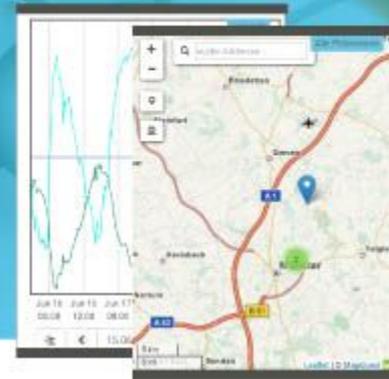**52north**
exploring horizons

September 2–4, 2019 Münster, Germany

Geospatial Sensing
Conference 2019

WELCOME

Ocean: Chlorophyll a Concentration (mg/m3)   Land: Normalized Difference Land Vegetation Index

CeNTech
CENTER FOR NANOTECHNOLOGY

PROGRAMME

https://52north.org/research/research-labs/sensor-web/geospatial-sensor-web-conferences/in-2019/program/
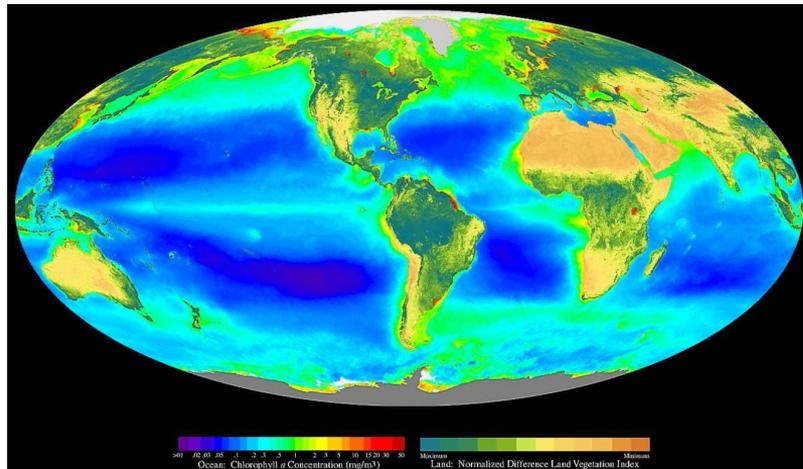
Workshops
- Event-based Sensor Web Architectures
- Sensor Web Data Visualisation
- Sensor Data Analysis, Processing
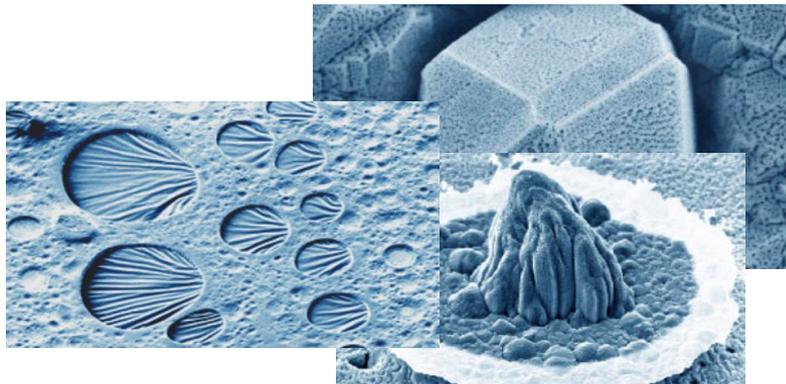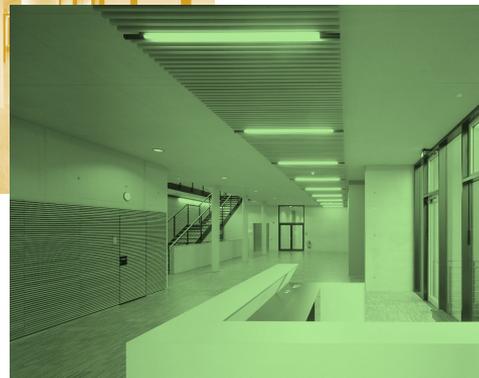- Observation Data Management/Storage/Publication

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Current Developments in the Sensor Web Community

