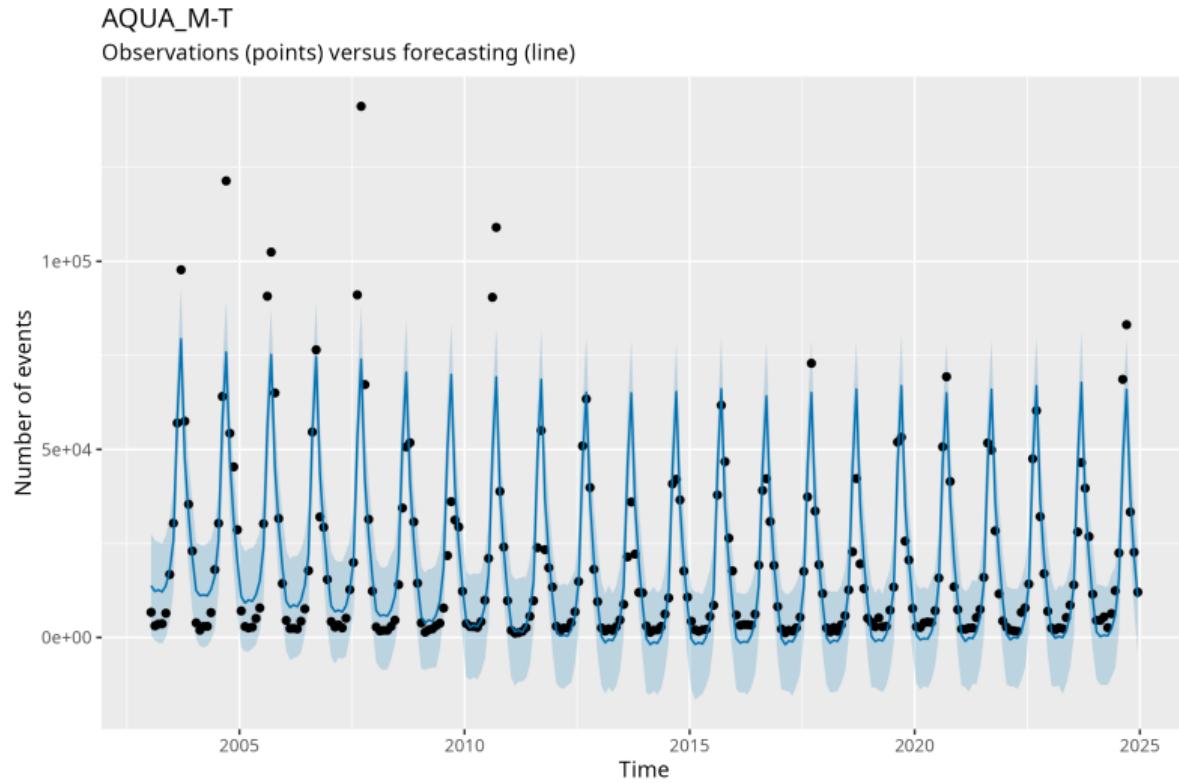
Time series seasonality

AQUA_M-T

Does the data have a seasonality?

