

Timeseries

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Quarto

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Running Code

When you click the **Render** button a document will be generated that includes both content and the output of embedded code. You can embed code like this:

```
setwd("C:/Users/sarah22/OneDrive - Université Laval/Uni Course R/New Time series")

# Maintenant, lisez les données de hawaii.csv
data <- read.csv("hawaii.csv")

# Charger les bibliothèques nécessaires

library(tidyverse)
```

Warning: package 'tidyverse' was built under R version 4.3.3

Warning: package 'ggplot2' was built under R version 4.3.3

Warning: package 'tidyr' was built under R version 4.3.3

Warning: package 'readr' was built under R version 4.3.3

Warning: package 'purrr' was built under R version 4.3.3

Warning: package 'dplyr' was built under R version 4.3.3

Warning: package 'forcats' was built under R version 4.3.3

Warning: package 'lubridate' was built under R version 4.3.3

```
-- Attaching core tidyverse packages ----- tidyverse 2.0.0 --
v dplyr      1.1.4      v readr      2.1.5
v forcats    1.0.0      v stringr    1.5.1
v ggplot2    3.5.0      v tibble     3.2.1
v lubridate  1.9.3      v tidyr      1.3.1
v purrr      1.0.2
-- Conflicts ----- tidyverse_conflicts() --
x dplyr::filter() masks stats::filter()
x dplyr::lag()     masks stats::lag()
i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become
```

```
library(readr)
library(lubridate)
library(dplyr)
library(forecast)
```

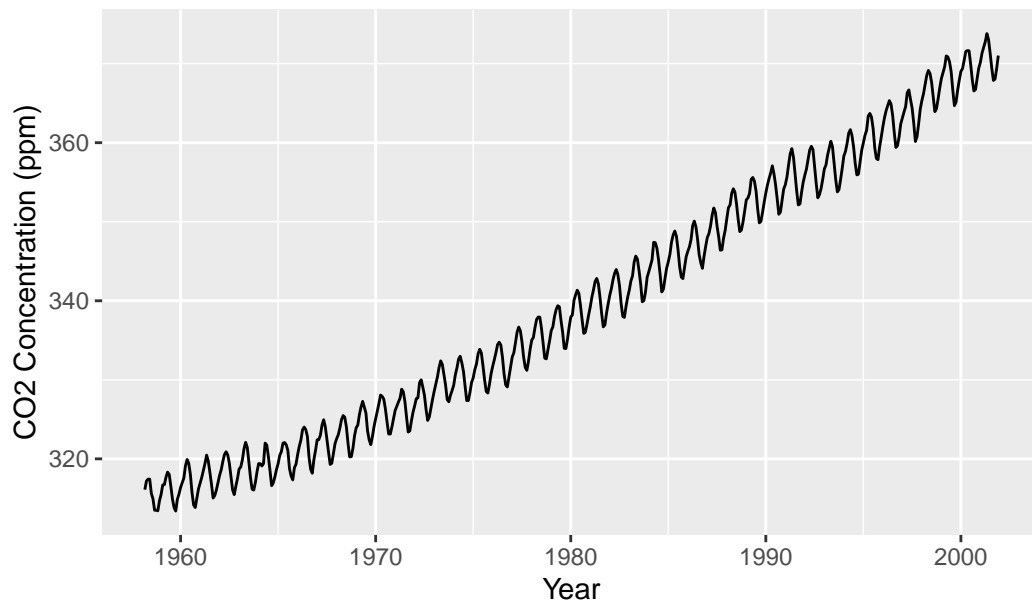
Warning: package 'forecast' was built under R version 4.3.3

Registered S3 method overwritten by 'quantmod':

```
method      from
as.zoo.data.frame zoo
```

```
tinytex::install_tinytex(force = TRUE)
co2_time_series <- ts(data$CO2, start = c(1958, 3), end = c(2001, 12), frequency = 12)

# Affichage des données (données de tracé)
autoplot(co2_time_series, xlab = "Year", ylab = "CO2 Concentration (ppm)")
```