Geospatial Sensing 2019

Agenda

- Projects
  - WaCoDiS
  - Creating Interfaces
  - mVIZ
  - European Data Portal 2
  - COS4CLOUD
- 52°North Sensor Web Activities
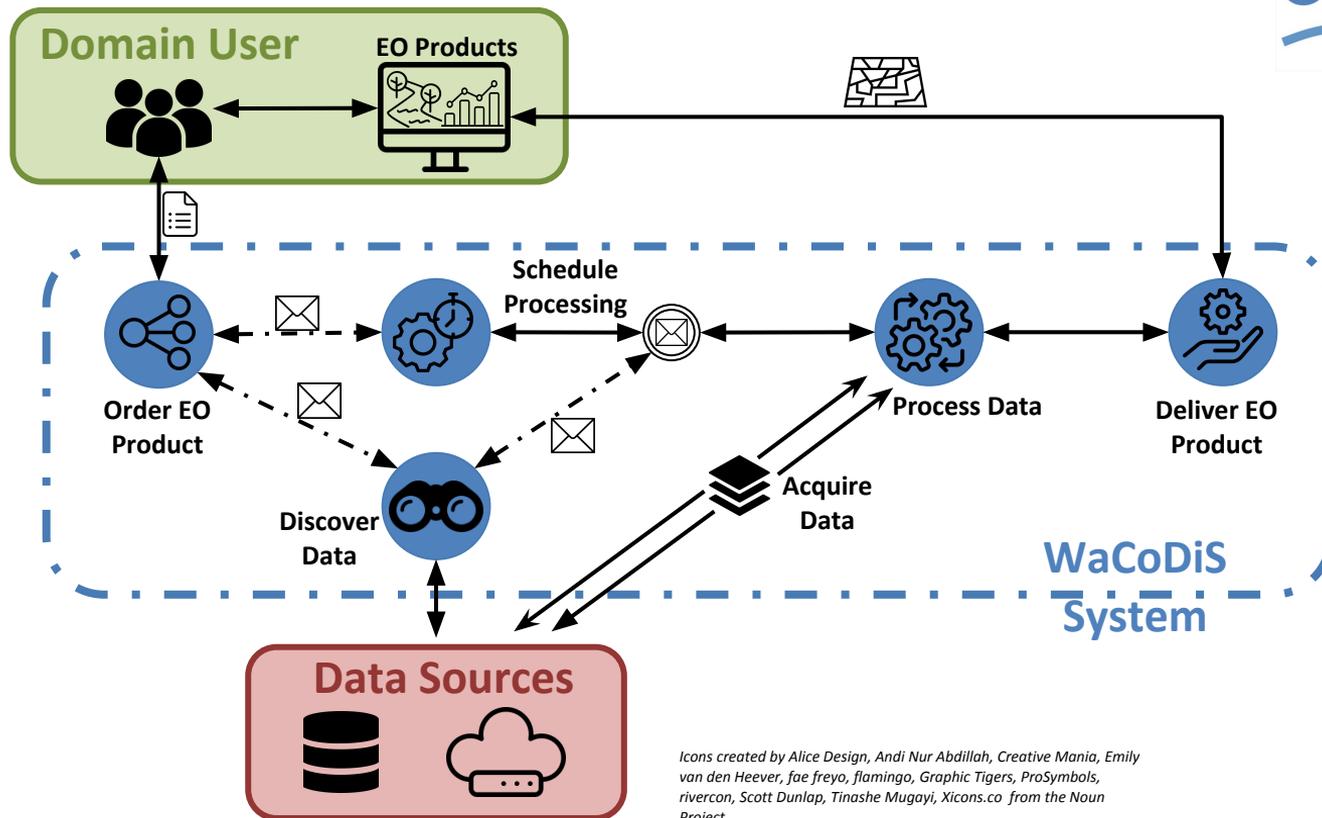 - Sensor Web Server
  - sos4R

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WaCoDiS

- Ongoing project (until 2020)
- Copernicus-based services for monitoring material inputs in watercourses and dams
- Funded by German Federal Ministry for Transport and Digital Infrastructure
- Monitoring of sediment inputs in rivers
  - Combining various spatial data, sensor data and model components
  - Special focus on combining Copernicus and in-situ sensor data

