



Datamanagement

NCK Theme Day
Vincent Vuik, 11-04-2022

Application: Research & Monitoring Houtribdijk



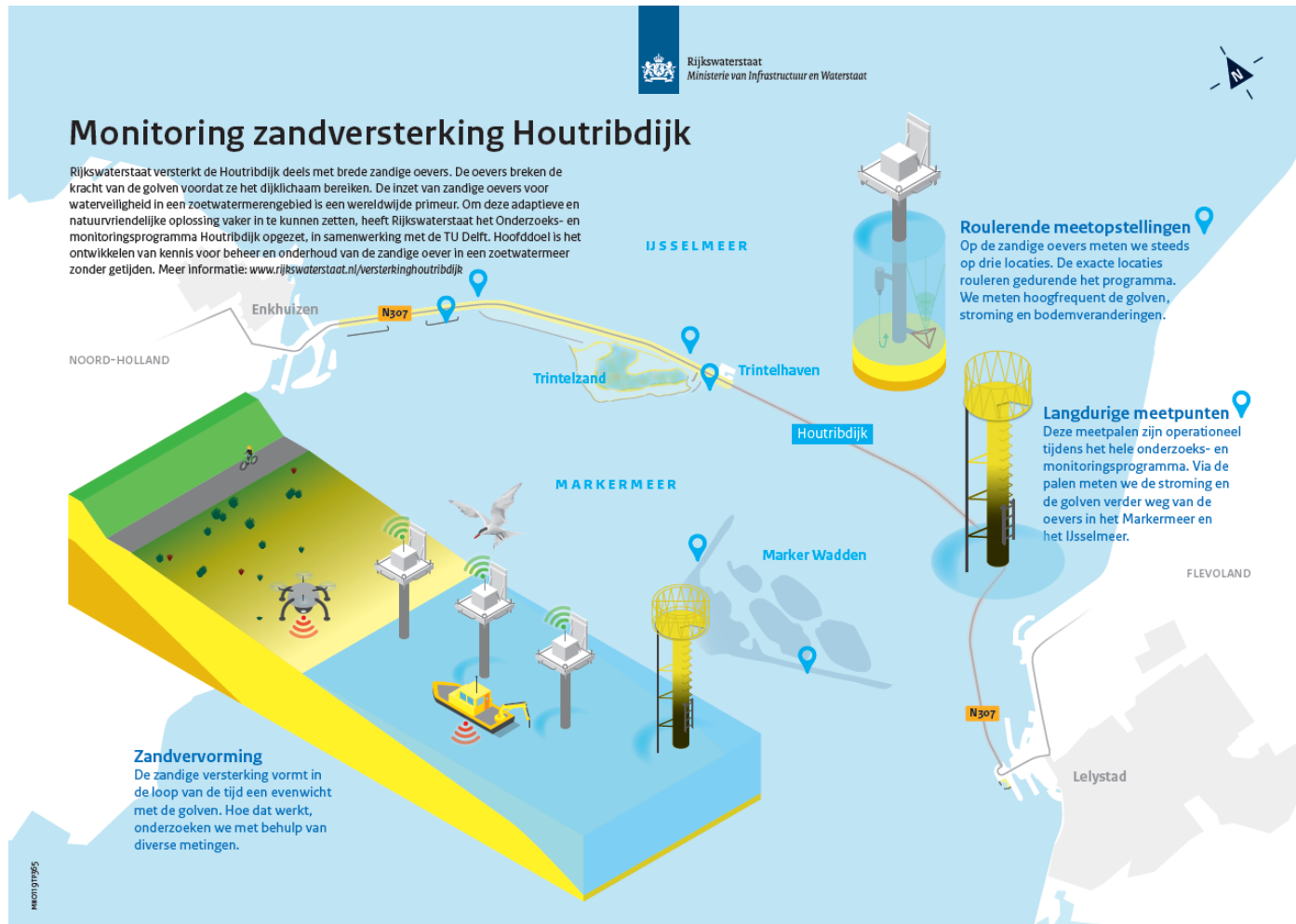
Sandy reinforcement of the Houtribdijk