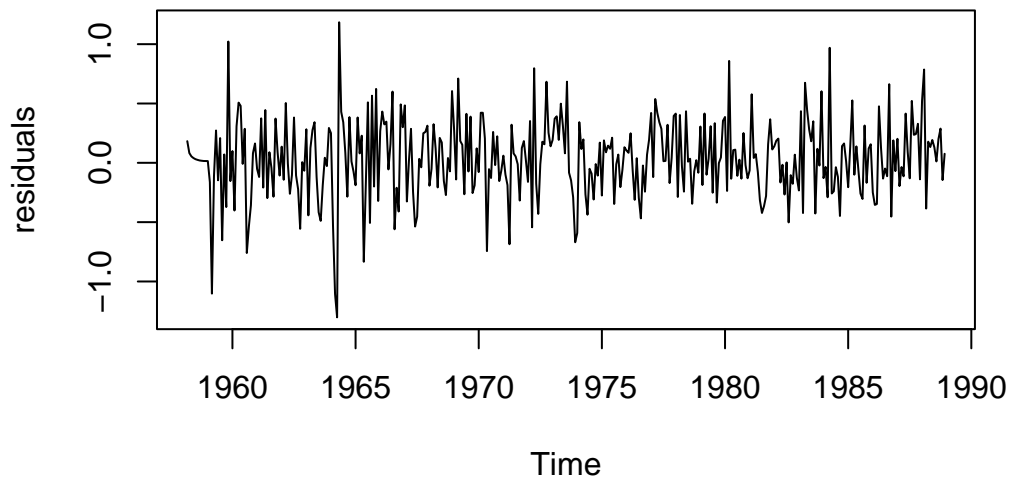


```
# Deuxièmement: séparez la série en parties de formation et de test
train_size <- round(length(co2_time_series) * 0.7)
train_data <- window(co2_time_series, end = c(1988, 12))
test_data <- window(co2_time_series, start = c(1989, 1))

# Troisième étape: Créer un modèle de prévision sur les données d'entraînement et projeter la
# prévision sur les données de test

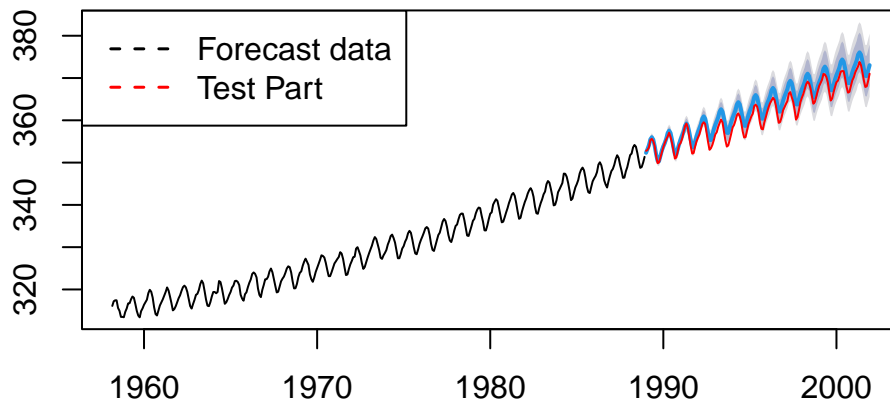
model <- auto.arima(train_data)
forecast <- forecast(model, h = length(test_data))

# Quatrième étape: Effectuer une analyse résiduelle
residuals <- residuals(model)
plot(residuals)
```



```
# Commenter la fiabilité du modèle et suggérer des améliorations
# Pour déterminer la fiabilité du modèle, vous pouvez examiner plusieurs facteurs :
# Essayez maintenant de comparer les prévisions aux données de test pour inspecter visuellement
plot(forecast, main = "CO2 Forecast vs. Test Data")
lines(test_data, col = "red")
legend("topleft", legend = c("Forecast data", "Test Part"), col = c("black", "red"), lty = 2)
```

CO2 Forecast vs. Test Data



```
# Calcul de métriques telles que l'erreur absolue moyenne (MAE) ou l'erreur quadratique moyenne
accuracy_metrics <- accuracy(forecast, test_data)
print(accuracy_metrics)
```

