Bijlage 3 - tijdreeks chlorofyl A

Initialisatie

Kwaliteitstoetsen

```
#Stationarity tests
adf.test(df_ts)
```

```
## Warning in adf.test(df_ts): p-value smaller than printed p-value
```

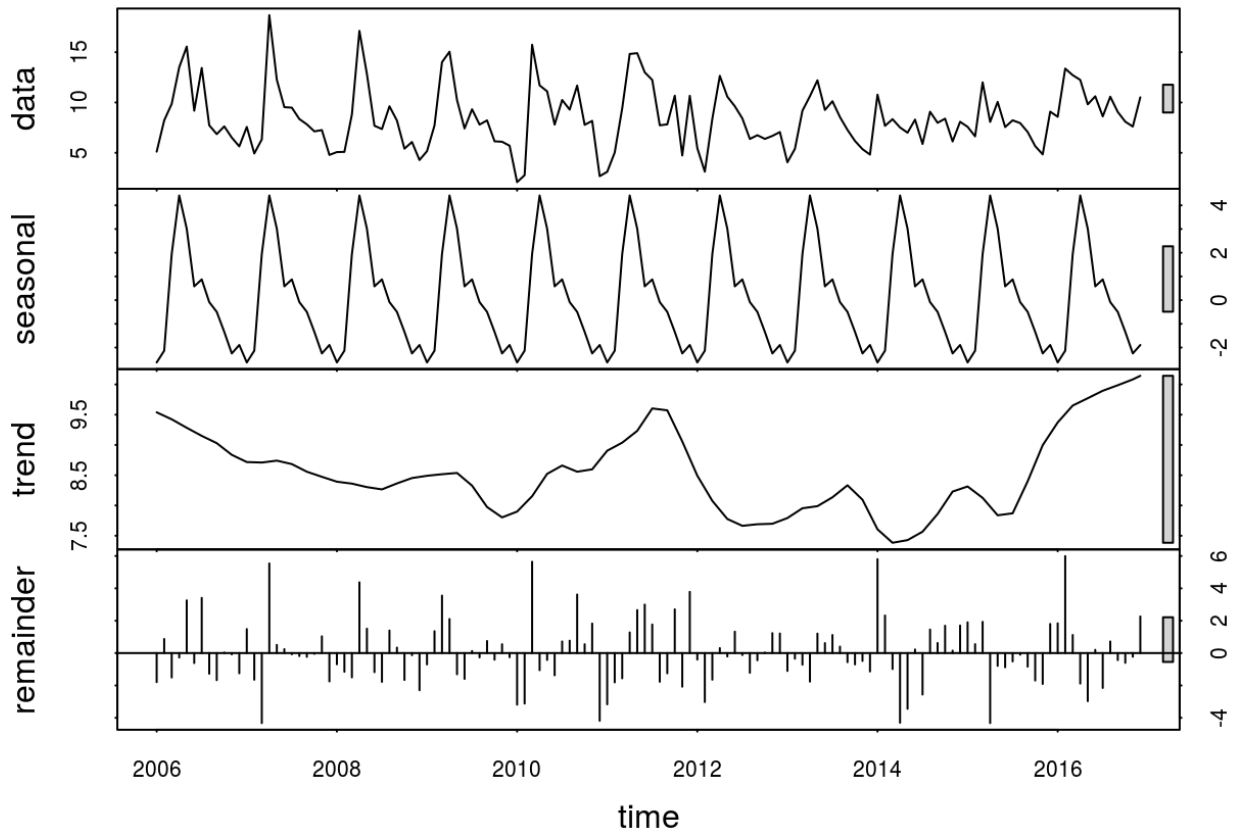
```
##
##  Augmented Dickey-Fuller Test
##
## data:  df_ts
## Dickey-Fuller = -6.1299, Lag order = 5, p-value = 0.01
## alternative hypothesis: stationary
```

```
kpss.test(df_ts)
```

```
## Warning in kpss.test(df_ts): p-value greater than printed p-value
```

```
##
##  KPSS Test for Level Stationarity
##
## data:  df_ts
## KPSS Level = 0.048221, Truncation lag parameter = 2, p-value = 0.1
```

