CHAIN AFSLUTNINGSSEMINAR

4. OKTOBER 2021

Shuna R. Nazari

AI specialist

Sammen kommer vi #ForanDigitalt

ALEXANDRA INSTITUTTET

What have we been working with:

ML Modelling:

- Prognosis and Forecast
- Anomaly detection
- Prepossessing

Prognose and forecast

Prognose and forecast

What is it and what is it used for ?

- Mapping of water consumption patterns
- To predict future events

- Prediction of measurements based on historical data
  - Historical measurements, day, date, time of day, seson..

Investigations of models in collaboration with Kampstrup

- SARIMAX
- Gradient Boosting
- Seasonal model

Prognose and forecast

Models: SARIMAX , Gradient Boosting (GB) and Seasonal model

Pros:

- SARIMAX: Accurate, unlimited forecasts
- GB: Fast and Accurate
- Seasonal: Robust

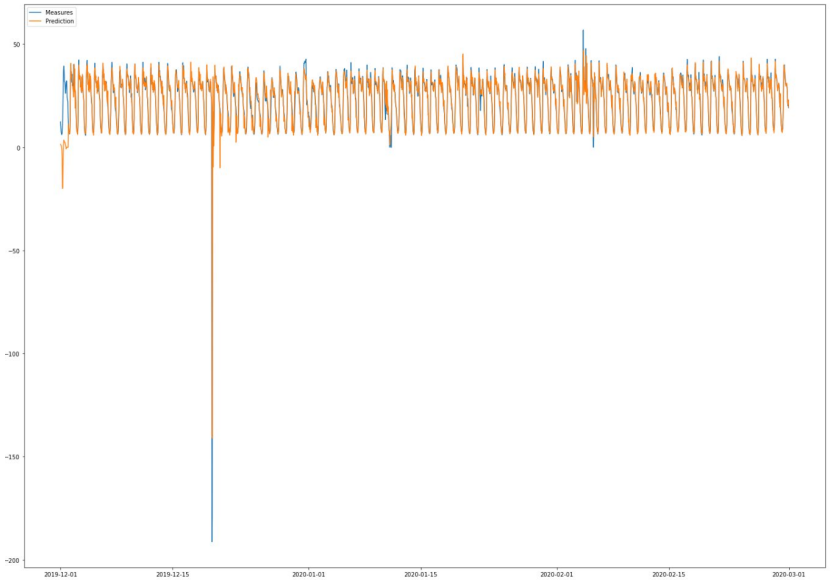
Cons:

- SARIMAX: Takes long time, needs continuous timeseries
- GB: Training on in- and output, may be affected by that
- Seasonal: Can not handle new behavior

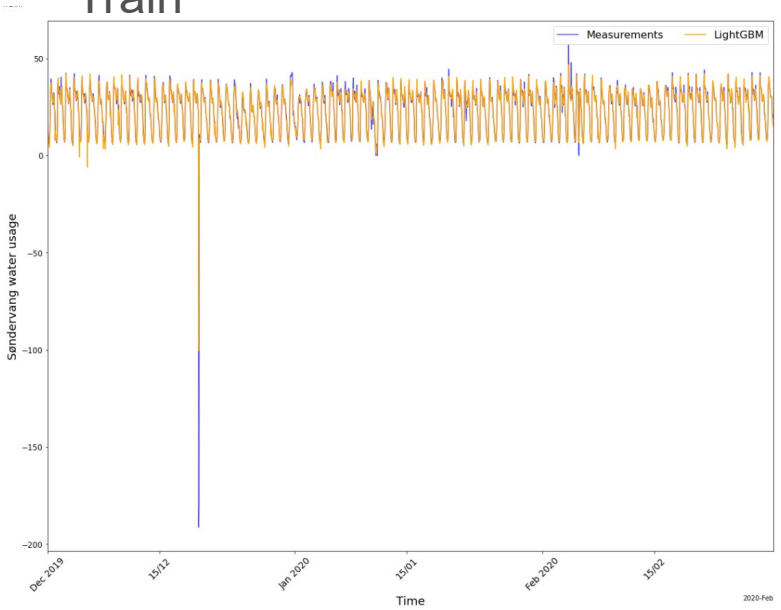
Prognose and forecast

SARIMAX and GB can easily get affected by outliers/anomalies. Preprocessing is important!