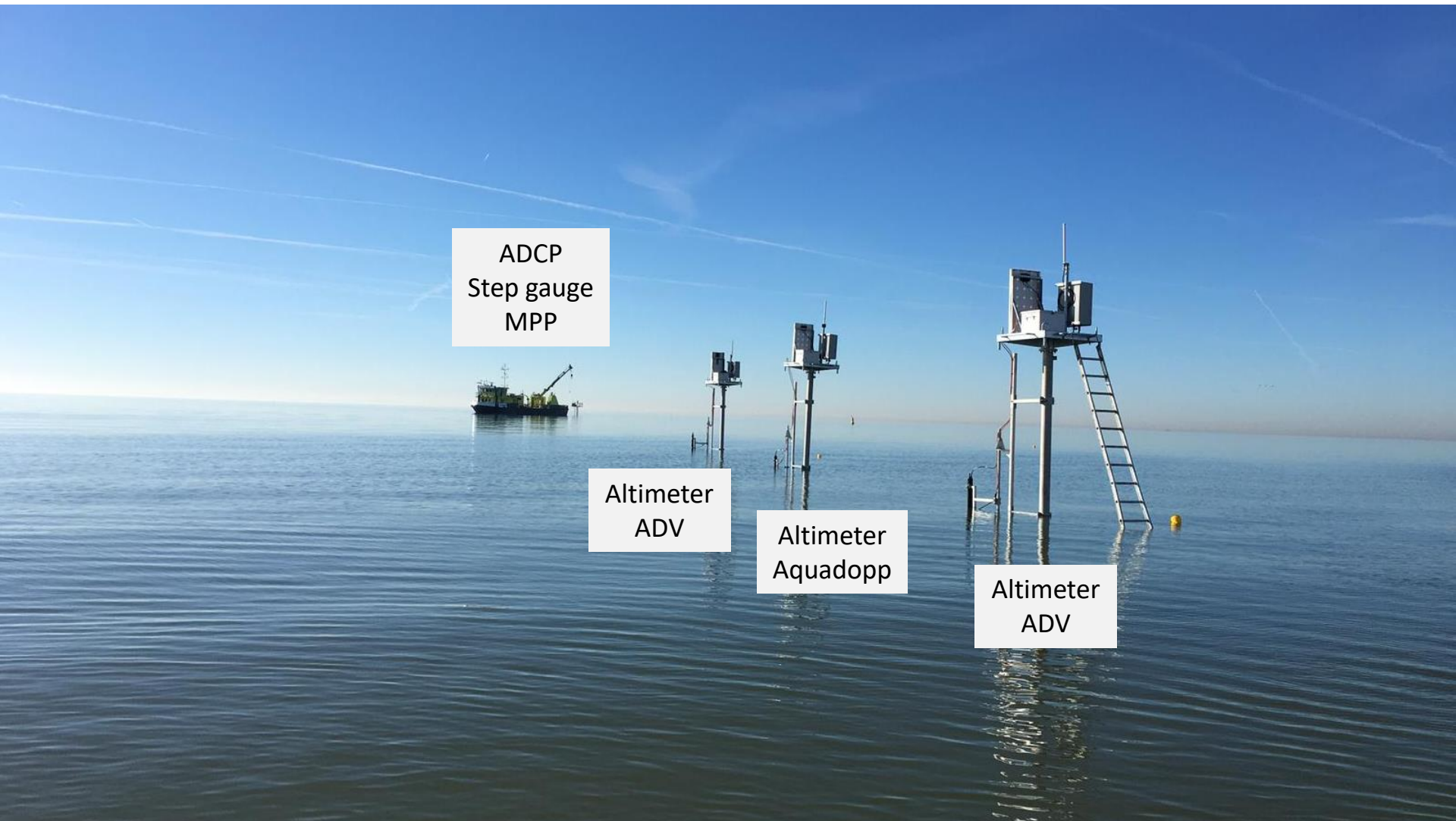
After sand nourishment



Research & monitoring program



Measurements and instrumentation



ADCP
Step gauge
MPP

Altimeter