Ein Forschungsprojekt gefördert vom BMVI
im Rahmen des mFund Förderprogramms

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mFUND
Das Startkapital für die Mobilität 4.0

WaCoDiS - Architecture

Domain User

EO Products

Schedule Processing

Order EO Product

Discover Data

Process Data

Deliver EO Product
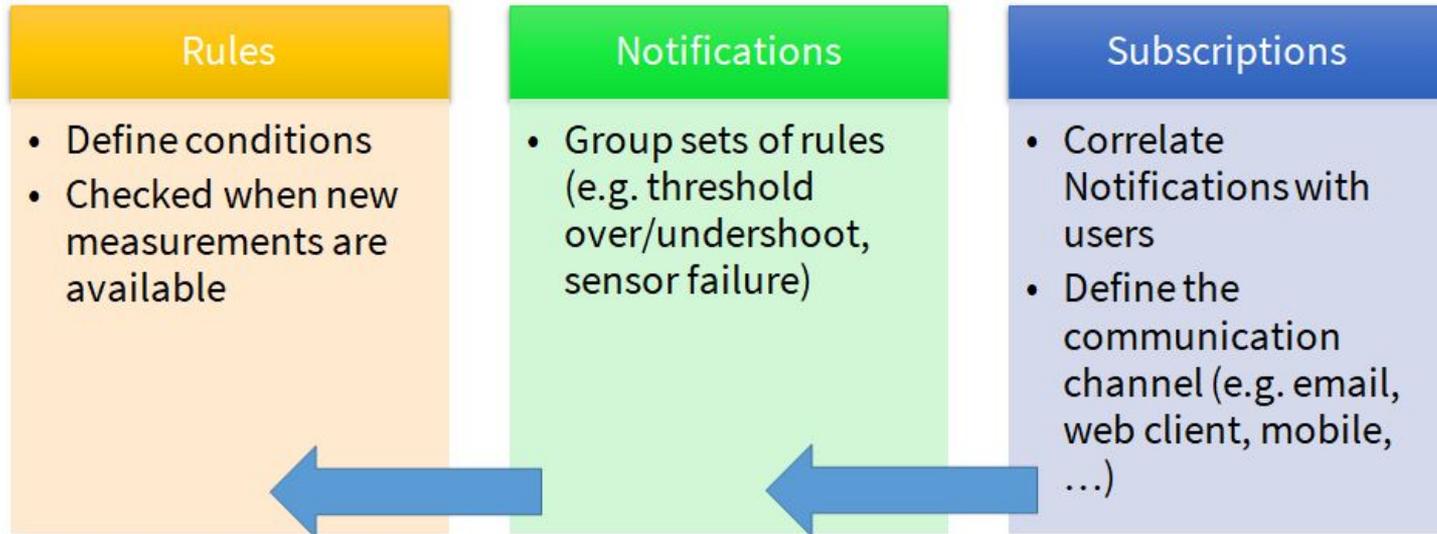
Acquire Data

WaCoDiS System

Data Sources

Icons created by Alice Design, Andi Nur Abdillah, Creative Mania, Emily van den Heever, fae freyo, flamingo, Graphic Tigers, ProSymbols, rivercon, Scott Dunlap, Tinashe Mugayi, Xicons.co from the Noun Project

WaCoDiS - Event-Driven SDI

- Eventing-API
  - REST/JSON-based API implementing and enhancing the OGC Pub/Sub standard

Rules	Notifications	Subscriptions
• Define conditions • Checked when new measurements are available	• Group sets of rules (e.g. threshold over/undershoot, sensor failure)	• Correlate Notifications with users • Define the communication channel (e.g. email, web client, mobile, …)