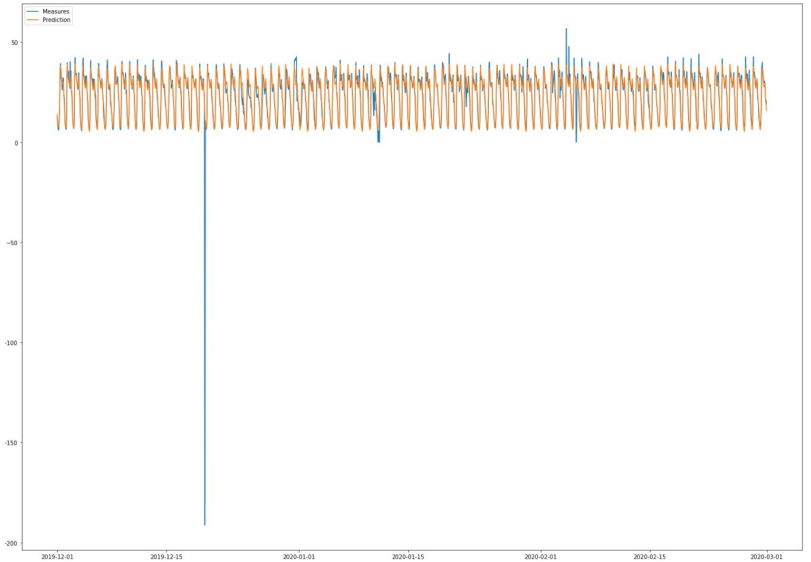
SARIMAX Train



Gradient Boosting Train

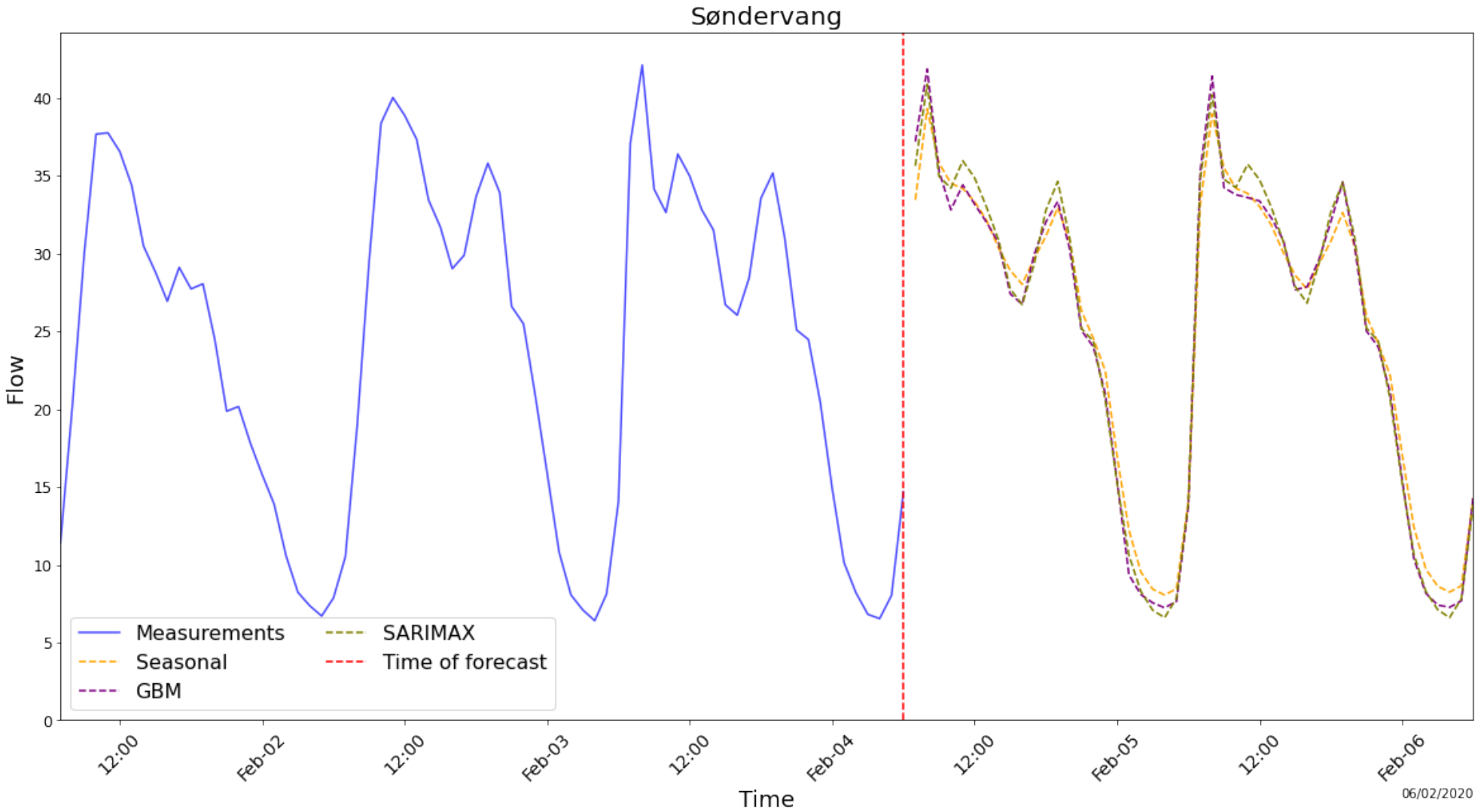


Seasonal Train



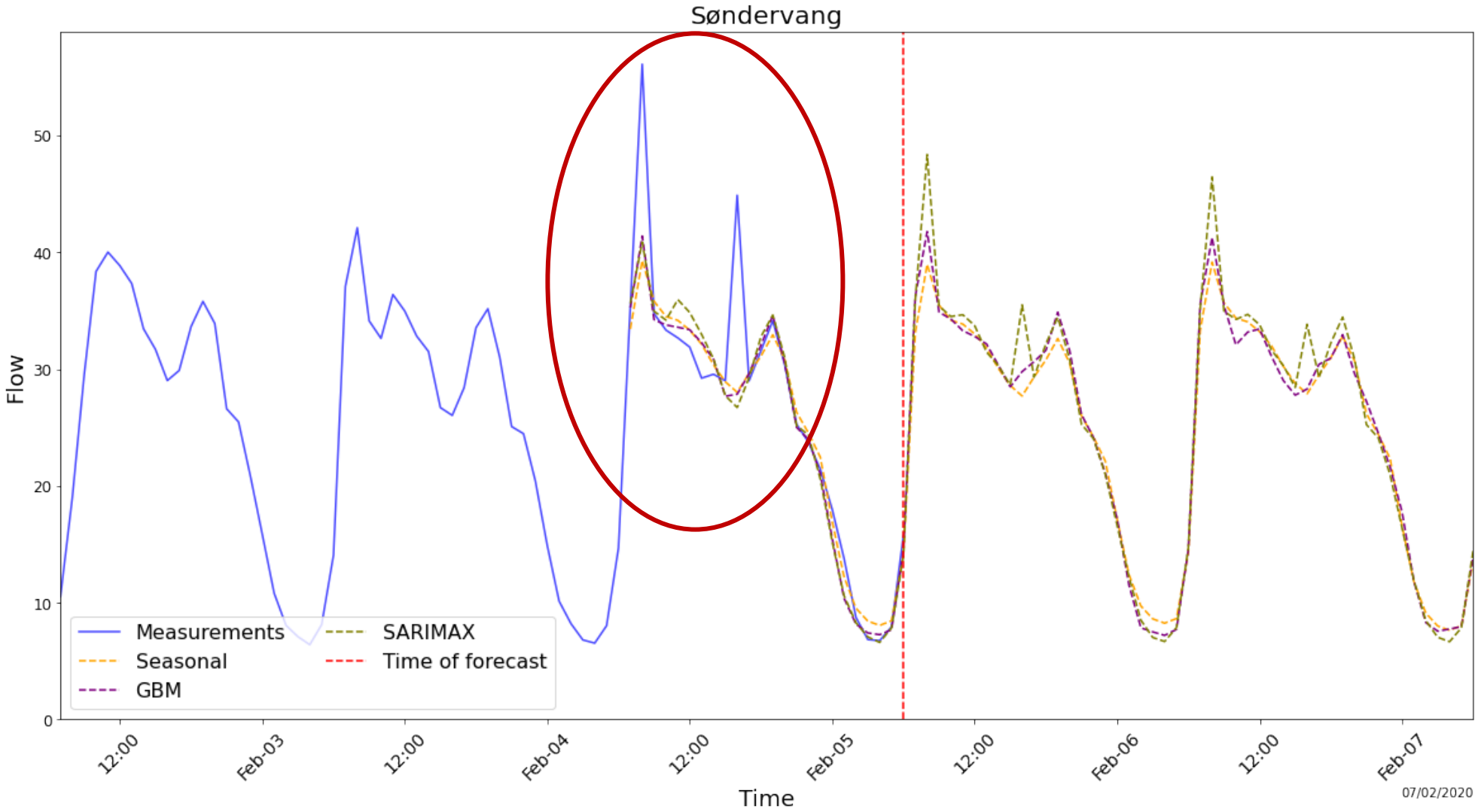