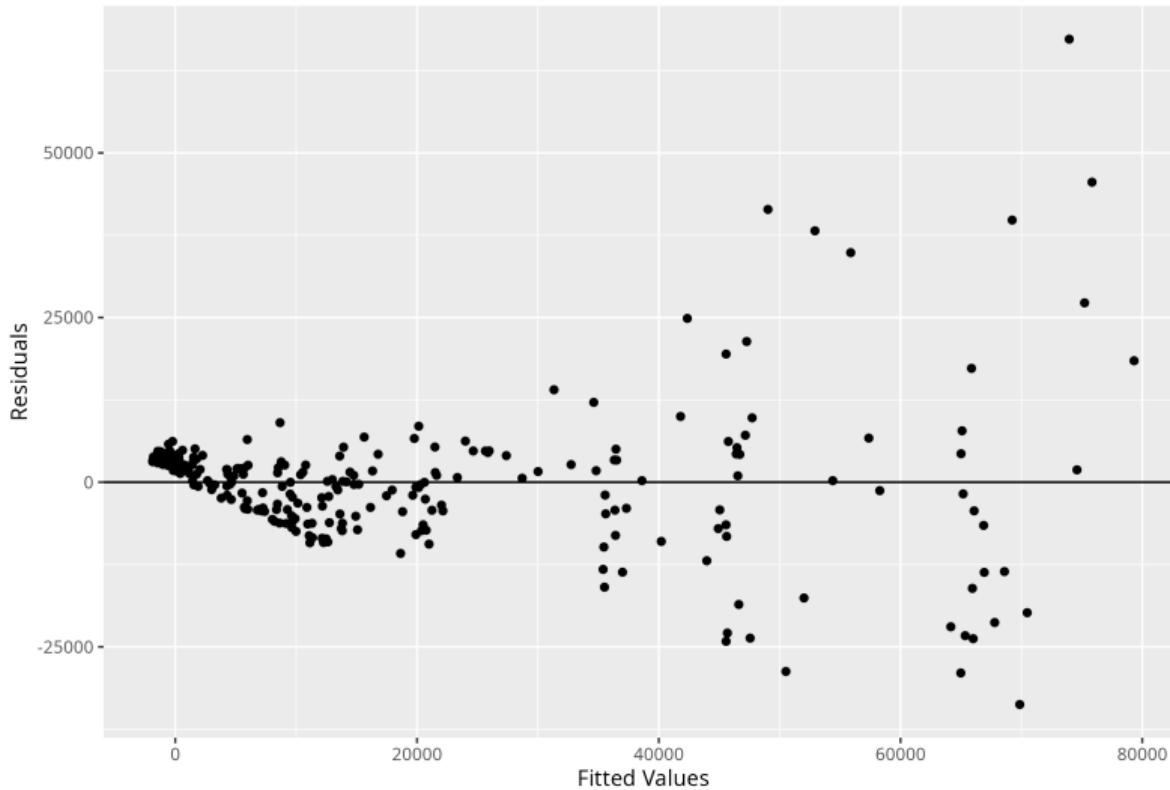


Time series versus forecast



Time series versus forecast

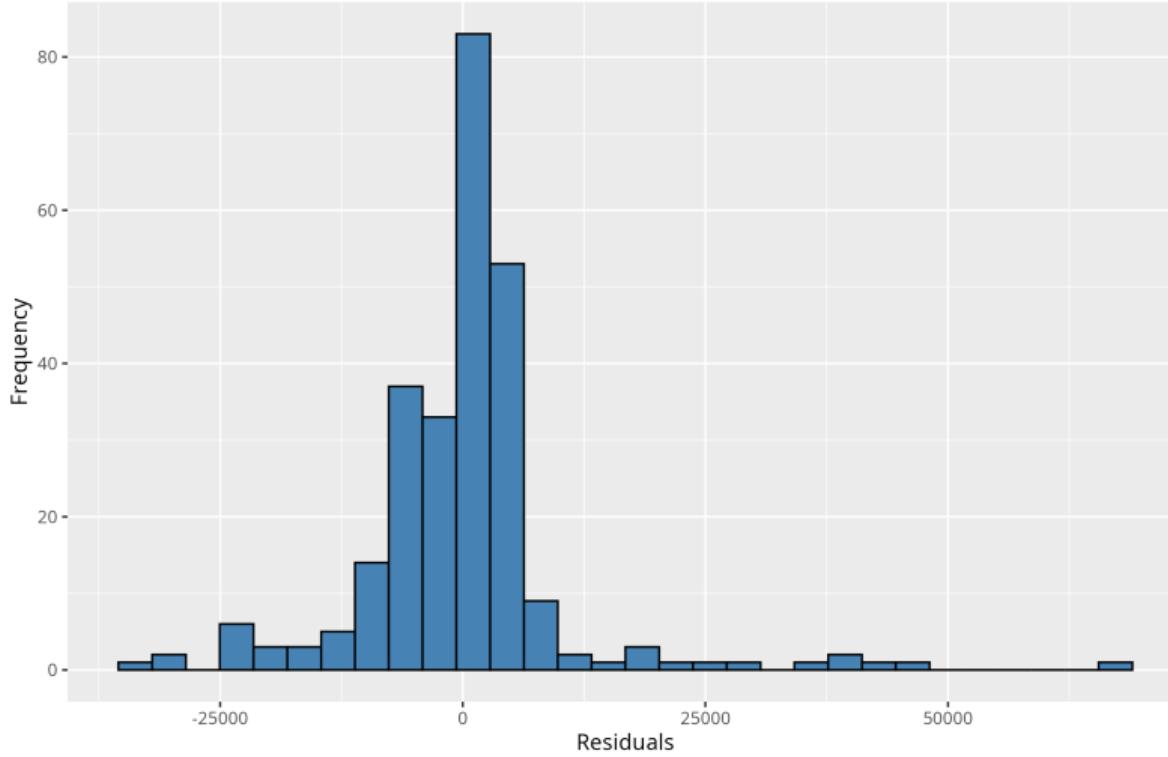
Residual vs. Fitted Values Plot



