JERICO

JOINT EUROPEAN RESEARCH INFRASTRUCTURE NETWORK FOR COASTAL OBSERVATORIES

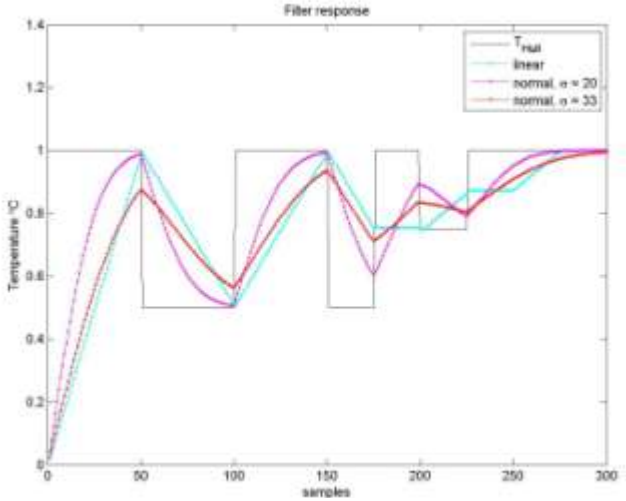
BEST PRACTICES – SOME LESSONS LEARNT FROM 2 SHIPS OF OPPORTUNITY.

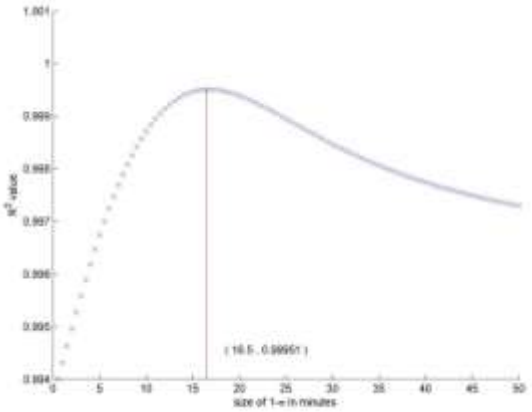
Is there room for procedural improvement?

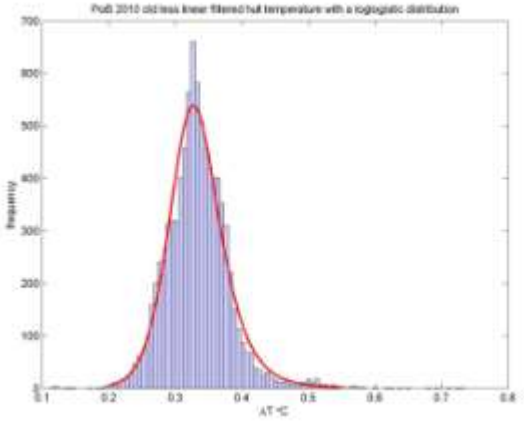
Mark Hartman | NOC | mch@noc.ac.uk

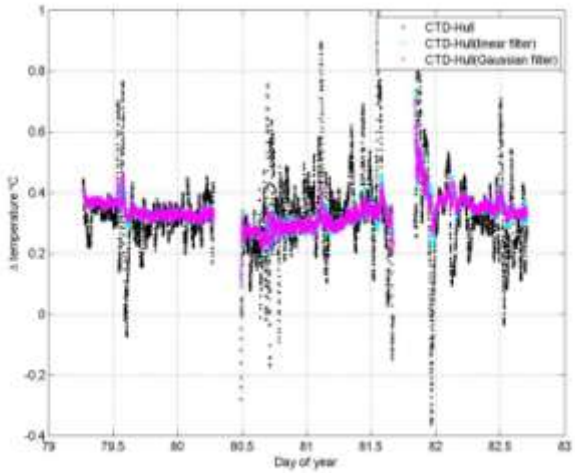
BULK FREIGHT CARRIER - MV PACIFIC CELEBES 2007 - 2012
INTERNATIONAL FERRY - PRIDE OF BILBAO 2002 - 2010