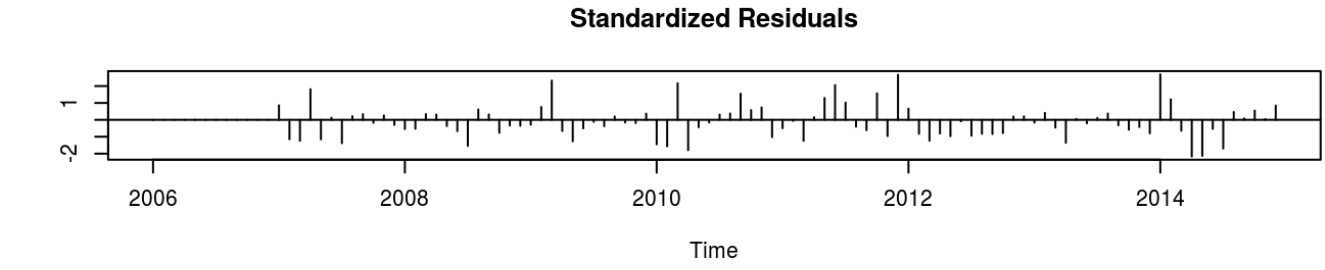
```
#STL decomposition
df_stl <- stl(df_ts, s.window = 'periodic')
plot(df_stl)
```

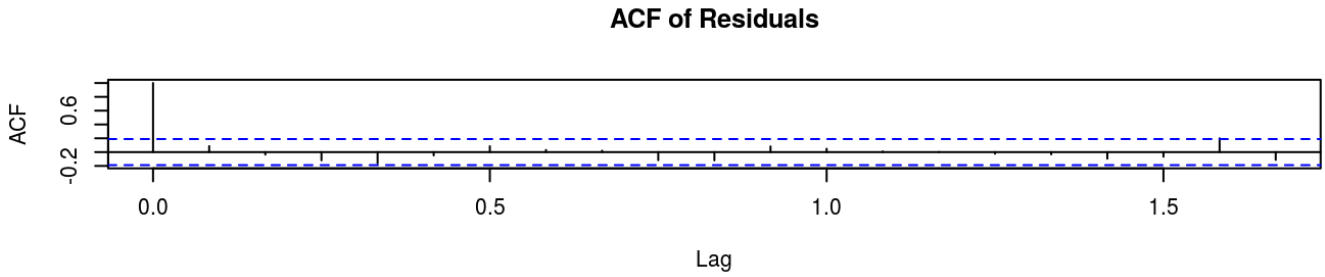


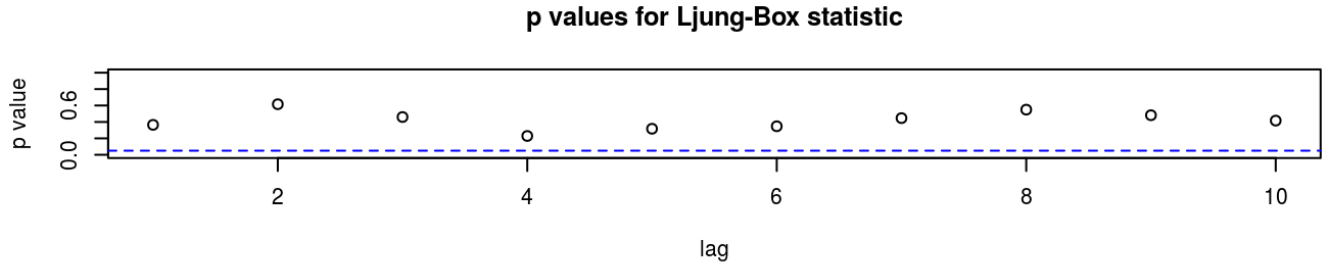
Model

```
##Train/test split to assess model quality with.
df_train <- stats::window(df_ts, 2006, c(2014, 12))
df_test <- stats::window(df_ts, 2015)
```

```
#Model fit and diagnosis
df_arima <- auto.arima(df_train)
tsdiag(df_arima)
```