ADV

Altimeter
Aquadopp

Altimeter
ADV

Data Management System



Measure



Save



Process

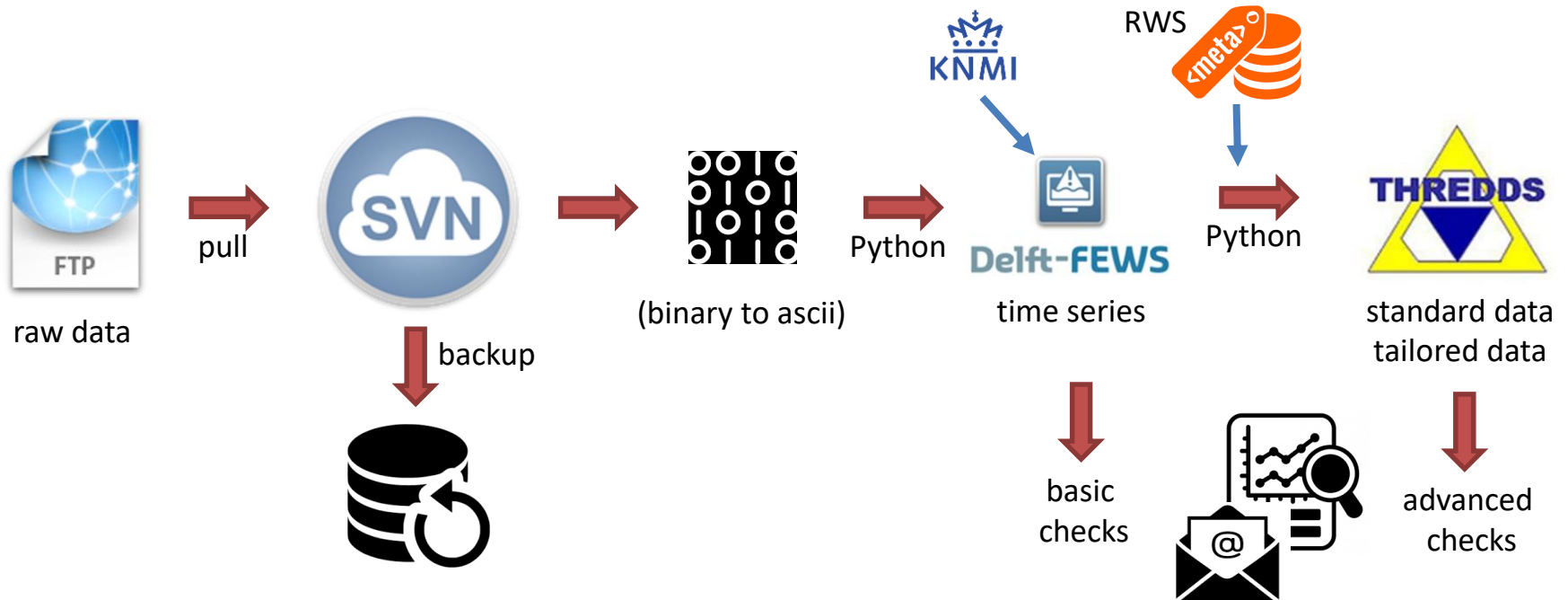
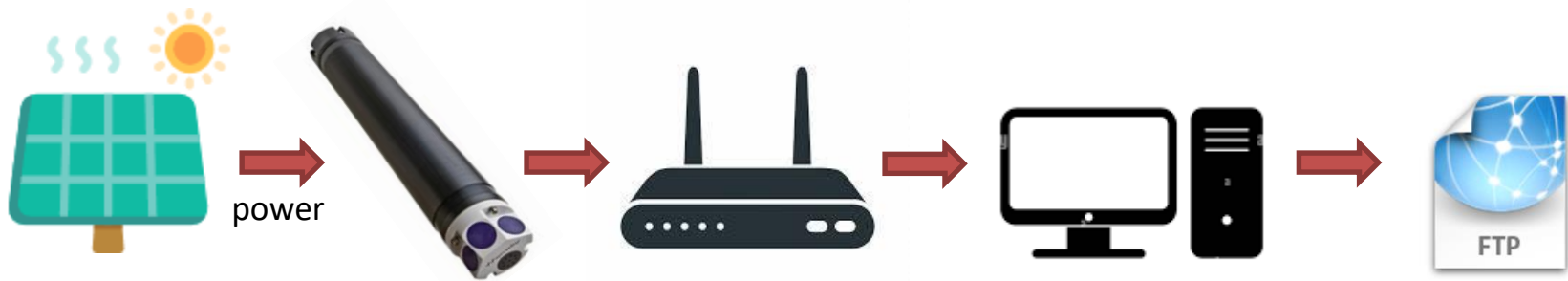