All units in m^3/h

Example single time of forecast



All units in m^3/h

Example for single time of forecast



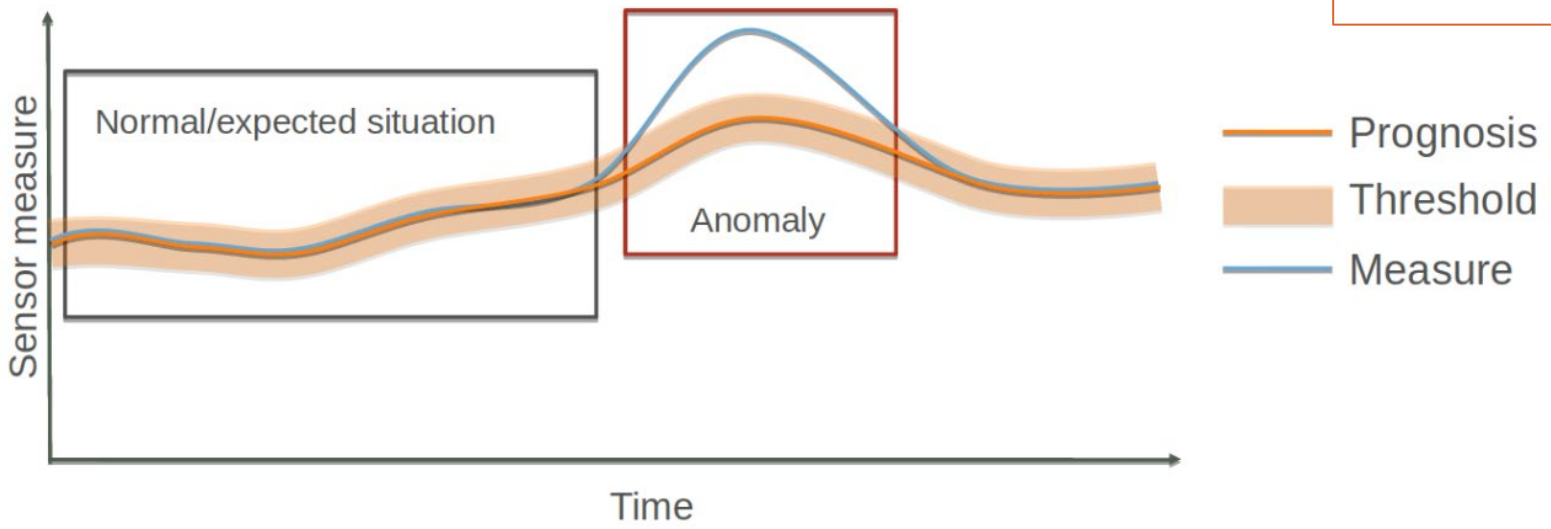
Anomaly detection

Anomaly detection