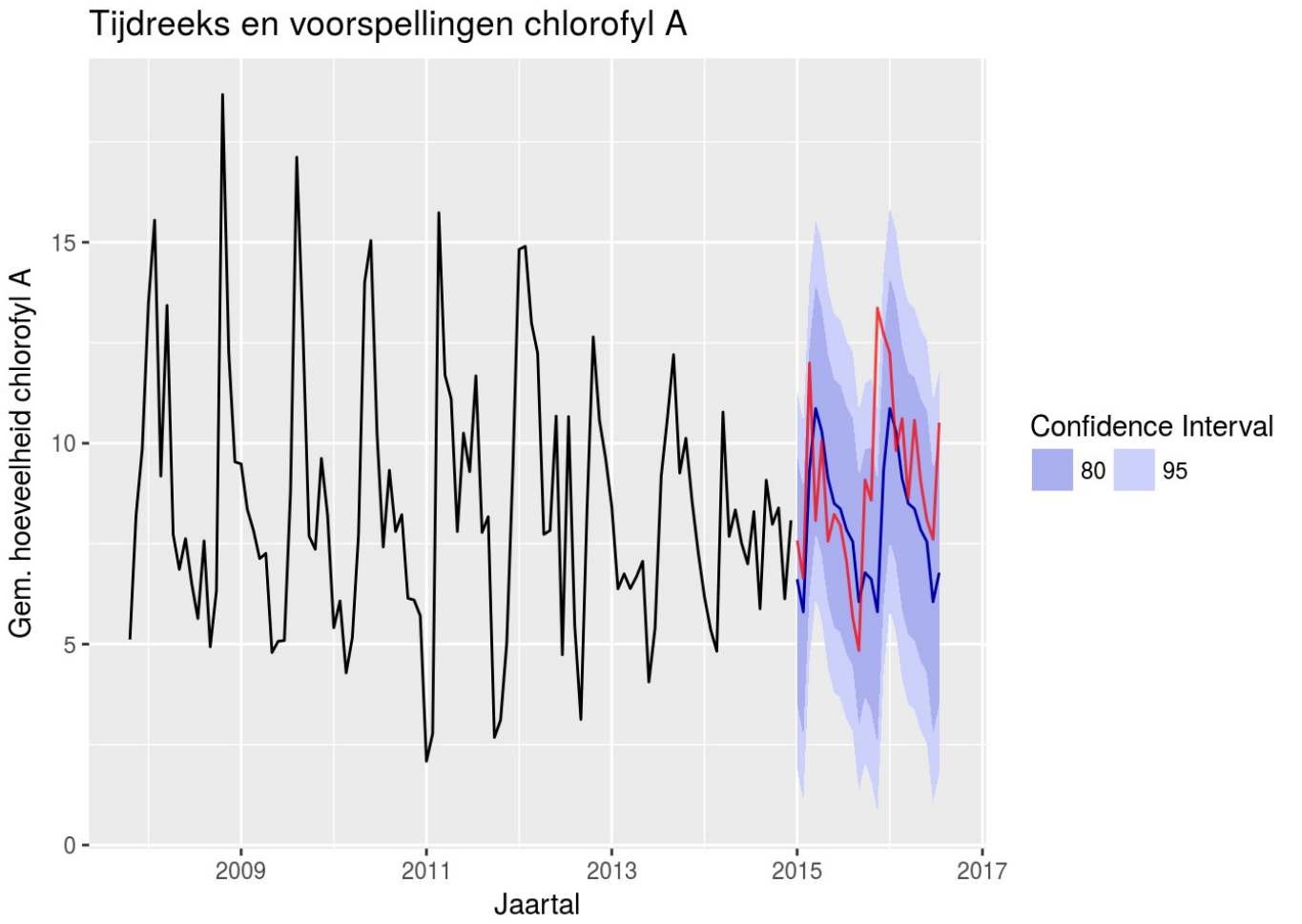


Visualisatie

```
#Create forecast
df_forecast <- forecast(df_arima, 24)

#Plotting
autoplot(df_forecast, alpha=0.5) +
  geom_line(aes(index(df_test), df_test), color='red', alpha=0.75)  +
  ggtitle("Tijdreeks en voorspellingen chlorofyl A") +
  xlab("Jaartal") + ylab("Gem. hoeveelheid chlorofyl A") +
  guides(fill = guide_legend(title = 'Confidence Interval', ncol = 2)) +
  scale_x_continuous(labels = c(2007,2009,2011,2013,2015,2017), limits = c(2006,201
7))
```

```
## Scale for 'x' is already present. Adding another scale for 'x', which
## will replace the existing scale.
```




```
ggsave('~/projectopdr-2/img/chlfa_timeseries_national_testset.png')
```

```
## Saving 7 x 5 in image
```