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WaCoDiS - Event-Driven SDI

- Eventing and INSPIRE?
- Concept can be transferred to several domains (Air Quality, Atmospheric Conditions, Hydrology)
- Future perspective for a possible INSPIRE enhancement idea of an "Event-Driven SDI"
- Next step: Workshop "Event-Driven INSPIRE" at the INSPIRE Helsinki 2019 (23rd October 2019)
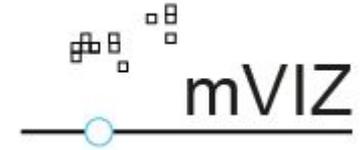
CREATING INTERFACES

- Explore socio-technical interfaces at the food-water-energy (FWE) nexus in cities near water
- 52°North:
    - Development of interoperable Citizen Science and decision support workflows
    - Evaluation of tools for citizen science data collection applications
    - wq framework: https://github.com/wq
    - Integration with Sensor Web components
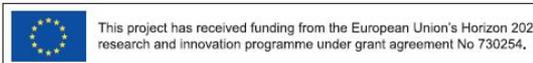
ᴍVIZ

- Started in June 2019
- Aim: Develop a prototype to support users in selecting appropriate visualisation approaches for spatio-temporal data sets
- Tasks:
  - Collect relevant visualisation approaches
  - Analyse user requirements
  - Analyse typical data sets and appropriate visualisation

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ᴍ**VIZ**

- Expected result
  - Prototypical enhancement of Helgoland
  - Decision support for users to select the best suited visualisation of a given data set
- Project will run until summer 2020
- Further information: https://mviz.geo.tu-dresden.de/

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EUROPEAN DATA PORTAL

- Portal operated by the European Commission
- Aim: Make open data resources offered by EU member states discoverable
- Technologies
  - Virtuoso triple store → Fraunhofer Fokus
  - map.apps → con terra
- 52°North
  - Improve the discoverability of near-real time data sets (i.e. sensor data)

European Data Portal

- FIWARE Context Broker
  - Supported by the European Commission
  - Share context information (e.g. sensor data) in a lightweight manner
- 52°North:
  - Support the mapping of metadata of Context Broker instances to DCAT-AP
 - Enable the discovery in the EDP

European Data Portal

- Current focus
  - Improve the discovery of SOS servers in the EDP
    (→ INSPIRE Download Services for near-real time data)
  - Enable discovery of data sets and not only servers
  - Create approach how to describe SOS datasets based on
    DCAT-AP
  - Implementation until early 2020

COS4CLOUD

- New project starting in November 2019
- Co-designed Citizen Observatories Services for the European Open Science-Cloud
- Focus of 52°North
  - Investigate the use of Sensor Web components to support citizen observatories
  - Options for integration into the European Open Science-Cloud
- Close cooperation with CREAF

SENSOR WEB SERVER

- New release planned for autumn 2019
- New module: SensorThings API including MQTT support
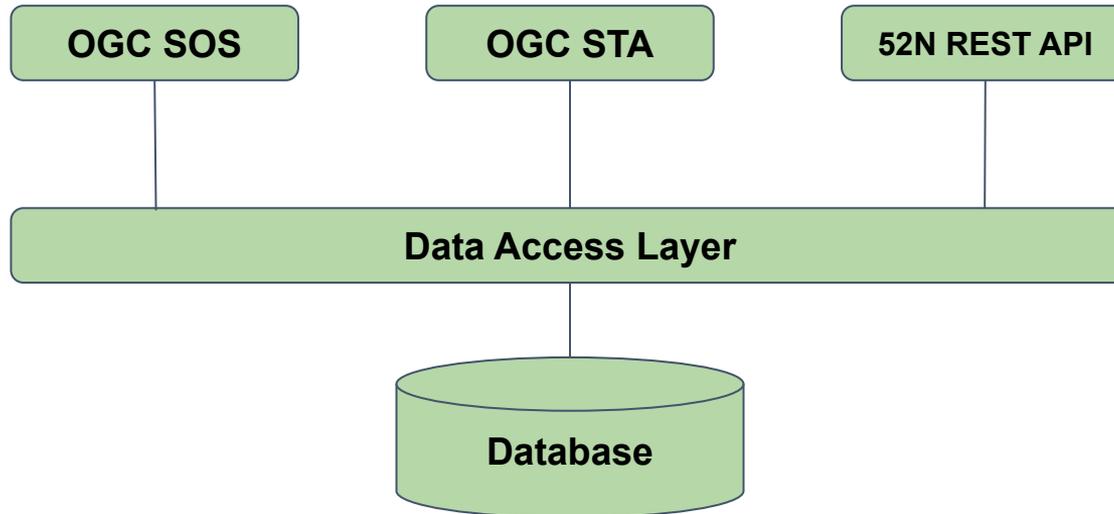
SOS4R - PROJECT FACTS

In a nutshell, sos4R ...