Time series versus forecast

Histogram of Residuals

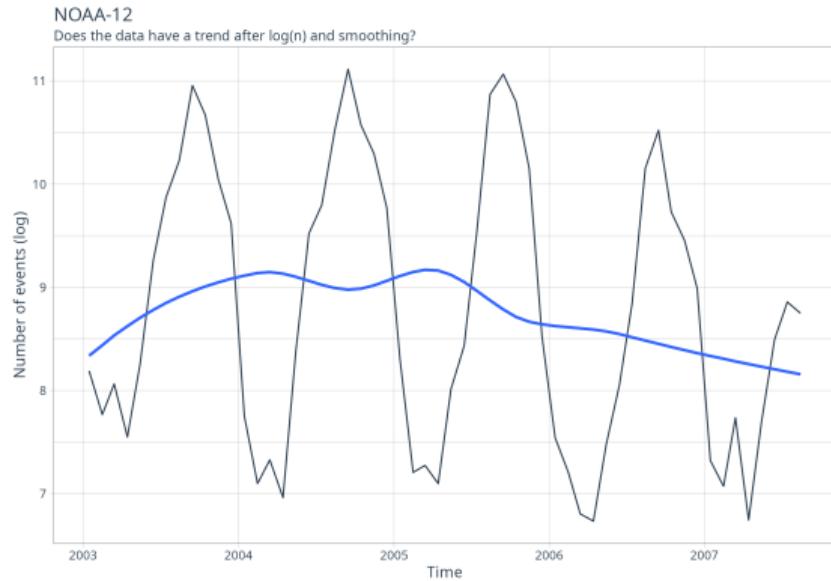
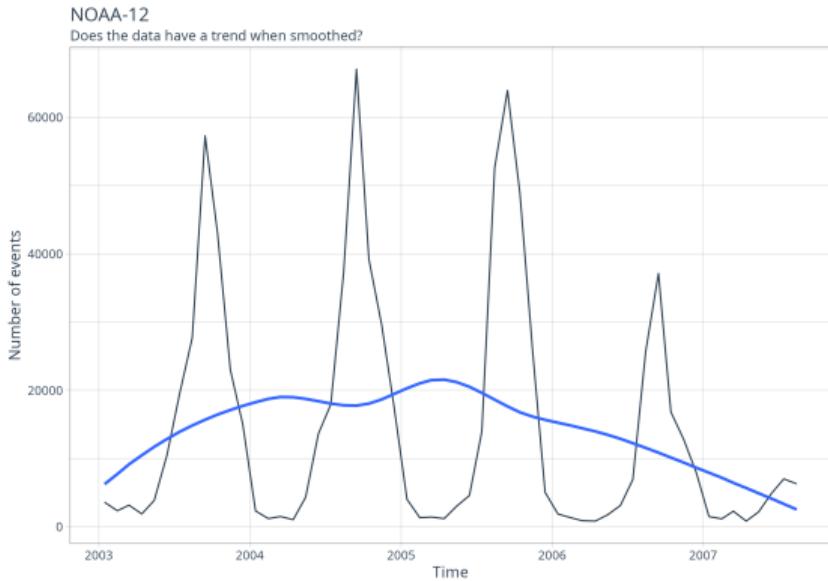
Do the residuals have a normal distribution?