To find events that are unusual

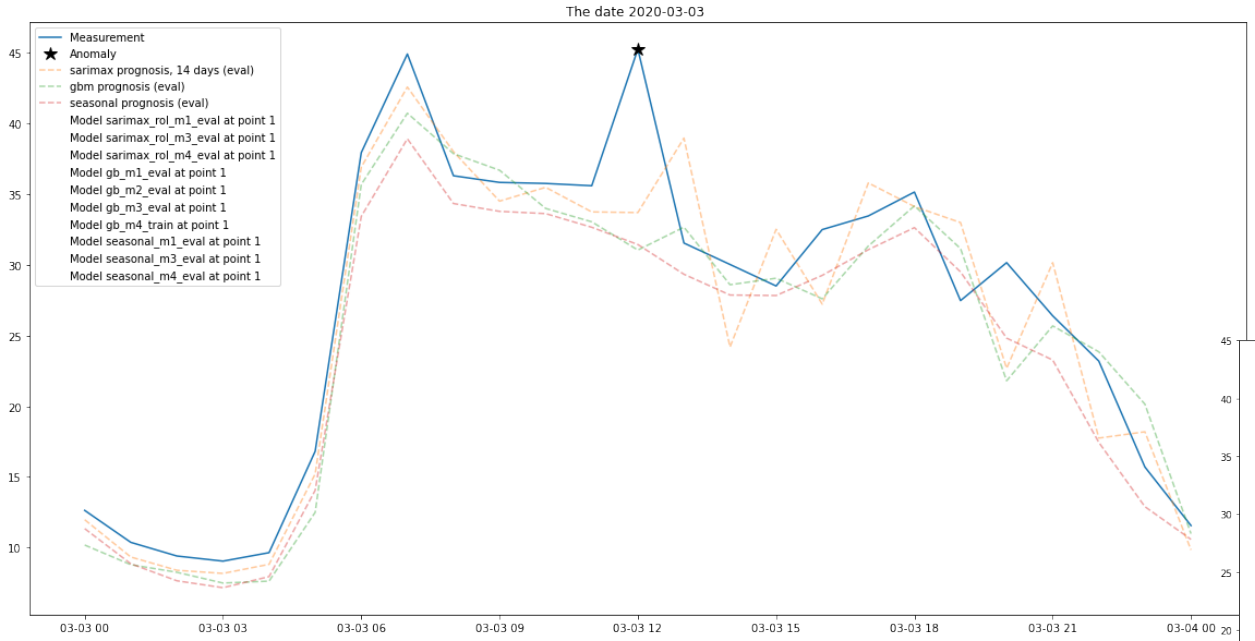
- Looks at the measurements and Prognosis
- Different ways find anomalies
- Preprocessing of data