Access



Checks and monitoring

Data flow in more detail

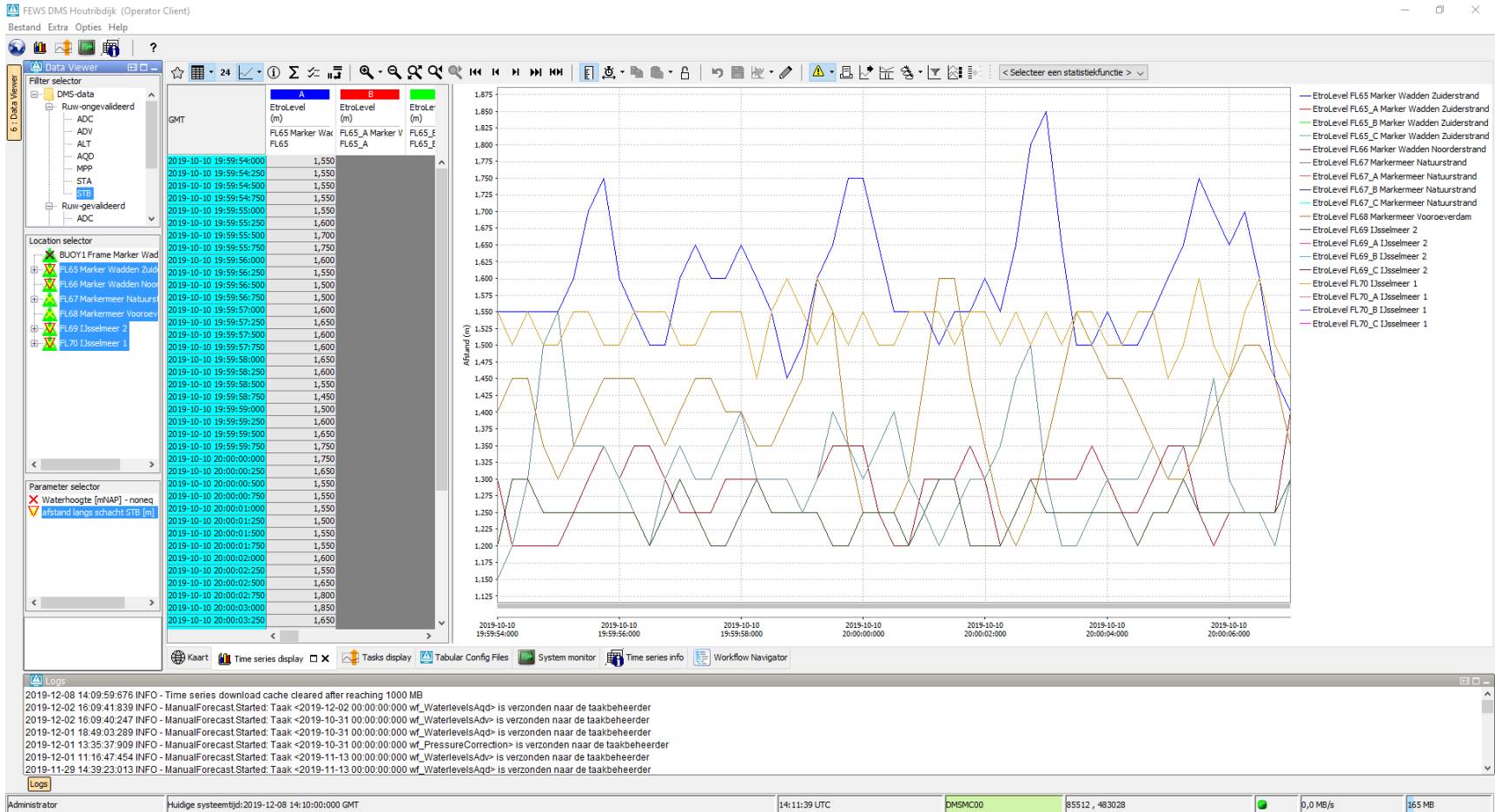


Objectives of a data management system

- Quality assurance: real-time monitoring of all instruments
- Validation: continuous data checks
- Standardization: automatized and standardized processing
- Disclosure: near-instantaneous availability for data users
- Reproducibility and version control
- Data security
- Archiving

And... to save a lot of handwork for a 4-year campaign!