PRIDE OF BILBAO TEMPERATURE COMPARISONS BETWEEN A FLOW THROUGH AND THE HULL MOUNTED TEMPERATURE SENSOR

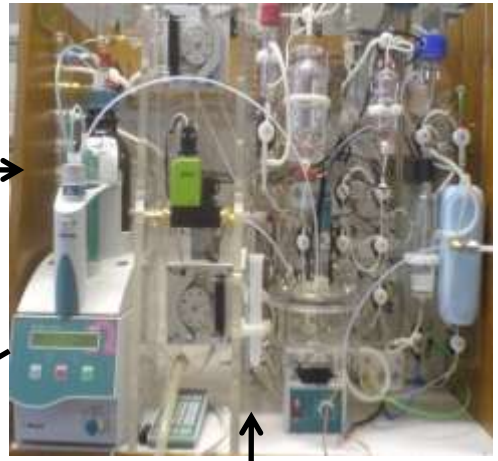


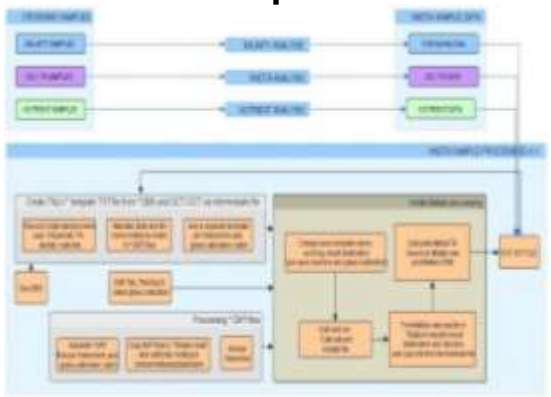