NOAA 12



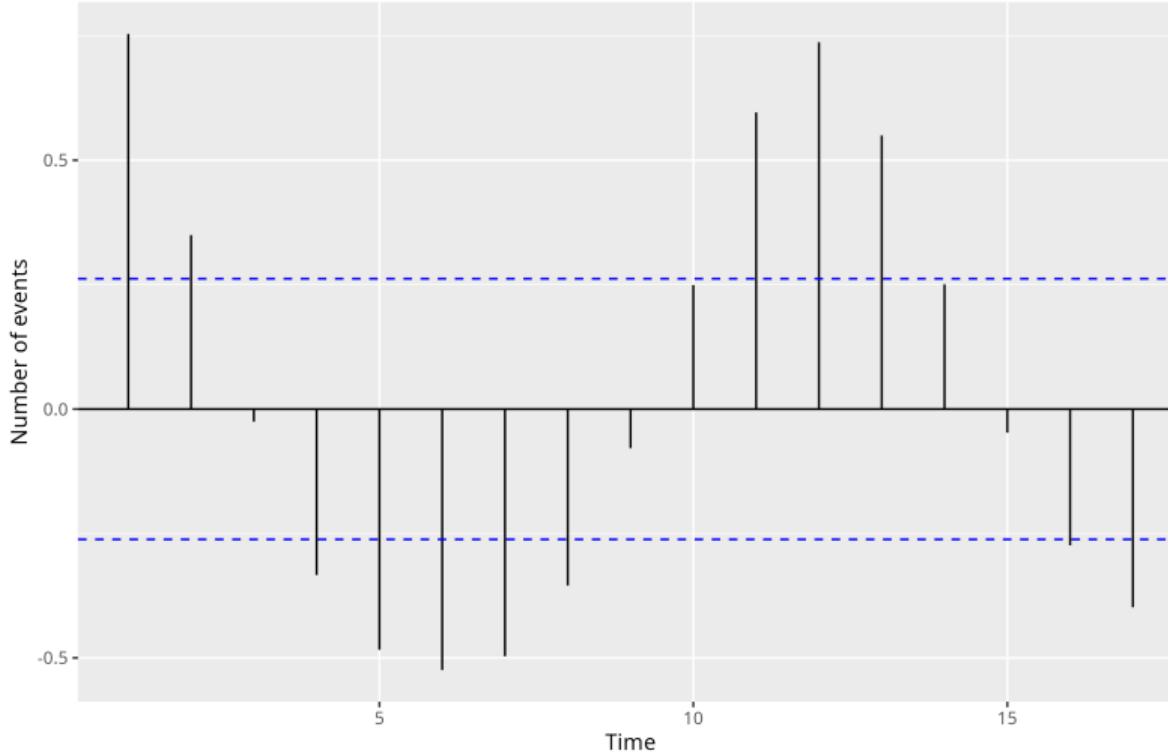
Time series trend (with smoothing)



