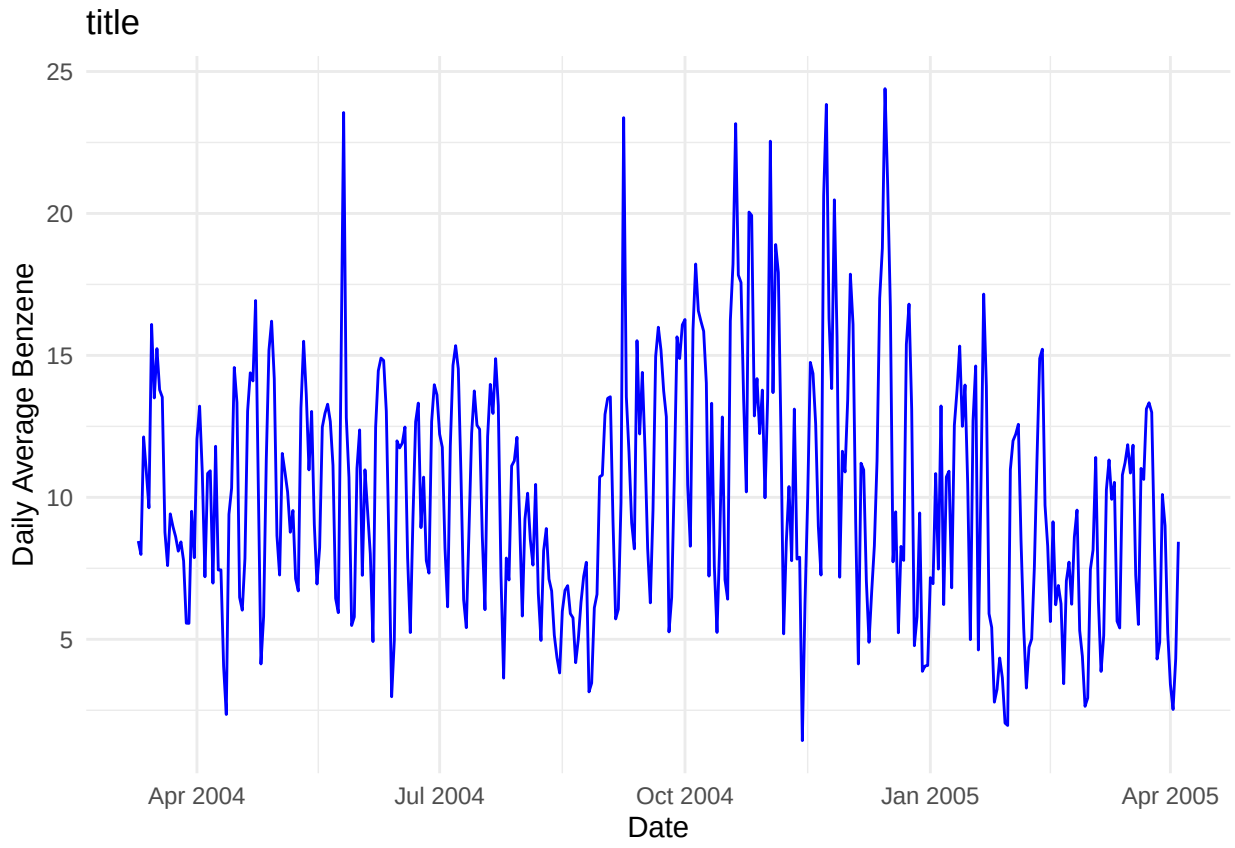
Experimental Analysis

Time Series Plots

Plot the Time Series Data to Visualize the Trends and Patterns of Benzene Concentration and Other Environmental Factors

```
plot_time_series(data_daily, "daily_avg_benzene", "Daily Average Benzene Concentration")
```

