

IODE DATA QUALITY FLAG SCHEME

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OUTLINE

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3. Advantages
4. Example use



Photo by Chris Linder (WHOI)

JUSTIFICATION

Wanted to identify a QF scheme that met these criteria:

- Simple to use and unambiguous flag scheme
- Contained only quantifiable assessments of data quality
- Non specific with regard to different data types
- Easily mapped to existing schemes, and other secondary quantifiable or specialised schemes
- Easy to use when generating QF for derived/calculated values (“QF inheritance”)

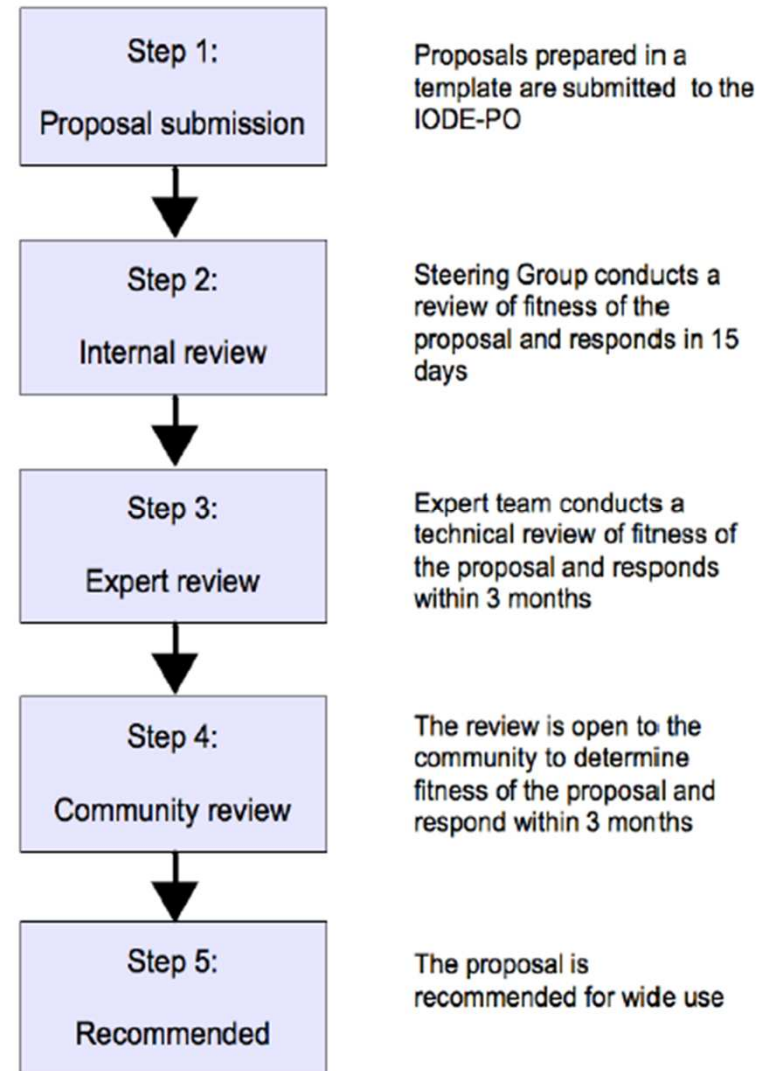
JUSTIFICATION

- Review of QF schemes in use: QARTOD, GTSP, ODV, SeaDataNet, OceanSITES, BODC, WOD
- No scheme met all our criteria perhaps because new schemes are often created to fit individual needs
- Need for a standard universal QF scheme designed to connect all present and any future schemes in a seamless manner without loss of information
- Scheme based on quantifiable criteria only

THE PROCESS

- Series of workshops sponsored by IODE
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- ODS evaluation and review process
 - Accepted February 2013
 - Proposed at IODE XXII in March 2013

Ocean Data Standards and Best Practices Review Process (2012)