Time series autocorrelation

NOAA-12

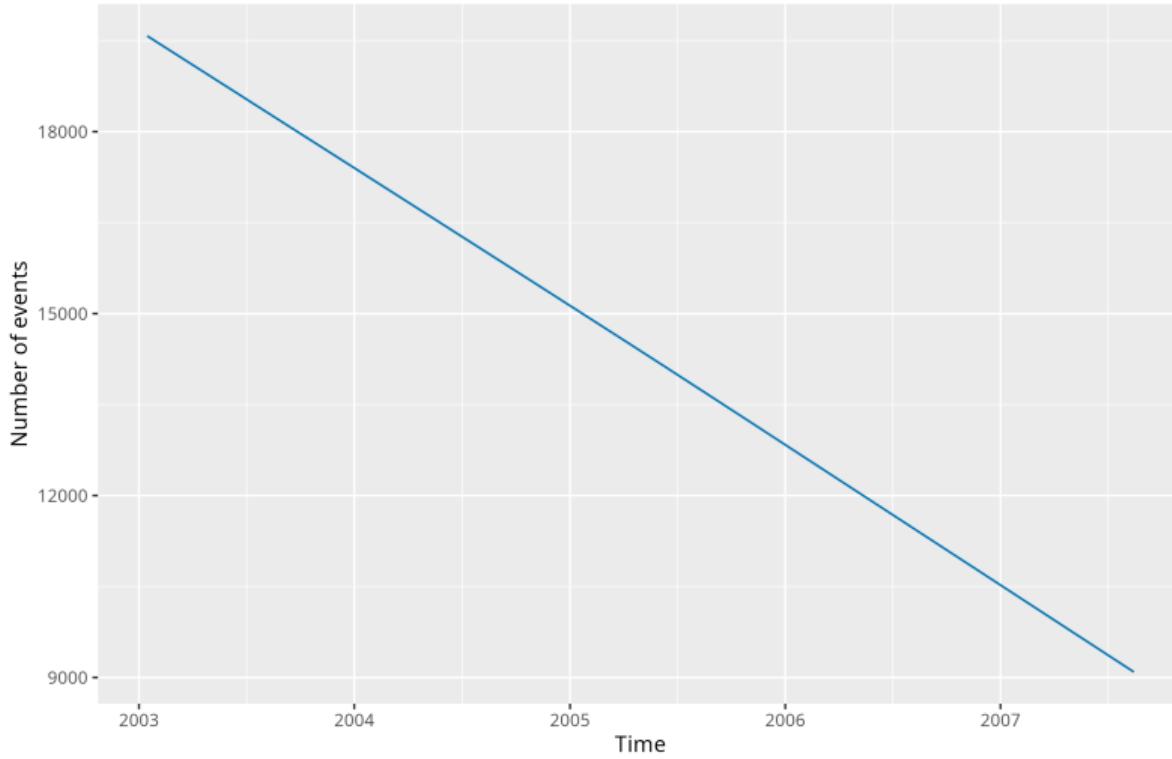
Is the time series autocorrelated?



Time series trend

NOAA-12

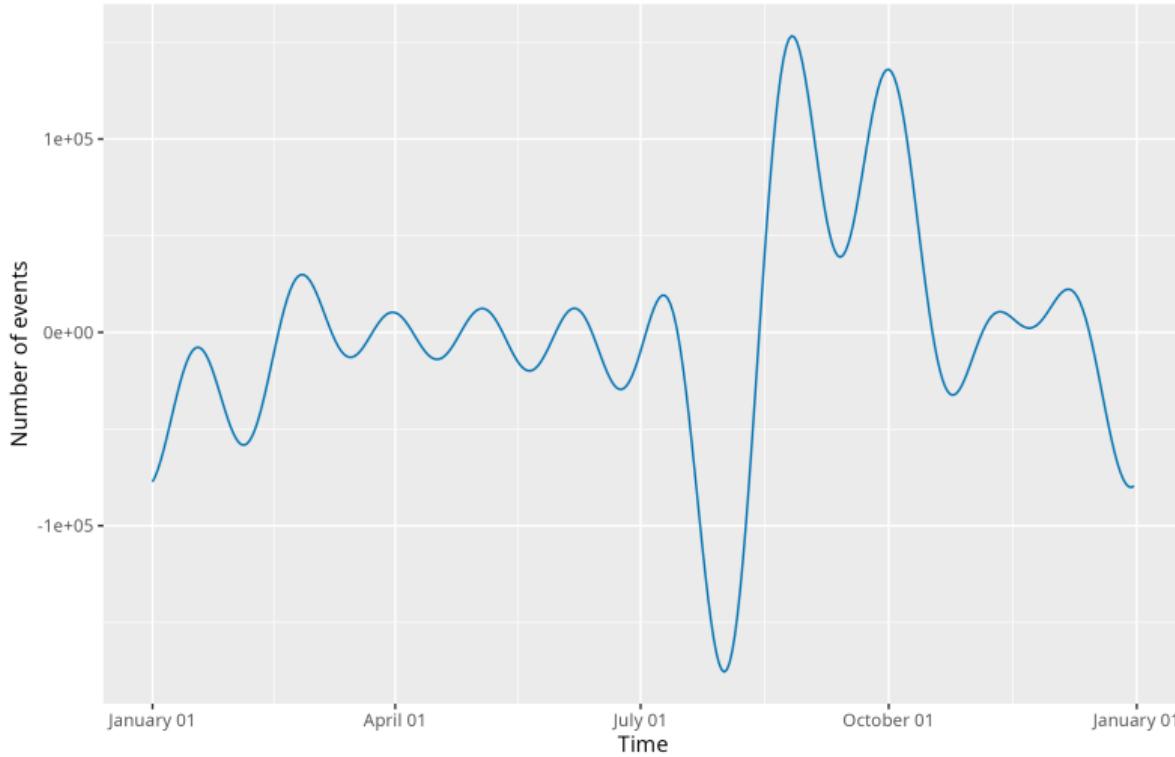
Does the data have a trend?



