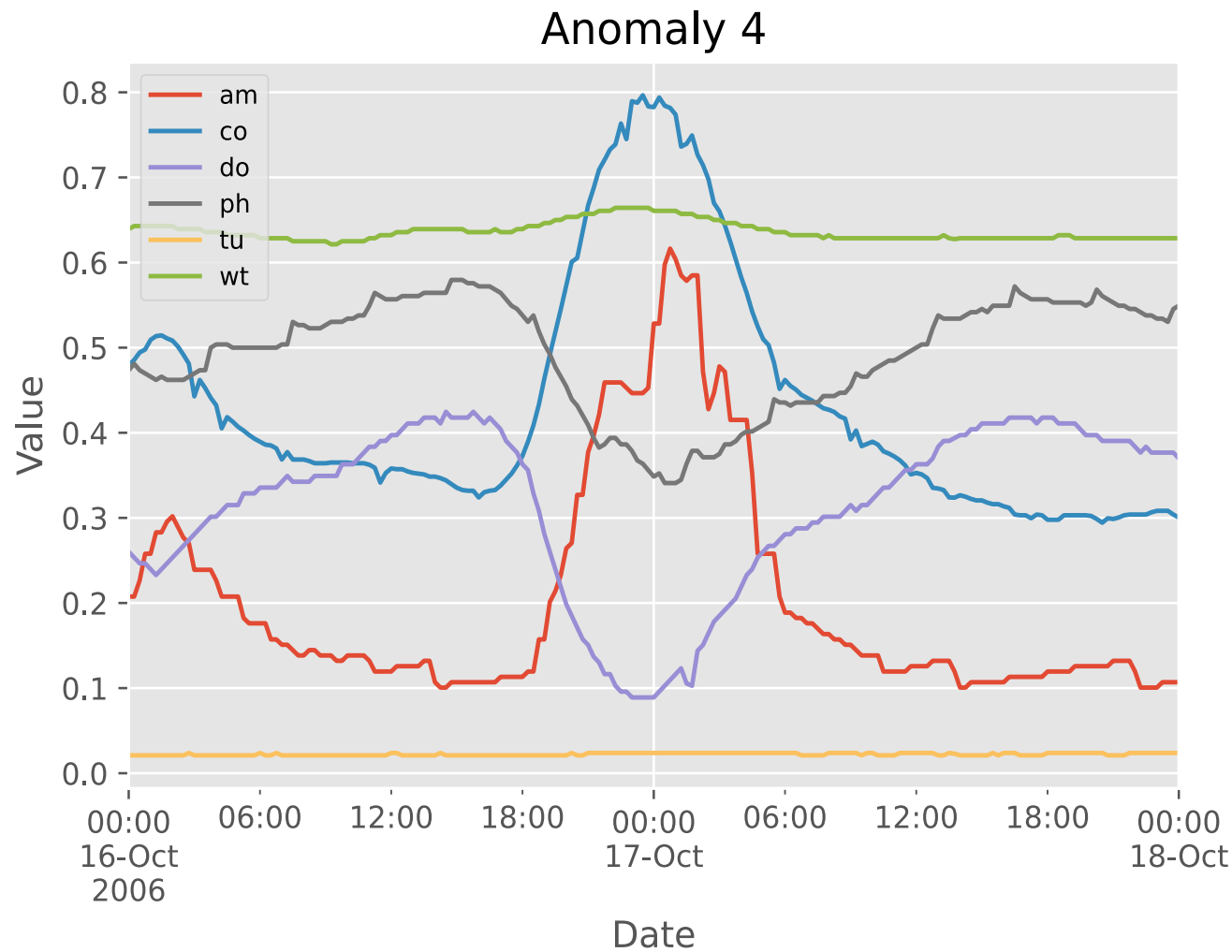
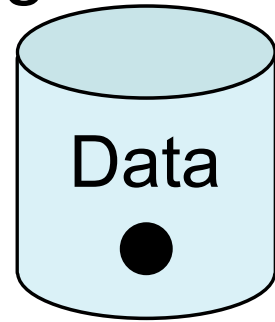


# Labeled water quality time series Jan 1st, 2005 to Dec 31st, 2022

ammonium, conductivity,  
dissolved oxygen pH,  
turbidity, water temperature



## Multivariate functional data analysis

MMSA

MUOD

MOUT

## Machine learning

RF

LR

OC-SVM

## Novelty

- Introduced a Multivariate functional model, based on directional outlyingness (Magnitude and Shape), which adds an Amplitude metric and a nonparametric outlier detector (MMSA).
- Proposed a machine learning framework incorporating moving windows and data rebalancing methods.

Anomaly detection