Ferrybox data management in NIVA
1. Data flow on ships

Windows Ferrybox PC

- Message "take sample now"
- Message with C3 data
- Message with CTD data
- Message with O2 data

Ferrybox Cabinet (Core parameters)

- CTD Temp, Sal
- C3 cDOM Turb Chl-a
- RBR or Optode O2

Autosampler

Discrete Samples **

Raspberry PI controlled

- pH
- CO3
- pCO2

Water
2. Generalized data flow

Data Pipeline [System]

- **NIVA stream**: Data processing, metadata, QC
  - python app fetching the data

- **FTP server [myocean]**
  - csv file

- **NIVA lake**: Data and QC flags
  - Expose data to internal and external users

- **NIVA port**: API to expose the data
  - Consoles, API, dashboards

Legend:
- person
- system
- container
- external person
- external system
- external container
3. Quality Control tests

1. Frozen test
The test checks if 4 consecutive values before the tested value are equal. An array \([5.,5.,5.,5.,0.,1.]\) gives \([-1,1,1,0,0,0]\)

2. Range test
Checks that data is within a specified range of values. Accepts time range and geographic range. The latter is based on minimum and maximum latitudes and longitudes values.

3. Spike test
Tests the difference between sequential measurements. Array to test \([V1,V2,V3]\)
Only \(V2\) is being tested for a spike:

\[
K_{\text{difference}} = \text{abs}(V2-(V3+V1)/2) - \text{abs}((V3-V1)/2)
\]

\[
\text{if } K_{\text{difference}} > \text{Threshold} \text{ then } V2 \text{ flag } = -1
\]

3. Boat velocity
Velocity based on lat and lon, bounded variance test

---

QC Flags meaning:
1 is PASSED
-1 is FAILED
0 is NOT TESTED

---

Final Flag Calculation:
Overall (Final) Flag can be calculated from different combinations of QC flags:

1) flags related to the given variable + gps flags + pump status flags
2) gps flags + pump status flags
3) only gps flags (for parameters not affected by pump status)

---

Additional info:
• List of test to apply for each signal can be different
4. Data sharing/visualization

API for querying data, and python wrapper for it

*External API access available on request

Public Consoles

Dashboards with local access (Grafana)