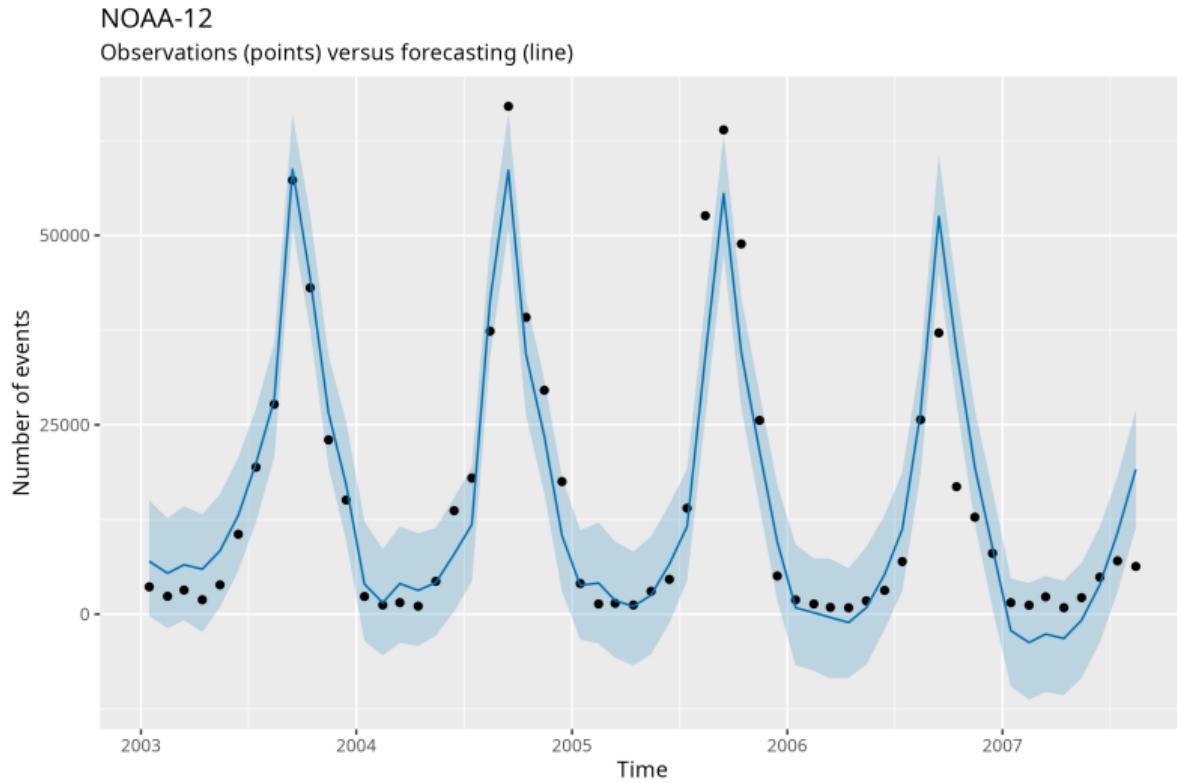
Time series seasonality

NOAA-12

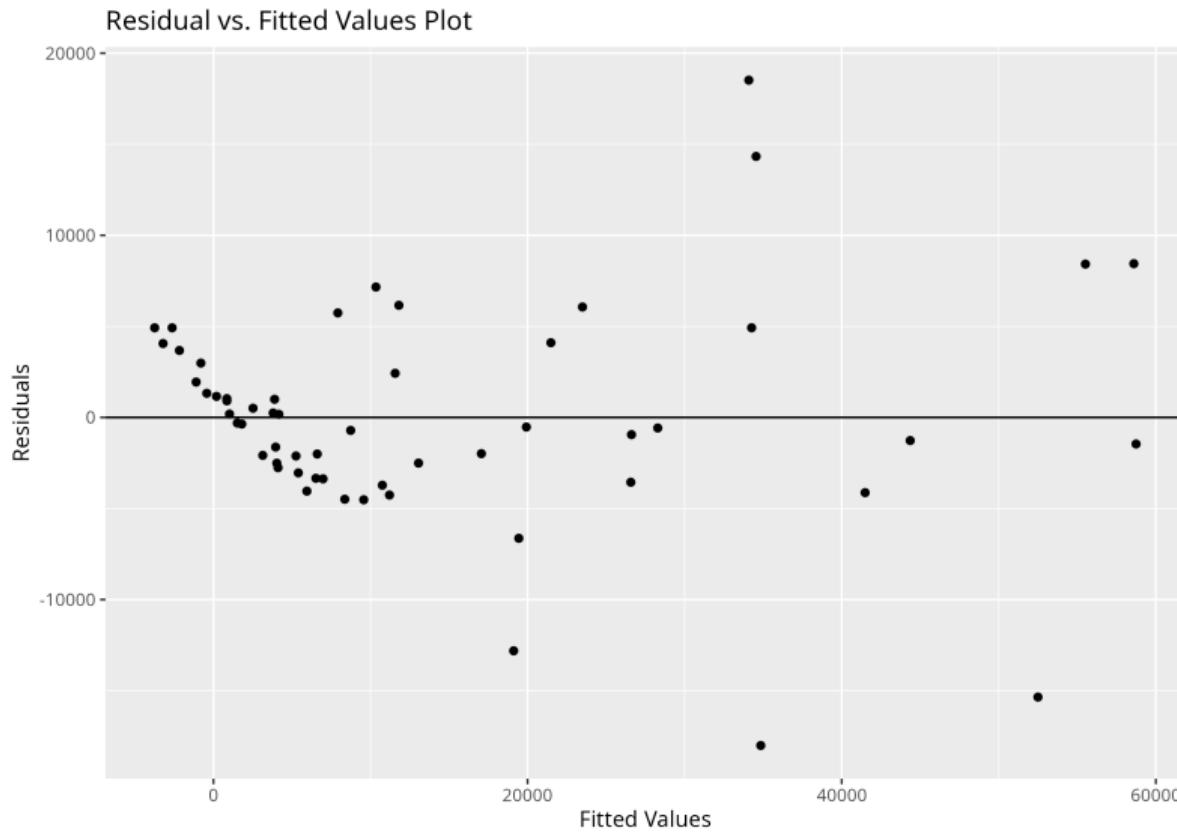
Does the data have a seasonality?