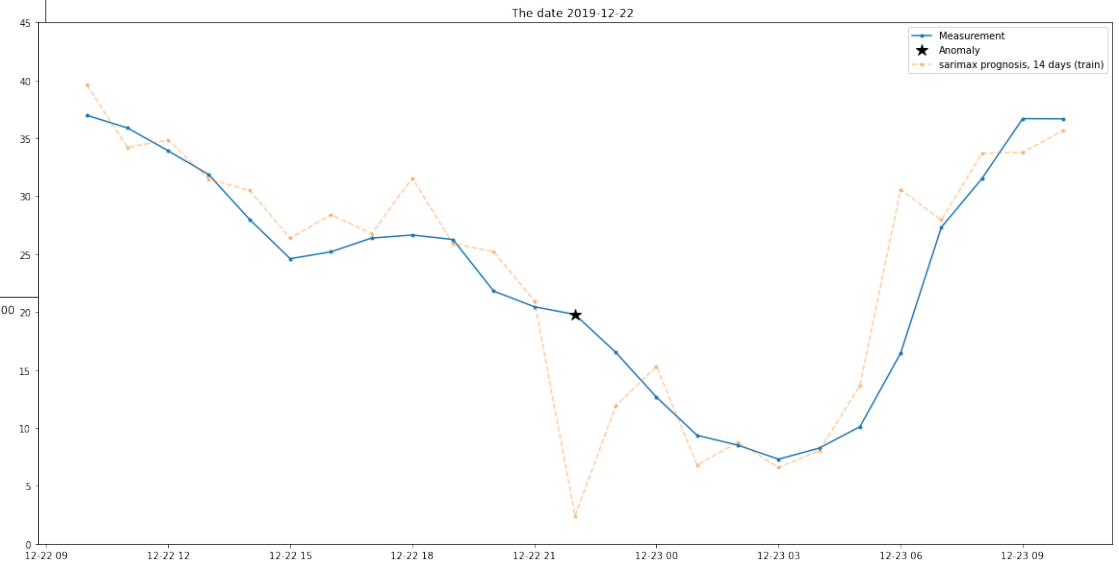
Reasons for anomalis:
- Wrong prognosis
- Sensor errors not removed
- Unusual amount of flow (high/loW)
- Unusual amount of flow (high/low) at a specific time



