Pushing Argo to the Limit

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Delayed-Mode Quality Control (DMQC)

Objectives

  Good and bad data identified (Read the QC flags)

  Ensure consistent application of DMQC methods

  Provide uncertainty estimates

10 national DAC streams

At least 20 groups performing DMQC

Series of DMQC workshops

    Apr 2005 First DMQC workshop Scripps

    Oct 2006 Second DMQC workshop WHOI

    Sep 2008 Third DMQC workshop U. Washington

Reports available at Coriolis web site

How do you know the DMQC status ?

Single profile names
  R1900292_100.nc
  D1900083_040.nc

DATA_MODE variable for each profile can be
  R real-time raw data
  A some adjustment has been applied, but not
       DMQC
  D profile has been assessed in DMQC

DMQC strategy

As far as possible check DATE and POSITION

Look for spikes not detected by automatic methods

DMQC of TEMP

Very little we can do; TEMP assumed to be
reliable unless there is obvious error

Small TEMP errors hard to detect in variable ocean

DMQC of PSAL

Use statistical methods to compare T-S data from a float with 'reference data'

Based on differences decide that

- Float PSAL appears to be good
- Float PSAL is in error and should be adjusted to agree with reference
- Float PSAL may be in error, but adjusting to agree with reference is not correct
- Cannot determine whether float PSAL is good

Default assumption is float data need no adjustment
unless statistical method clearly suggests
otherwise

Statistical method provides an uncertainty estimate,
generally determined by variability in
reference data

Reference dataset

Based on holdings in World Ocean Database, edited and supplemented by Argo efforts

May be sparse: not enough data to evaluate float

May be out of date: difference between float and reference is real

Supplementing the reference database

Add recent CTDs from research cruises: issue of availability/timeliness

New data critical to ensure Argo dataset can represent a changing ocean climate

Studying the implications of adding 'good' Argo data

In data sparse regions, the number of Argo profiles dominates all 'historical' data

DMQC of PRES

Pressure sensor calibration can drift

Different platforms have different ways of measuring, reporting and allowing for sensor drift

In recent sensors, drift is of order a few dbars (< 5) over lifetime of float

Earlier models sometimes had drift of order 5 to 10 dbars, not random

Not all D floats have had consistent PRES adjustments applied: practice varies across DACs

Topics for discussion at DMQC-3

Known patterns of instrument bias

Statistical methods and tools for PSAL

Consistency of application across DMQC groups

Regional variations

Reference data (include good Argo data or not ?)

DMQC for PRES and TEMP

Recording results of DMQC in NetCDF files

Conclusions on PRES, TEMP, PSAL

For many applications, D-mode data are sufficient. Use

        <param>_ADJUSTED

        <param>_ADJUSTED_QC

        <param>_ADJUSTED_ERROR

When pushing right to the limit, it is necessary to consider carefully how the measurement is made, to understand the limitations of the QC process and to consider whether the data are appropriate for the application.