Time series versus forecast



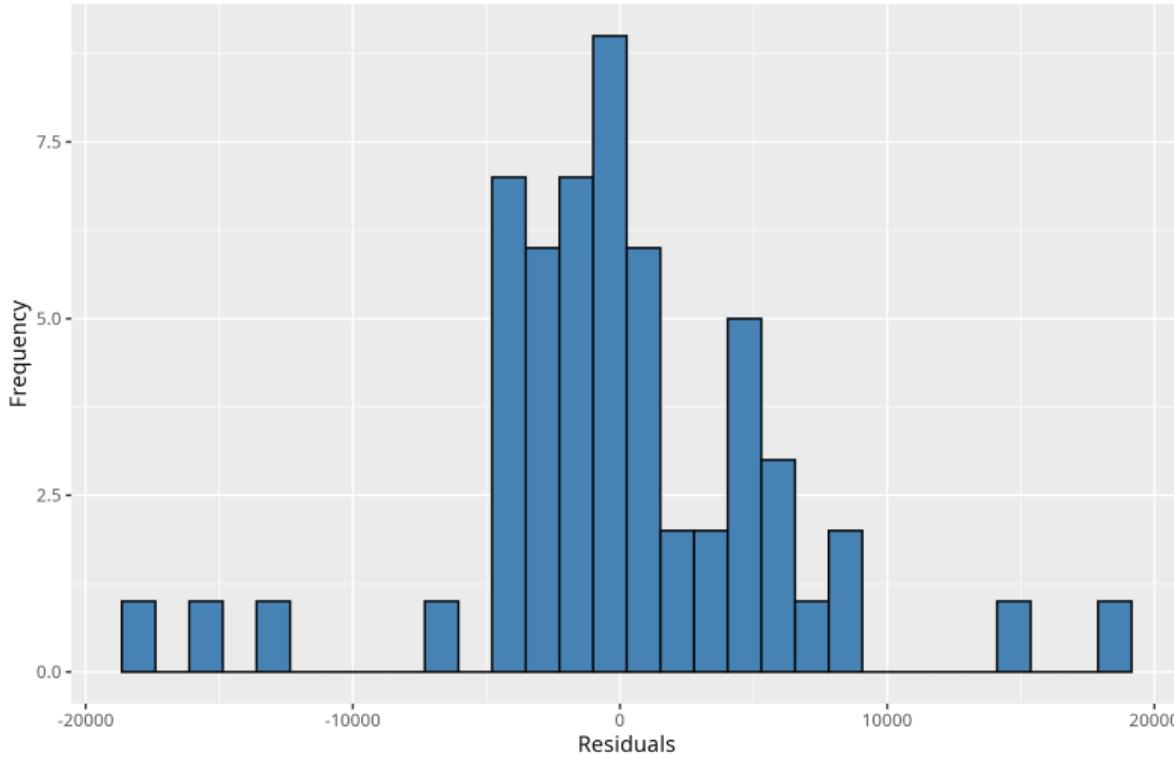
Time series versus forecast



Time series versus forecast

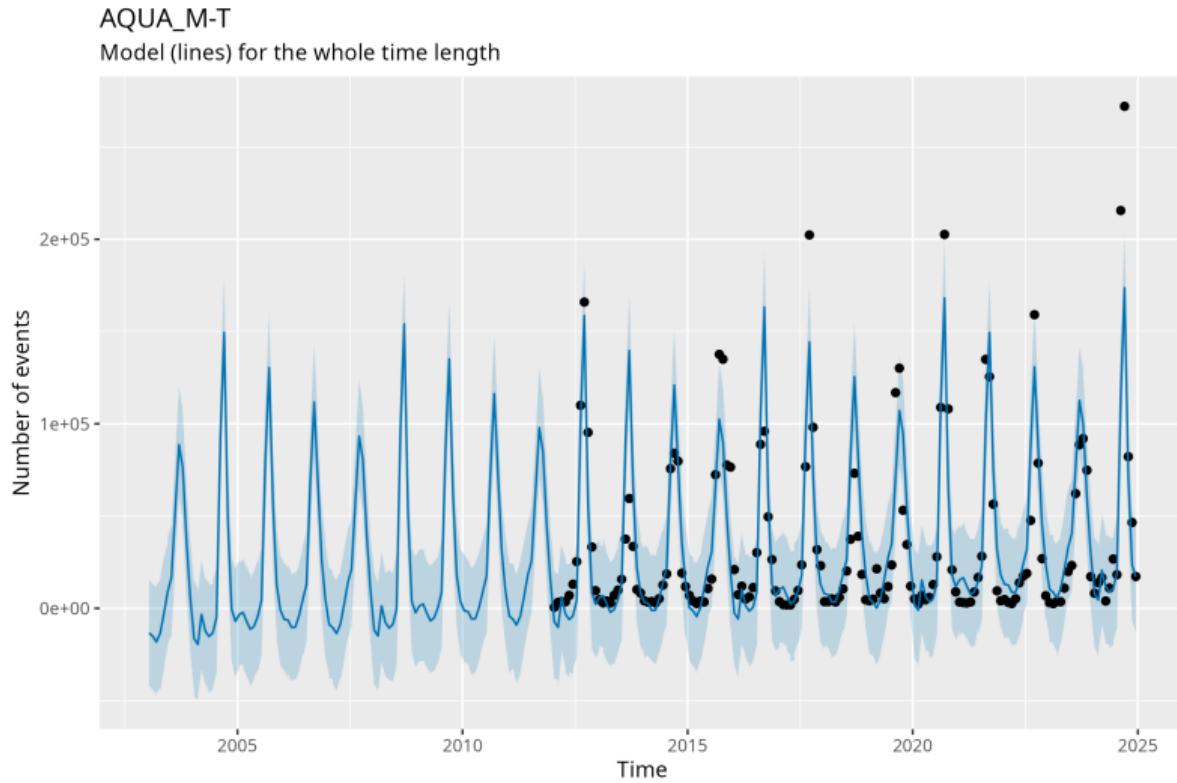
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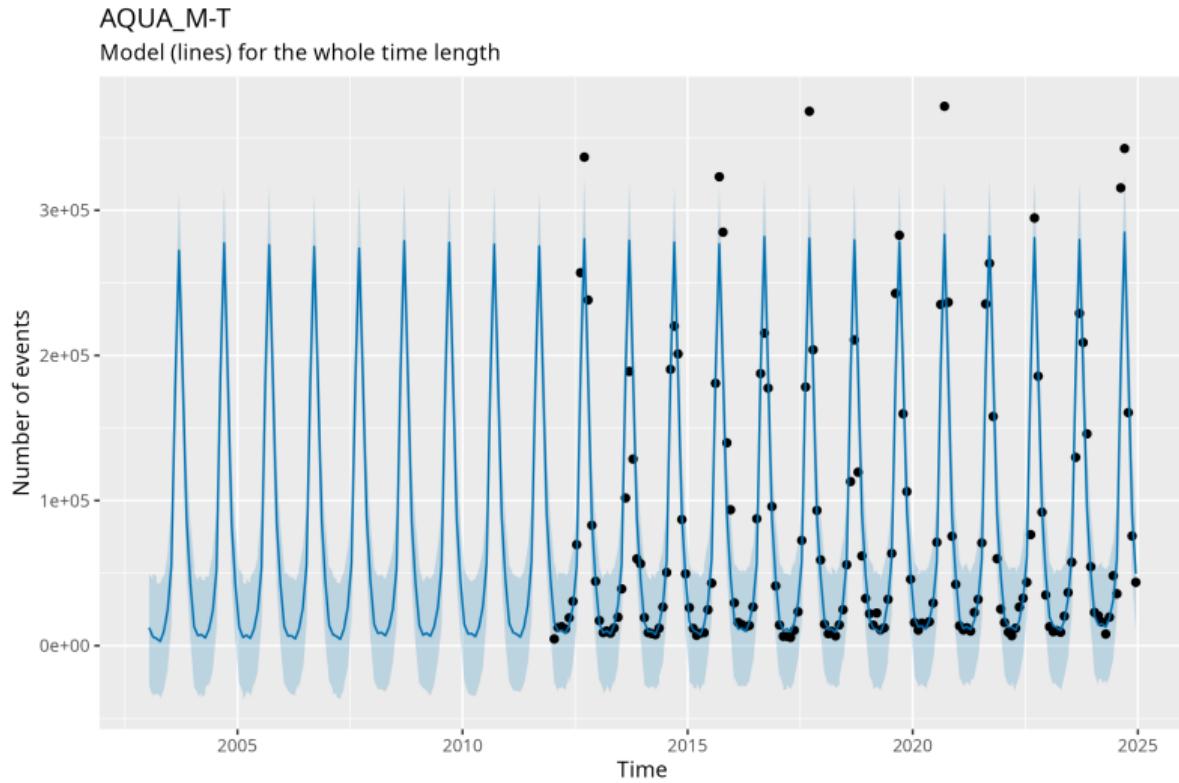