Aggregated time series in Delft-FEWS

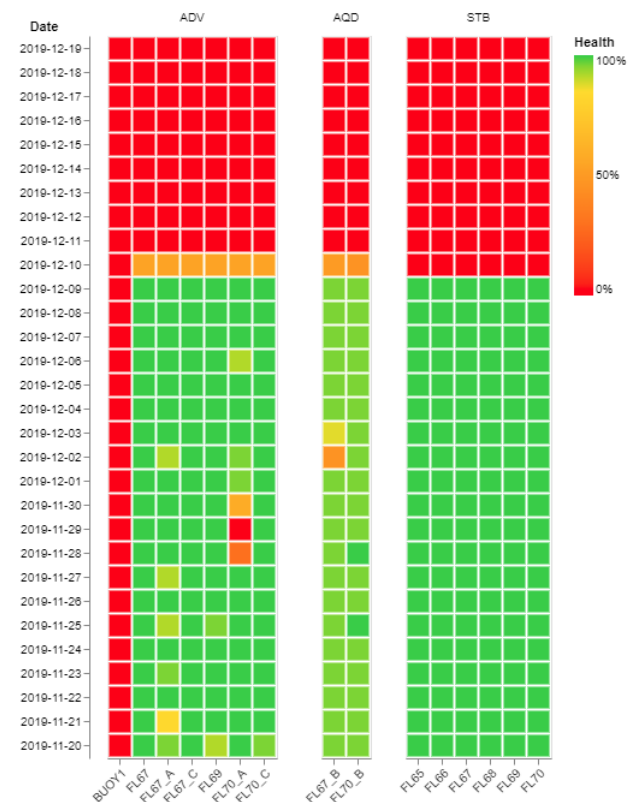


Monitor for THREDDS server

Status THREDDS Standard Data at 2019-12-20



Status THREDDS Tailored Data at 2019-12-20



FAIR principles

Data management follows the FAIR principles:



Data with rich metadata
Data in a searchable resource (structured THREDDS server)



Open and free with optional authentication procedure
Data in standardized format (SI-units, NetCDF)