IODE DATA QUALITY FLAG SCHEME

- A flag scheme to enable exchange of oceanographic and marine meteorological data
- Published in April 2013 as a UNESCO/IOC ODS

Ocean Data Standards volume 3
http://www.iode.org/mg54_3

IOC MG #54: http://www.iode.org/mg54_3



QUALITY FLAGS: PRIMARY LEVEL

Quality Flag scheme – primary level flags

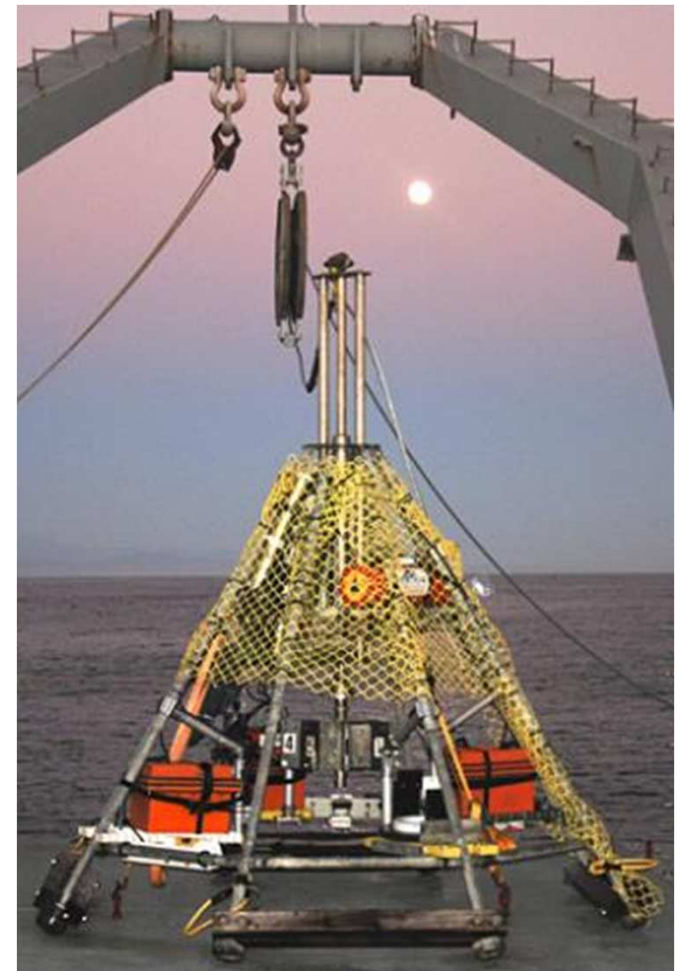
Value	Primary-level flag short name	Definition
1	Good	Passed documented required QC tests
2	Not evaluated, not available or unknown	Used for data when no QC test performed or the information on quality is not available
3	Questionable/suspect	Failed non-critical documented metric or subjective test(s)
4	Bad	Failed critical documented QC test(s) or as assigned by the data provider
9	Missing data	Used as place holder when data are missing

The secondary level flags are optional, but can be used to represent details of quality assessment and control or data processing history.

ADVANTAGES

For data producers and data managers ...

- Small number of primary level flags simplifies implementation
- Primary level flags are objective and therefore easier to apply



ADVANTAGES

For data producers and data consumers ...

- Primary-level flag values are numeric and ordered such that increasing quality flag values indicate decreasing level of quality.
- Scheme supports identification of all data that meet a minimum quality level and facilitates programmatic filtering and assignment of quality flags to calculated parameters.