Model accuracy

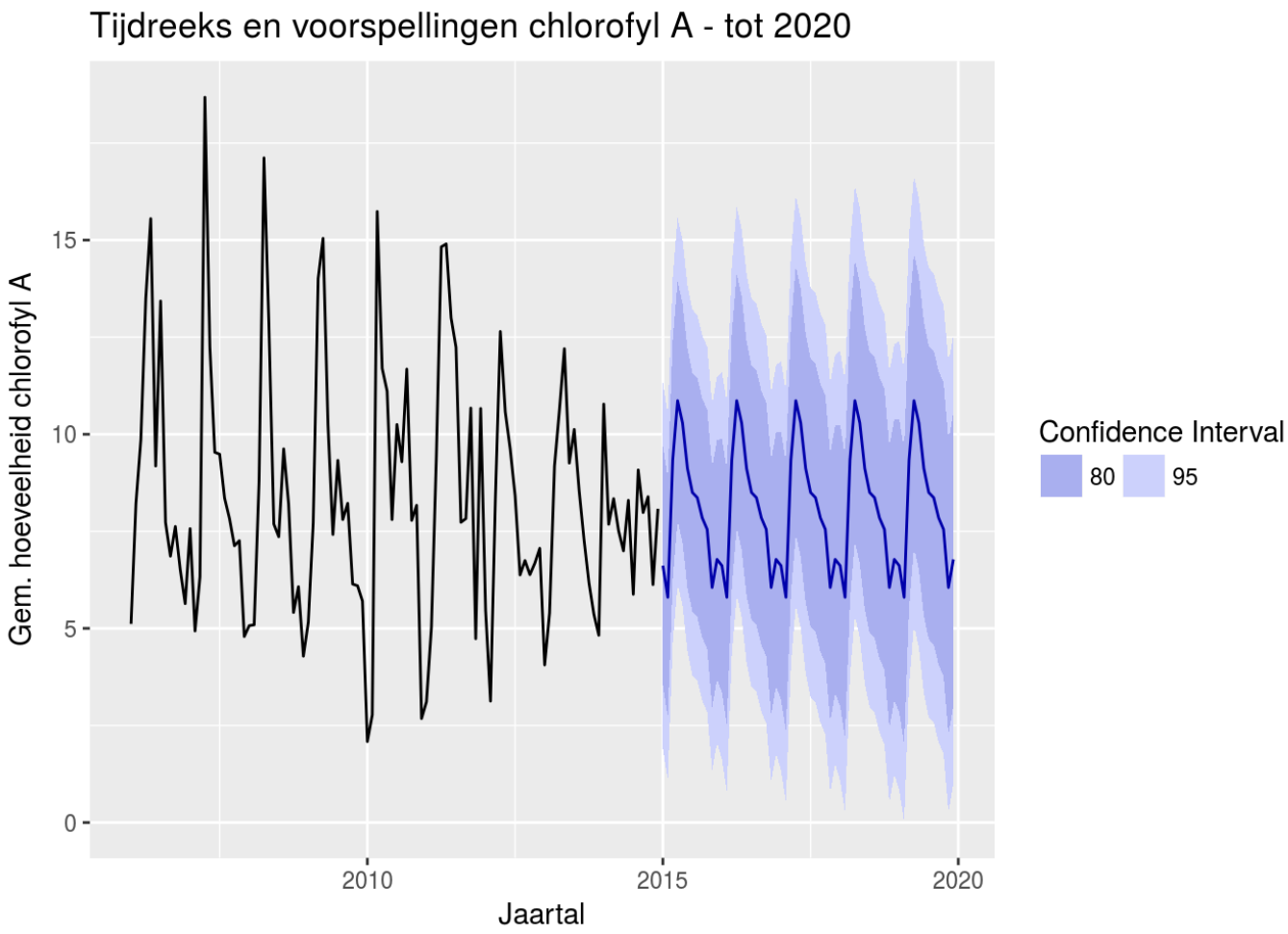
```
accuracy(df_forecast, df_test)
```

```
##                      ME     RMSE      MAE       MPE     MAPE      MASE
## Training set -0.2603242 2.251799 1.652283 -9.161142 22.73336 0.7553972
## Test set      0.9291998 2.328300 1.730964  6.764238 18.45123 0.7913686
##                    ACF1 Theil's U
## Training set 0.08604821        NA
## Test set     0.36429860 0.8920067
```

Predictions

```
#Forecast
df_forecast_far <- forecast(df_arima, 60)

#Plotting
autoplot(df_forecast_far, alpha=0.5) +
  ggtitle("Tijdreeks en voorspellingen chlorofyl A - tot 2020") +
  xlab("Jaartal") + ylab("Gem. hoeveelheid chlorofyl A") +
  guides(fill = guide_legend(title = 'Confidence Interval', ncol = 2))
```




```
ggsave('~/projectopdr-2/img/chlfa_timeseries_national_future.png')
```

```
## Saving 7 x 5 in image
```