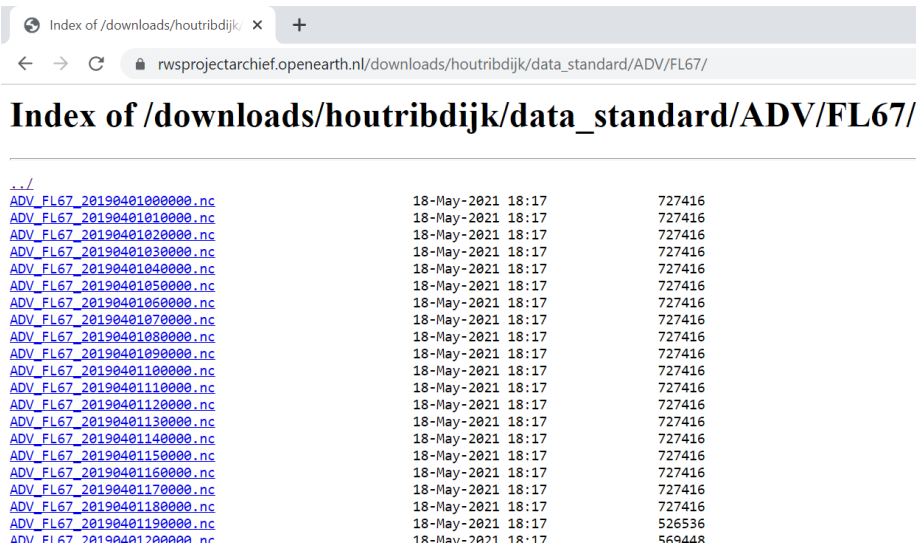
(Meta)data follow a broadly applicable standard (AQUO)



(Meta)data richly described with a plurality of accurate
and relevant attributes

THREDDS server

- Structured database
- Standard data
- Tailored data
- NetCDF files



ADV_FL67_20190401000000.nc	18-May-2021 18:17	727416
ADV_FL67_20190401010000.nc	18-May-2021 18:17	727416
ADV_FL67_20190401020000.nc	18-May-2021 18:17	727416
ADV_FL67_20190401030000.nc	18-May-2021 18:17	727416
ADV_FL67_20190401040000.nc	18-May-2021 18:17	727416
ADV_FL67_20190401050000.nc	18-May-2021 18:17	727416
ADV_FL67_20190401060000.nc	18-May-2021 18:17	727416
ADV_FL67_20190401070000.nc	18-May-2021 18:17	727416
ADV_FL67_20190401080000.nc	18-May-2021 18:17	727416
ADV_FL67_20190401090000.nc	18-May-2021 18:17	727416
ADV_FL67_20190401100000.nc	18-May-2021 18:17	727416
ADV_FL67_20190401110000.nc	18-May-2021 18:17	727416
ADV_FL67_20190401120000.nc	18-May-2021 18:17	727416
ADV_FL67_20190401130000.nc	18-May-2021 18:17	727416
ADV_FL67_20190401140000.nc	18-May-2021 18:17	727416
ADV_FL67_20190401150000.nc	18-May-2021 18:17	727416
ADV_FL67_20190401160000.nc	18-May-2021 18:17	727416
ADV_FL67_20190401170000.nc	18-May-2021 18:17	727416
ADV_FL67_20190401180000.nc	18-May-2021 18:17	727416
ADV_FL67_20190401190000.nc	18-May-2021 18:17	526536
ADV_FL67_20190401200000.nc	18-May-2021 18:17	566448

Action:

Data URL: https://thredds.dmhoutribdijk.nl/thredds/dodsC/HKV/data_standard/STB/FL68/STB_FL68.nc