Forecast

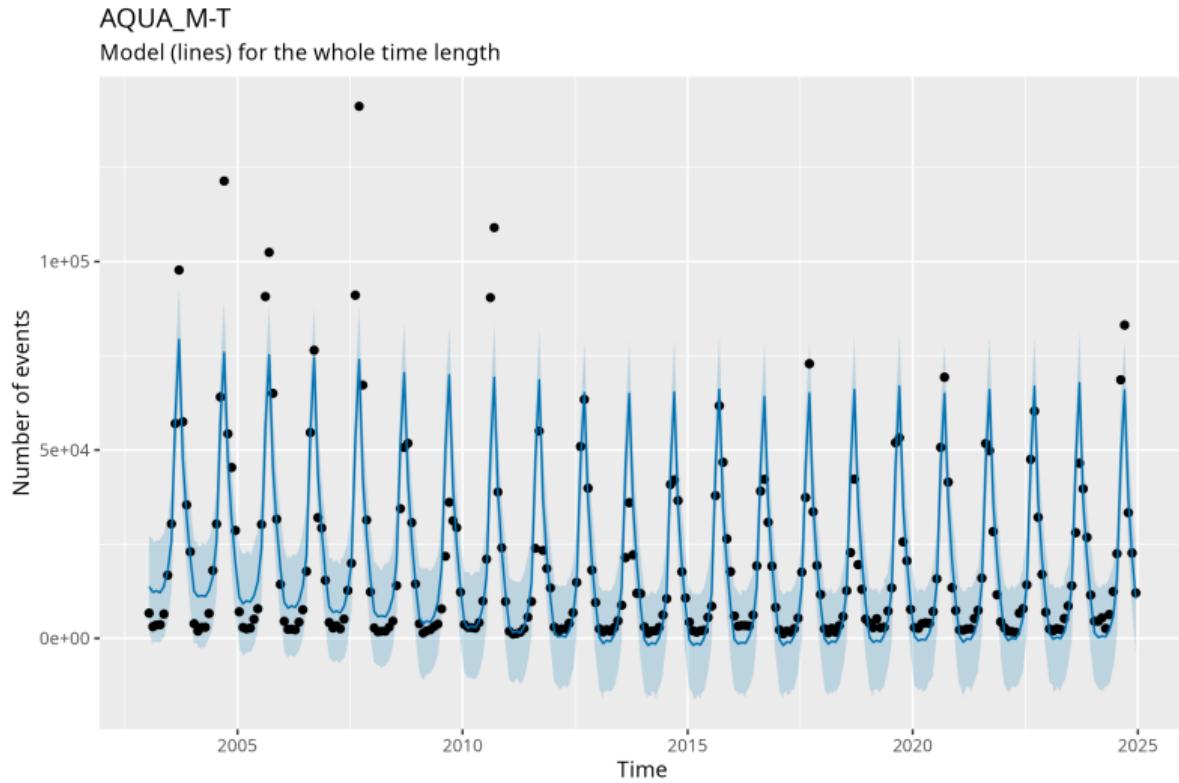
Forecast



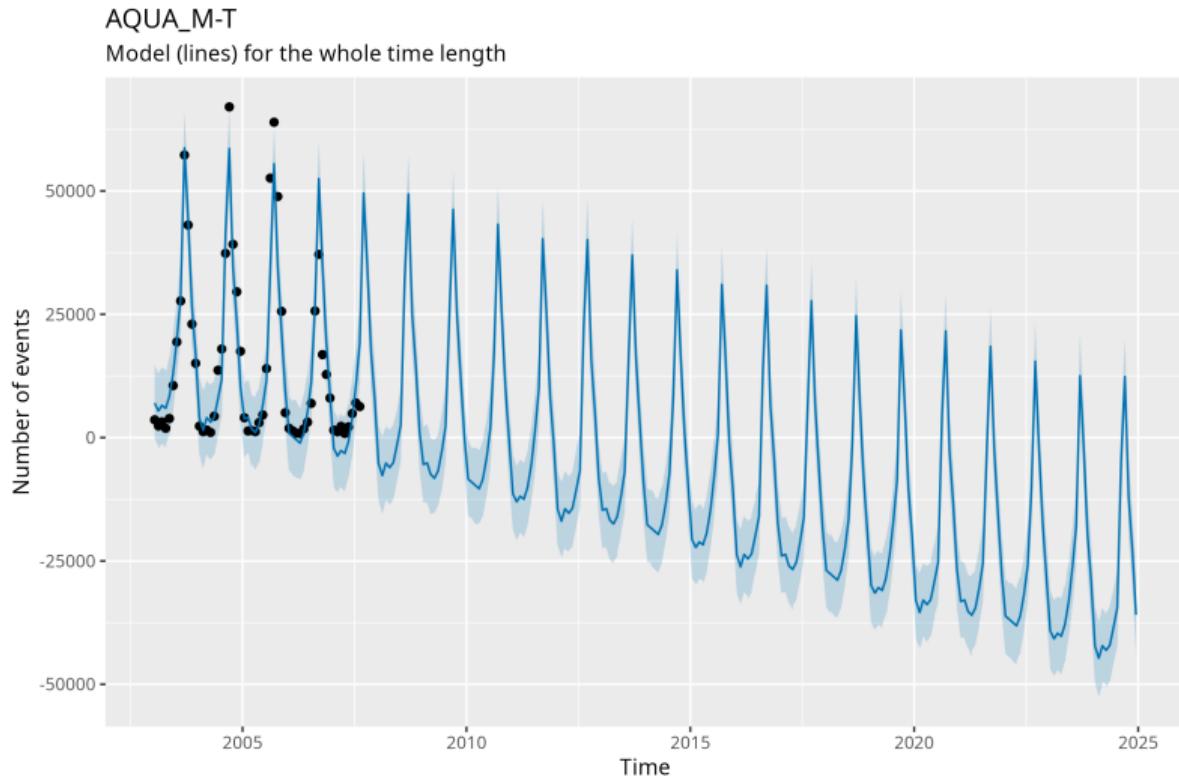
Forecast



Forecast



Forecast



Future Work

Future work

- Compare the forecasts to the actual observations of other satellites. This would require to do a transformation from one time series to another in order to make their values comparable to the forecast.
- NOTE: This is well documented in the reviewed literature (so far).



References

References |

- [1] National Institute for Space Research in Brazil. *Banco de Dados de Queimadas*. 2023.
URL: <http://www.inpe.br/queimadas/bdqueimadas> (visited on 02/11/2026).
- [2] Alberto Setzer, Fabiano Morelli, and Jean Carlos Souza. “O Banco de Dados de Queimadas Do INPE”. In: *Biodiversidade Brasileira* 9.1 (2019), pp. 239–239.