- has had 589 commits made by 9 contributors representing 12,680 lines of code
- is mostly written in R with a well-commented source code
- has a well established, mature codebase maintained by a average size development team with increasing Y-O-Y commits
- took an estimated 13 years of effort (COCOMO model) starting with its first commit in May, 2013 ending with its most recent commit about three weeks ago

CRAN: https://cran.r-project.org/package=sos4R

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KEY FUNCTIONS

- SOS(): initializes the connection with an SOS endpoint
- phenomena(): returns a list of phenomena that the SOS provides. It can also provide details on the recording period and the stations providing this phenomenon
- sites(): retrieves details on the feature of interests/measurement stations. This can include their locations, observed phenomena and temporal extent of each time series.
- getData(): fetches the desired time series data from the SOS.

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```
library("mapview")
mapview(sites[-16,], legend=FALSE, col.regions="#65c6e4")
```
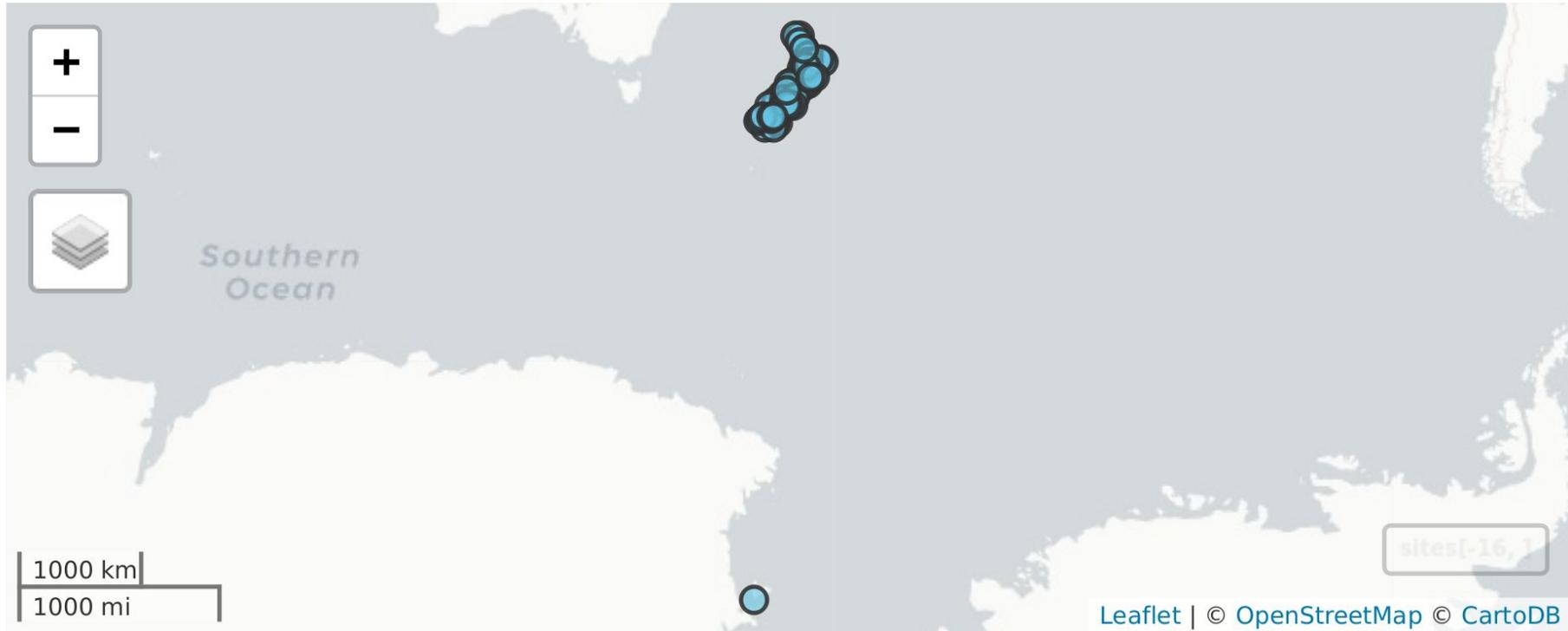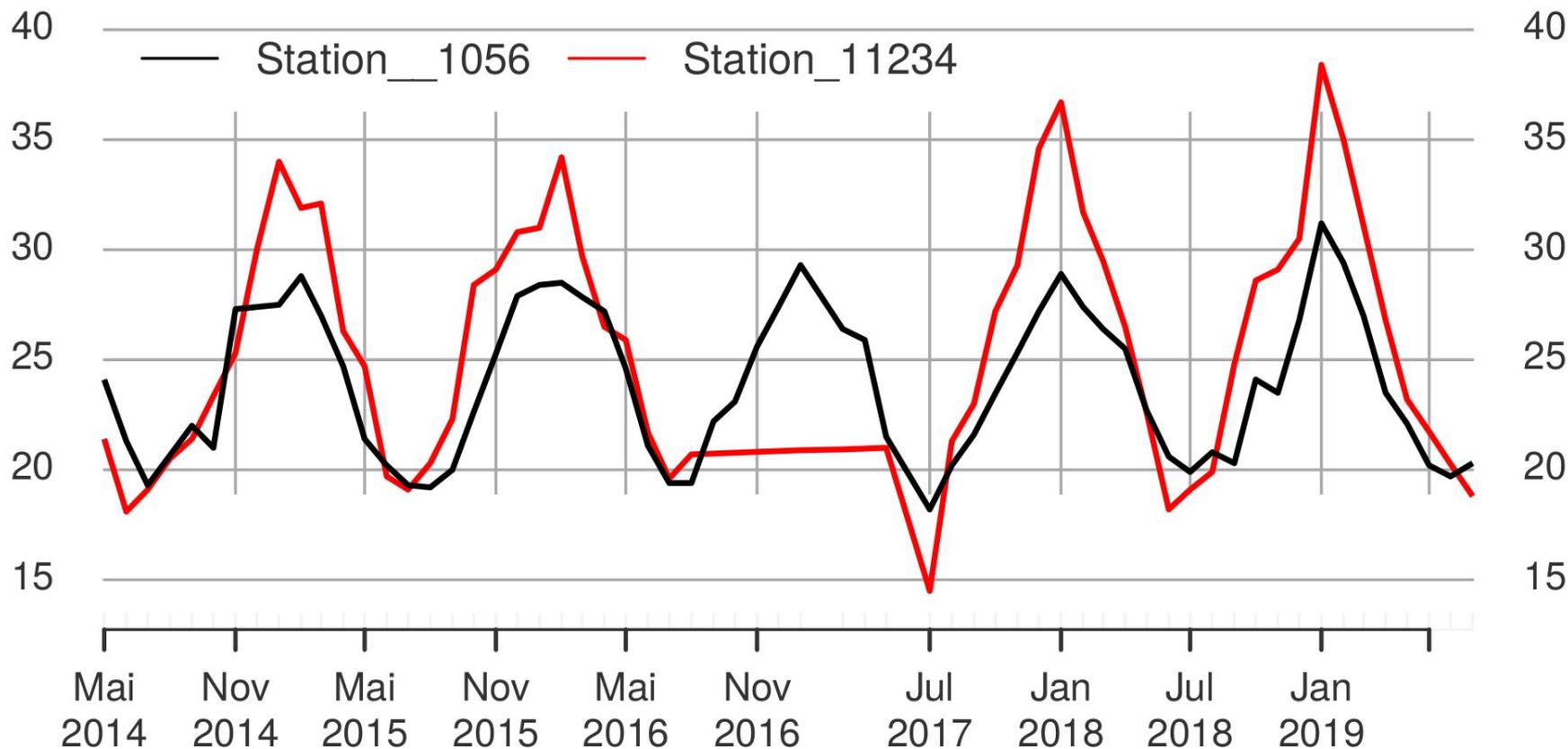
```
plot(decTs)
```


Decomposition of additive time series
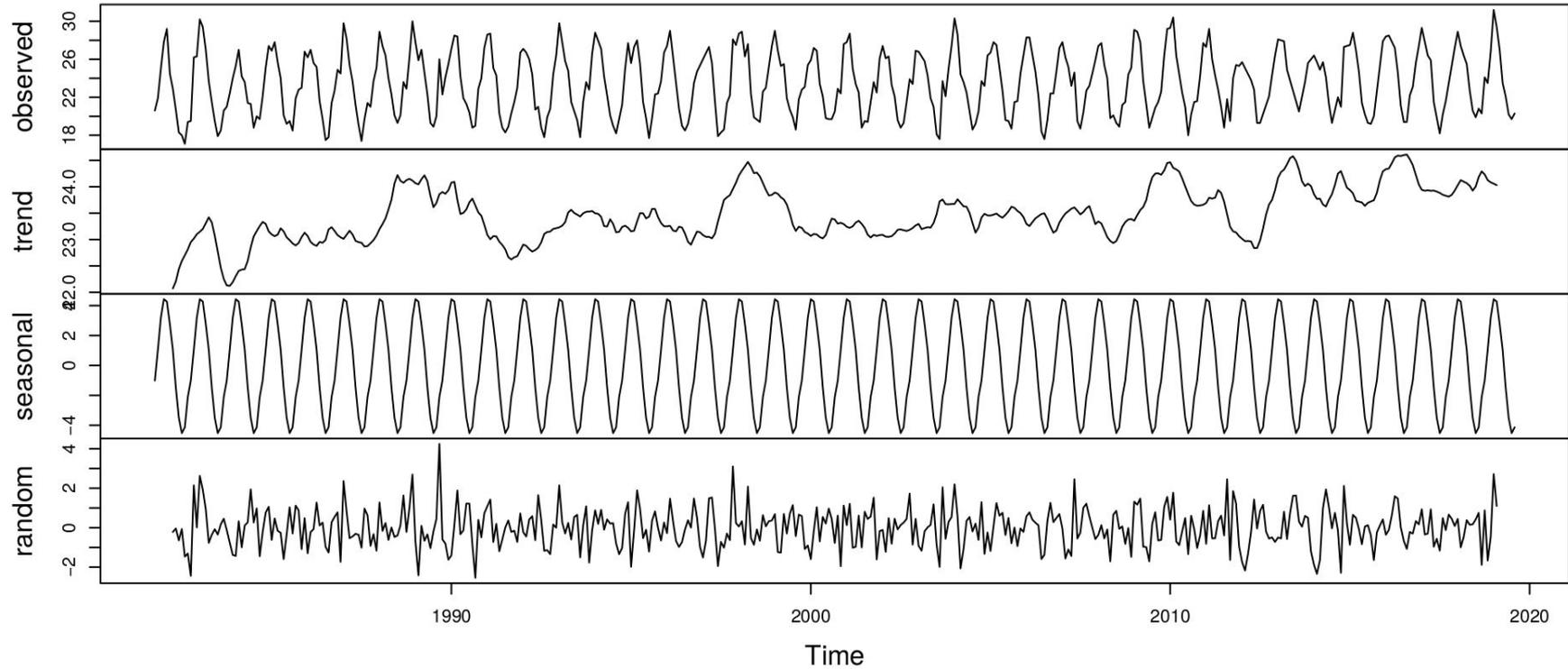
Monthly: Extreme max. Temp. (°C)   2014−05−01 / 2019−08−01

Station__1056   Station_11234

FURTHER INFORMATION

Annual Report 2018:

https://52north.org/delivery/annual%20report/Annual%20Report%202018_web.pdf

Thank you for your Attention!

Questions?

jirka@52north.org

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