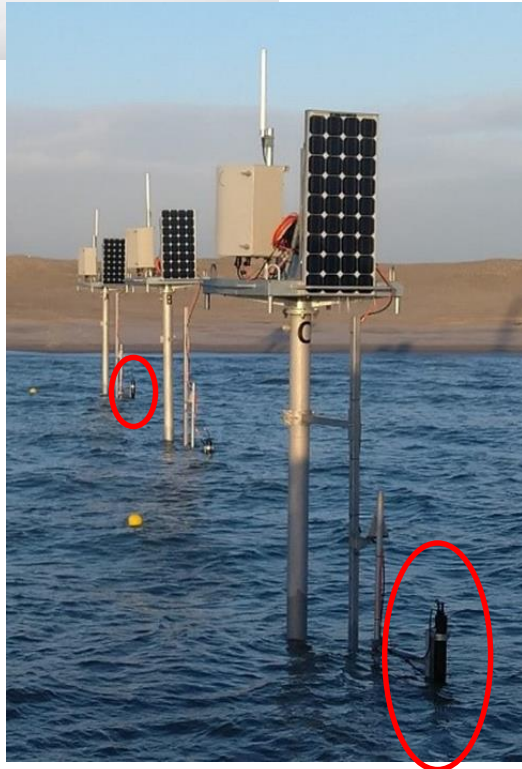
Global Attributes:

```
summary: data measured by STB sensor at platform FL68
time_start: 2019-12-08 00:00:00.000000
time_end: 2019-12-09 00:00:00.000000
time_duration: 1 day, 0:00:00
sensor: STB
sensor_serialnumber: 5494
metadata_timestamp: 2019-12-08
platform_id: FL68
platform_name: FL68 Markermeer Vooroeverdam
bed_level: -3.5138 m+NAP
functions_used: RUN.py, Revision: 394352; ProcessData.py, Revision: 420912; importData.py, Revision: 382143; getData.py, Revision: 417463; ReadMetaDataAdjusted_NoLog.py, Revision: 394439; readAquo.py, Revision: 387493; writeNetCDF.py, Revision: 420912; golf_parameters.py, Revision: 407352; spectrum1D.py, Revision: 380303; calcmoments.py, Revision: 380303;
publisher_name: HKV Consultants, Tauw, Iv-Infra
publisher_url: https://www.hkv.nl
publisher_institution: HKV Consultants
publisher_email: info@hkv.nl
ncfile_created: 2019-12-18 15:51:11
measurement_frequency: 4 Hz
```

Revision numbers → SVN → Version scripts

Final products can be reproduced based on raw data and scripts

Example: ADV measurements



- Type: Nortek Vector ADV
- 6 ADV's in total
- 4 Hz continuously
- Main output parameters: pressure, velocity u, v, w
- Binary files
- 1 file per 30 minutes
- 223 kB/file
- 23 GB/year for 6 ADV's

Example: ADV measurements

Data flow:

1. Binary file on ftp server
2. Hourly pull to HKV server
3. Copy raw data files to back-up server
4. Conversion from Binary to ASCII file
5. Python: read ASCII file and write time series to FEWS database
6. FEWS: perform range checks & difference checks
7. FEWS: import air pressure from KNMI data server
8. Python: read and combine the following
 - a) Measured pressure from FEWS
 - b) Air pressure from FEWS
 - c) Pressure offset and instrument height from metadata sheet