Exampler of anomalies

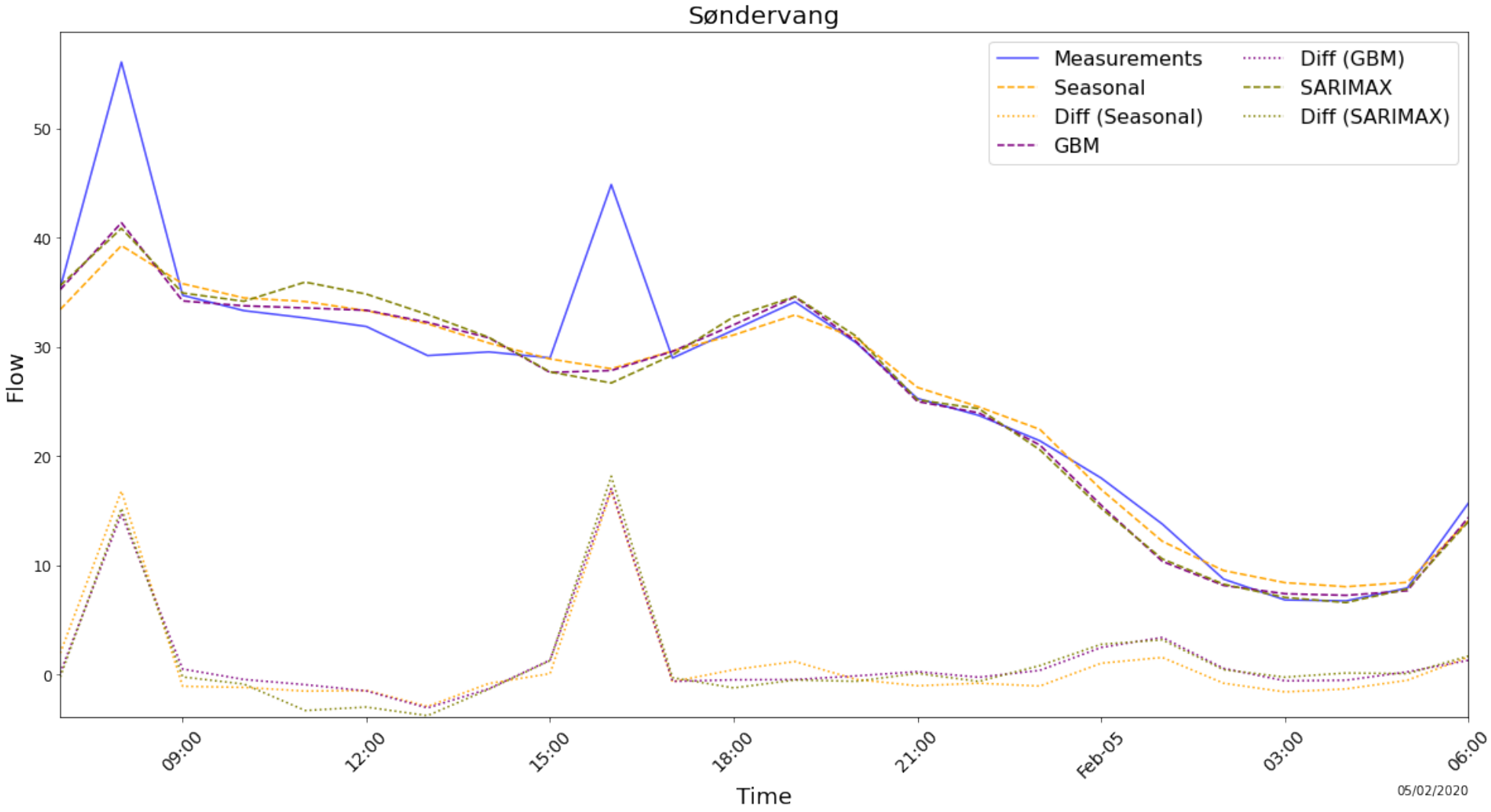
All units in m^3/h





All units in m^3/h

Anomalis via differences



Preprocessing

Prepossessing