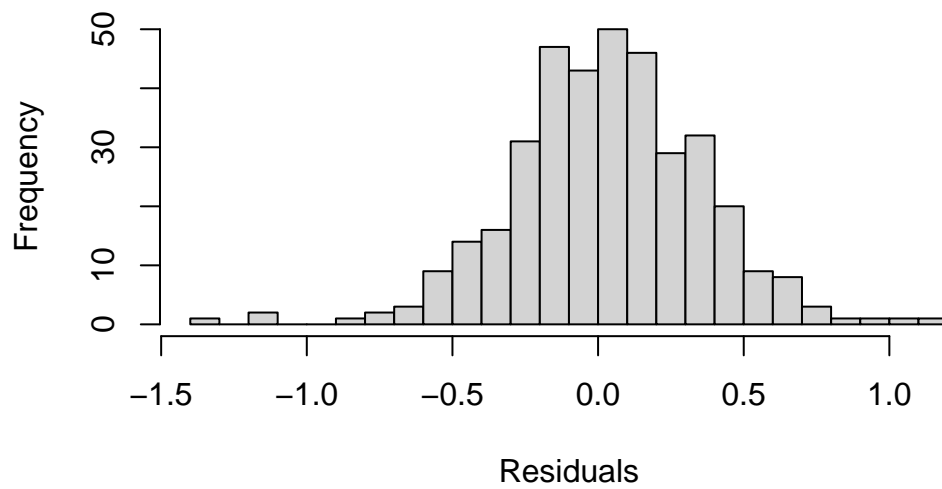
	ME	RMSE	MAE	MPE	MAPE	MASE
Training set	0.03148463	0.3297152	0.2532262	0.009219151	0.07684692	0.2063318
Test set	-1.83590171	2.0347280	1.8424535	-0.506681008	0.50853683	1.5012537

	ACF1	Theil's U
Training set	-0.01364101	NA
Test set	0.91558811	1.599435

```
# Extrayez les résidus de votre modèle
residuals <- residuals(model)

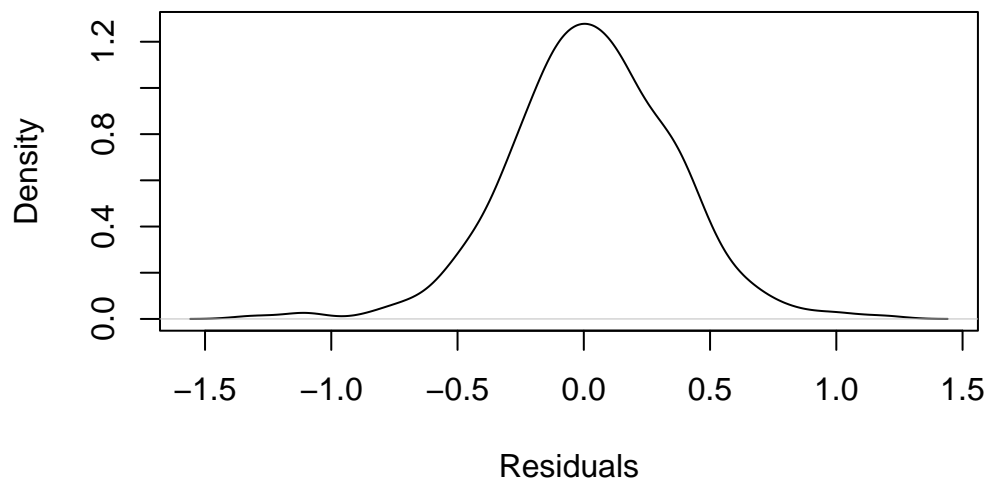
# Tracer l'histogramme des résidus
hist(residuals, breaks = 20, main = "Histogram of Residuals", xlab = "Residuals")
```