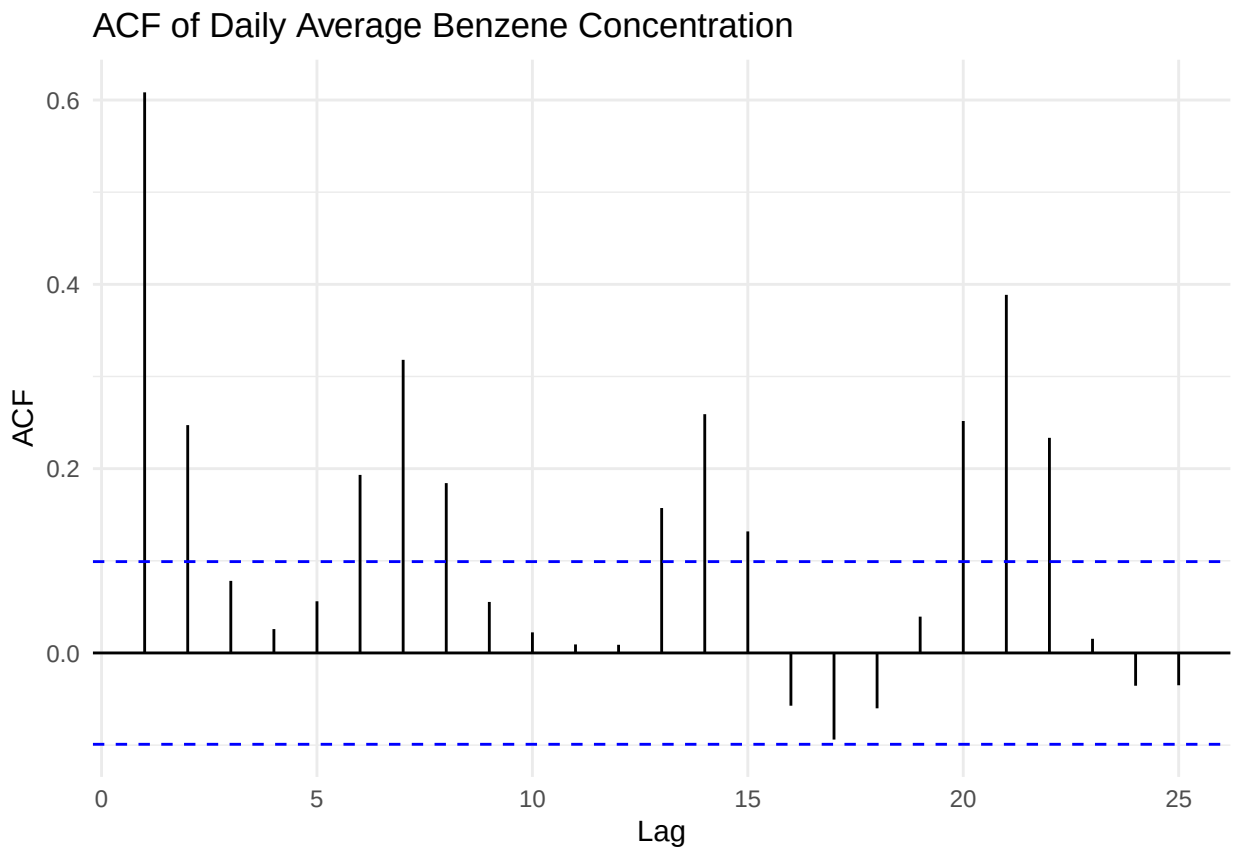


Plot ACF

Plot the ACF of Benzene Concentration to Observe the Autocorrelations

```
plot_acf(data_daily, "daily_avg_benzene", "Daily Average Benzene Concentration")
```