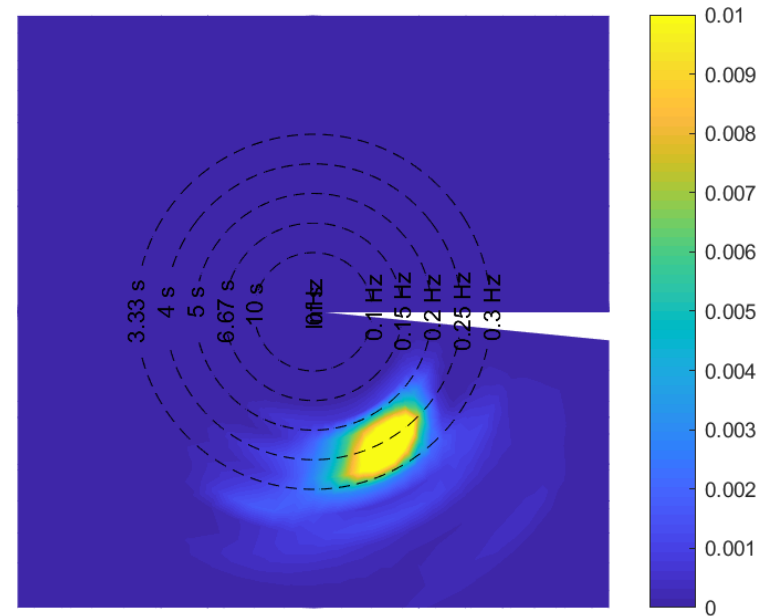
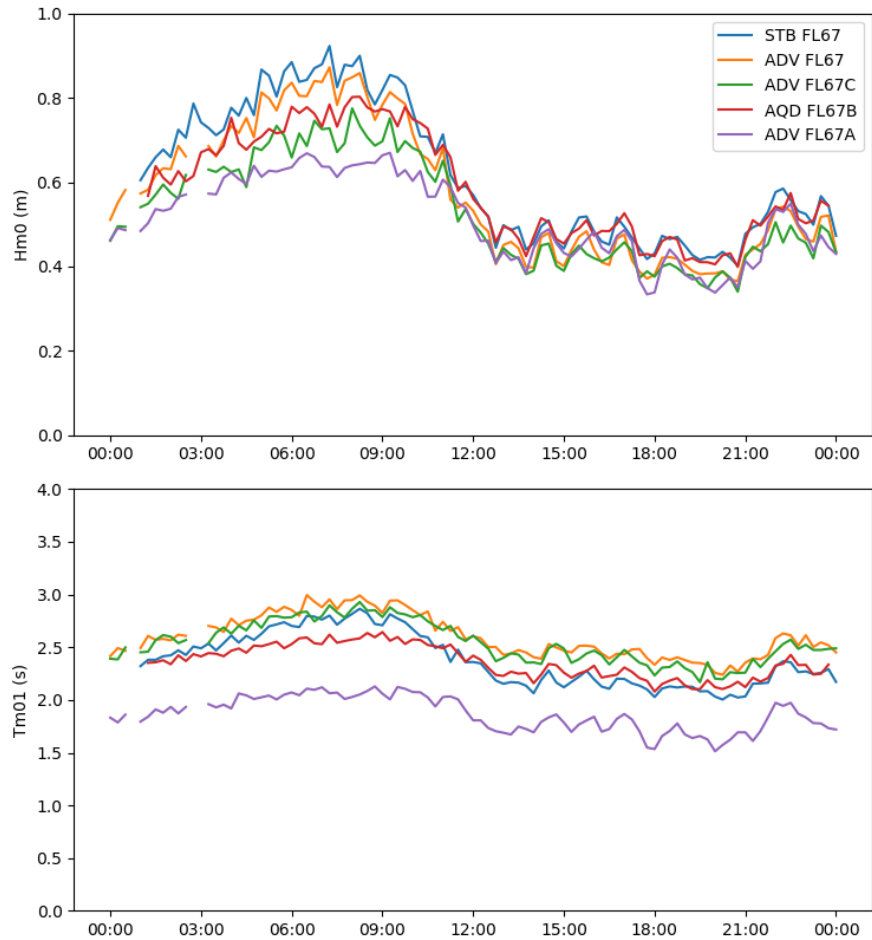
Example: ADV measurements

Data flow (continued):

9. Python: calculate time series water level and rotate velocities from u, v, w to x, y, z
10. Python: write standardized time series to NetCDF on THREDDS server (standard data)
11. Python: calculate 2D wave spectrum and wave parameters using the Maximum Entropy Method
12. Python: write wave spectra and wave parameters to NetCDF on THREDDS server (tailored data)
13. Python: perform range checks & difference checks on standard and tailored data
14. Send daily email with results of all checks and validations



Example: ADV measurements



Archiving

Archive: Waterinfo Extra (Rijkswaterstaat)

<https://rwsprojectarchief.openearth.nl/downloads/houtribdijk/>

Data report available
on request:



Thank you

Initiator and client:



Rijkswaterstaat
Ministerie van Infrastructuur en Milieu

Consortium for data management:



Tauw

External users:



You?

Vincent Vuik
V.Vuik@hkv.nl