ADVANTAGES

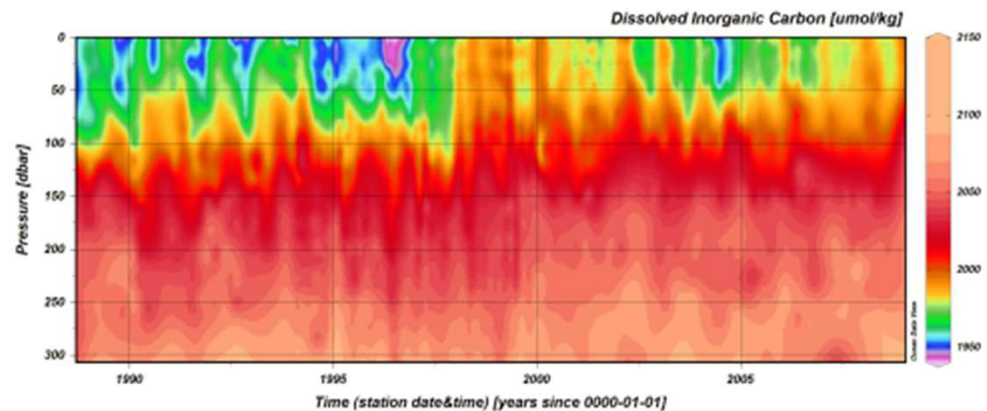
For data consumers ...

- Facilitates data exchange
 - Mapping between quality flag schemes
 - Within a data viewer (e.g. ODV)
 - Between repositories (e.g. NODC and WDS)
 - Protects against information loss
 - Simple primary level flags
 - Details encoded in secondary level flags
- Supports machine interpretation of flags

ADVANTAGES

For data consumers ...

- Data consumers (human or machine clients) can assess data quality using the primary flags.
- If needed, secondary flags provide more detailed information ('fitness for purpose').



EXAMPLE USE

In software application: Ocean Data View

- ODV Qflag mapping
- label Qflag columns as "QV:IODE"
(IODE Quality Value)
- drop this file onto ODV to import the data
and view in ODV



EXAMPLE USE



Implementation of the QF scheme for QC of CTD profile data done by Greg Reed and Andrew Walsh at the RAN Hydrography and Metoc Branch (Australia)

- Level 1 flag is the primary quality flag
- Level 2 flags indicate results of specified QC tests

L1 PRIMARY FLAGS (NETCDF)

```
byte salinity_qc_flag(pressure) ;
  salinity_qc_flag:long_name = "quality control flag for salinity (primary
Level 1 flag)" ;
  salinity_qc_flag:standard_name = "sea_water_salinity_status_flag" ;
  salinity_qc_flag:quality_control_convention = "Proposed IODE qc scheme March
2012" ;
  salinity_qc_flag:valid_min = 1 ;
  salinity_qc_flag:valid_max = 9 ;
  salinity_qc_flag:flag_values = 1b, 2b, 3b, 4b, 9b ;
  salinity_qc_flag:flag_meanings = "good not_evaluated_or_unknown suspect bad
missing" ;
  salinity_qc_flag:coordinates = "time latitude longitude pressure" ;
```

- Level 1 tests for time, position, temperature, pressure, salinity
- Flag: 1=good; 2=not evaluated or unknown; 3=suspect; 4=bad; 9=missing

L2 SECONDARY FLAGS (NETCDF)

```
byte salinity_sd_test(pressure) ;
  salinity_sd_test:long_name = "qc flag for monthly salinity 3 standard
deviation test (secondary Level 2 flag)" ;
  salinity_sd_test:quality_control_convention = "Proposed IODE qc scheme
March 2012" ;
  salinity_sd_test:valid_min = 0 ;
  salinity_sd_test:valid_max = 2 ;
  salinity_sd_test:flag_values = 0b, 1b, 2b ;
  salinity_sd_test:flag_meanings = "passed failed unknown" ;
  salinity_sd_test:coordinates = "time latitude longitude pressure" ;
```

- Level 2 Standard deviation tests for temperature, pressure, salinity
- Check if observation is greater than 3 SD
- Flag: 0=pass; 1=failed; 2=unknown

THANK YOU

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Questions ?



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IOC MG #54: http://www.iode.org/mg54_3