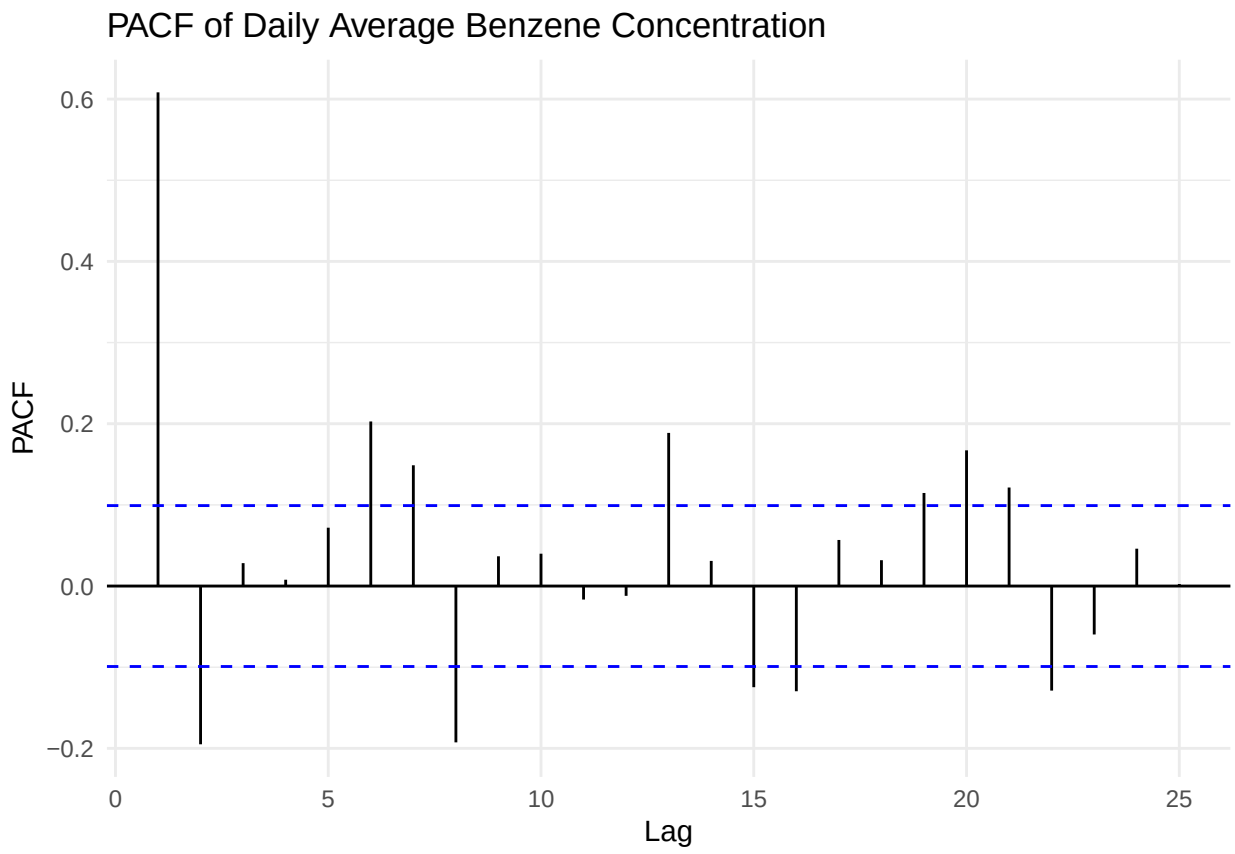
```
## Warning in ggplot2::geom_segment(lineend = "butt", ...): Ignoring unknown
## parameters: `main`
```



Plot PACF

Plot the PACF of Benzene Concentration to Observe the Partial Autocorrelations

```
## Warning in ggplot2::geom_segment(lineend = "butt", ...): Ignoring unknown
## parameters: ‘main‘
```



Hypothesis Testing

Conduct Hypothesis Testing to Check the Stationarity of the Benzene Concentration Time Series

```
hypothesis_tests <- conduct_hypothesis_testing(data_daily, "daily_avg_benzene")

# Print Detailed Results for Each Test
print(hypothesis_tests$adf_test)
```

```
##
##  Augmented Dickey-Fuller Test
##
## data:  df[[column]]
## Dickey-Fuller = -5.1861, Lag order = 7, p-value = 0.01
## alternative hypothesis: stationary
```

```
print(hypothesis_tests$kpss_test)
```

```
##
##  KPSS Test for Level Stationarity
##
## data:  df[[column]]
## KPSS Level = 0.40337, Truncation lag parameter = 5, p-value = 0.0757
```