Histogram of Residuals

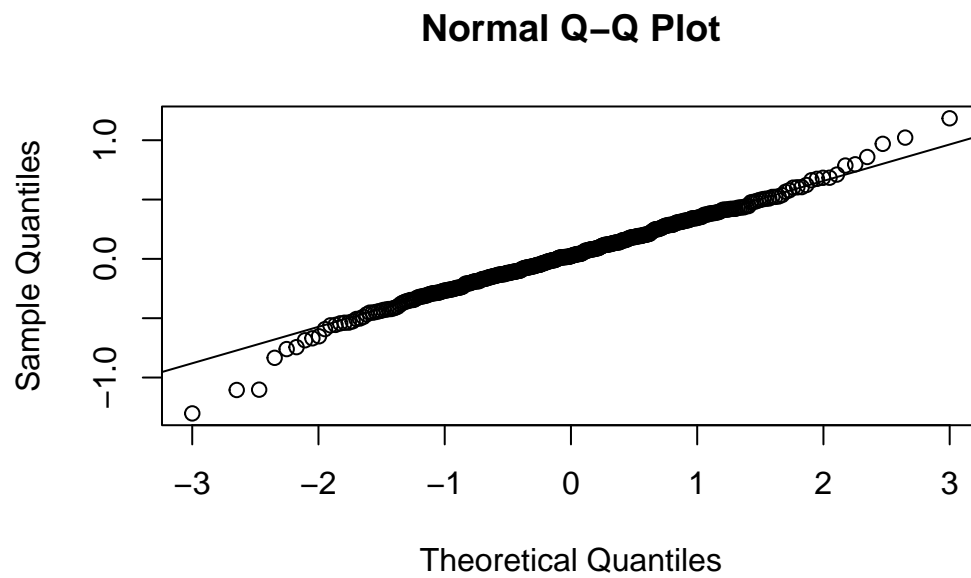


```
# Tracer la densité des résidus  
plot(density(residuals), main = "Density Plot of Residuals", xlab = "Residuals")
```

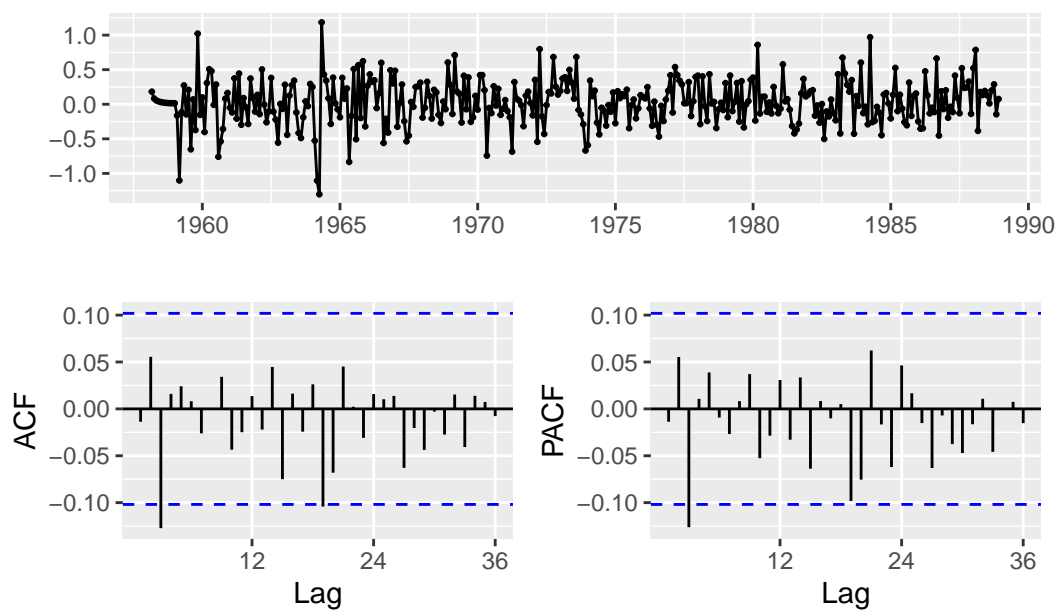
Density Plot of Residuals



```
# Évaluer la normalité des résidus  
qqnorm(residuals)  
qqline(residuals)
```



```
# Effectuer des diagnostics supplémentaires sur les résidus pour s'assurer qu'il s'agit bien  
# Tracés ACF et PACF des résidus  
ggtsdisplay(residuals)
```



You can add options to executable code like this

```
[1] 4
```

The `echo: false` option disables the printing of code (only output is displayed).