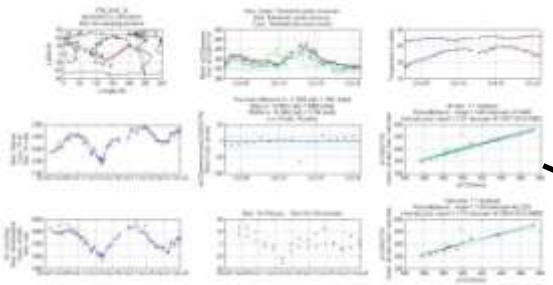


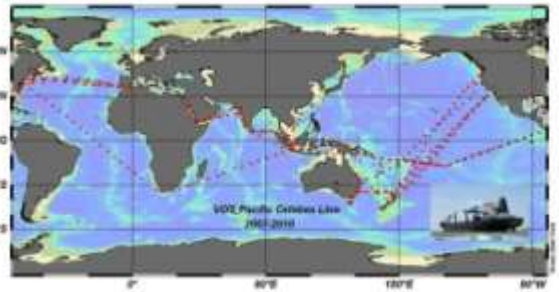


SCHEMATIC OF END TO END PROCESSING PROCEDURE

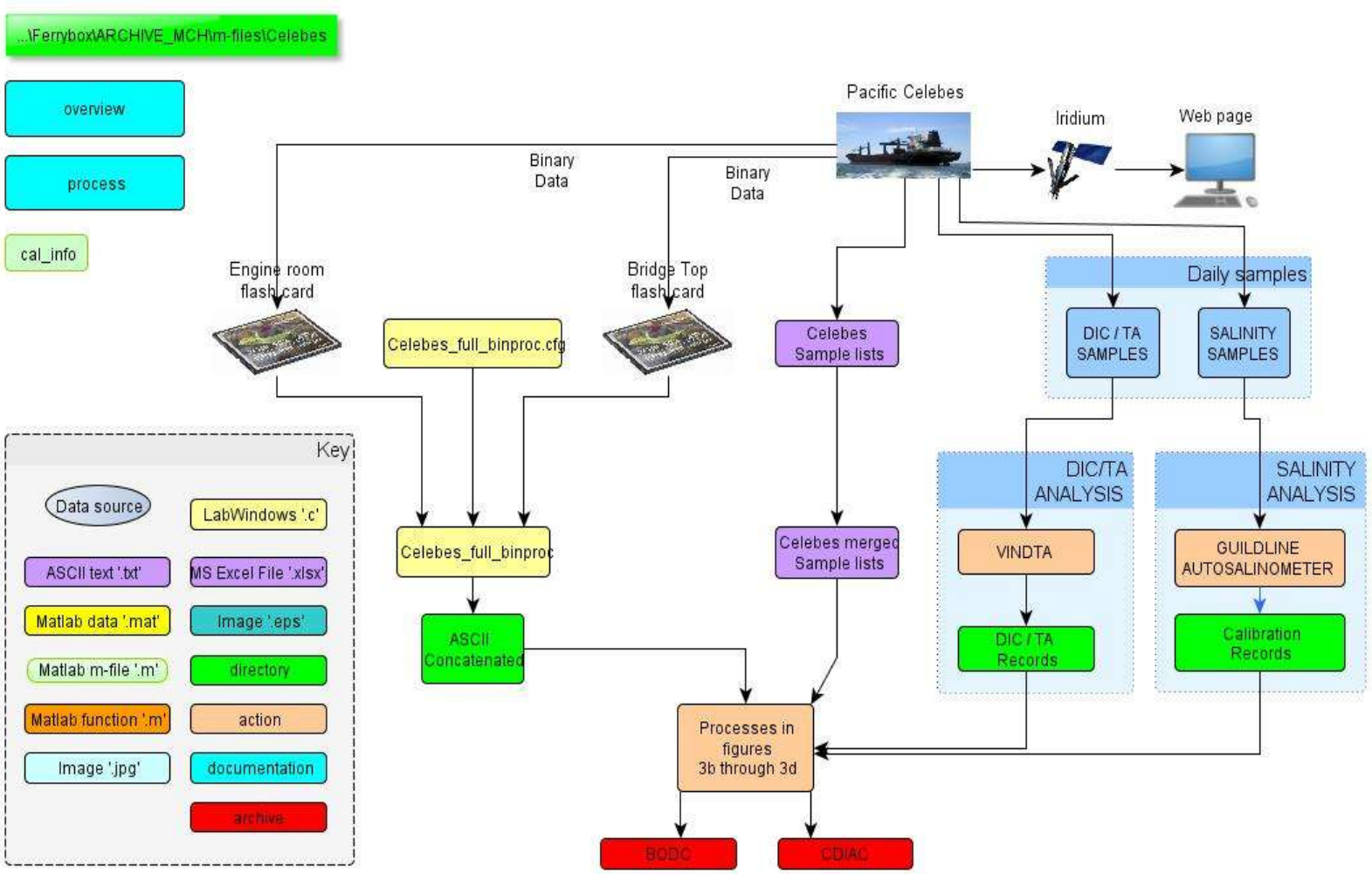




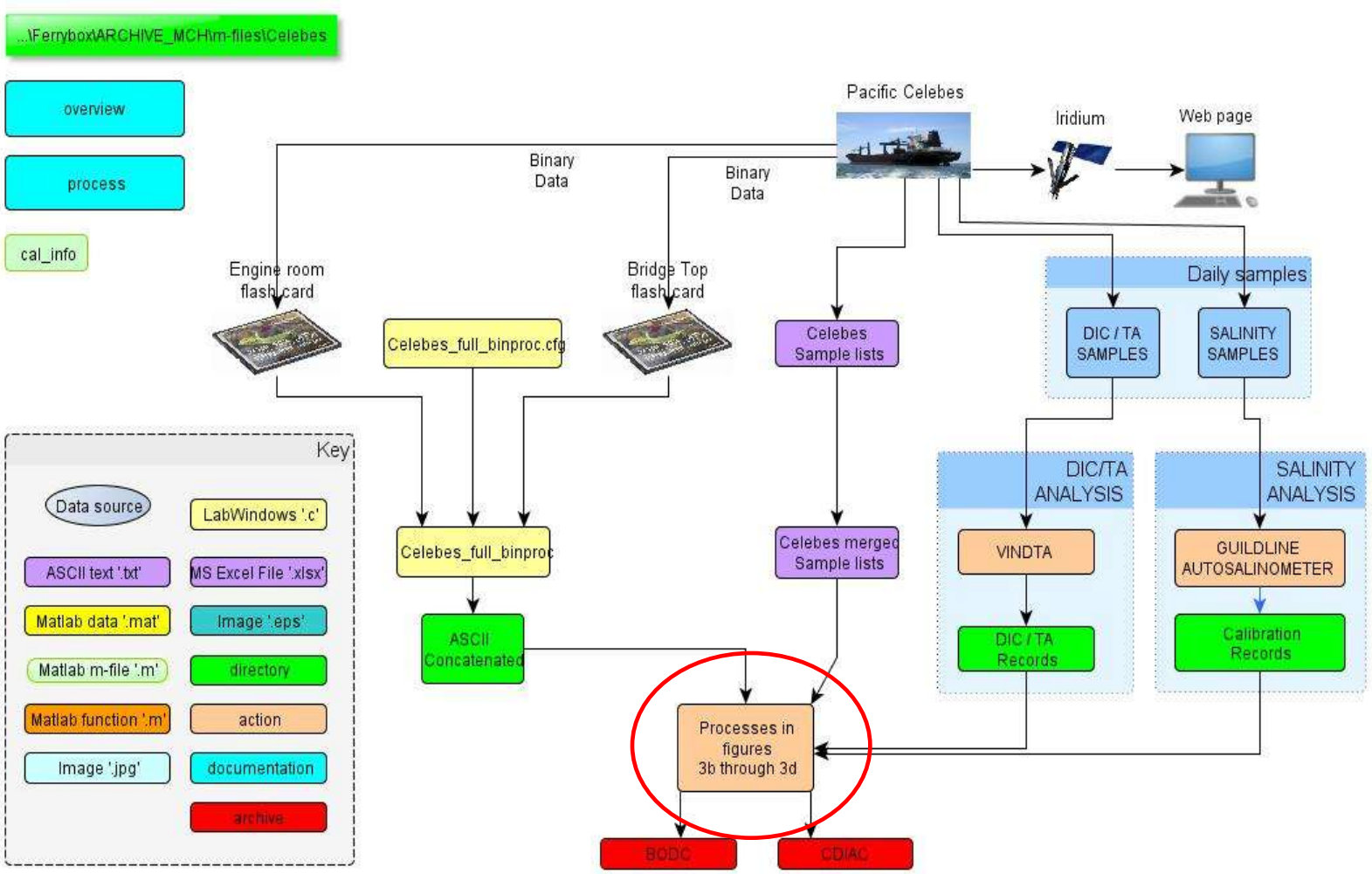




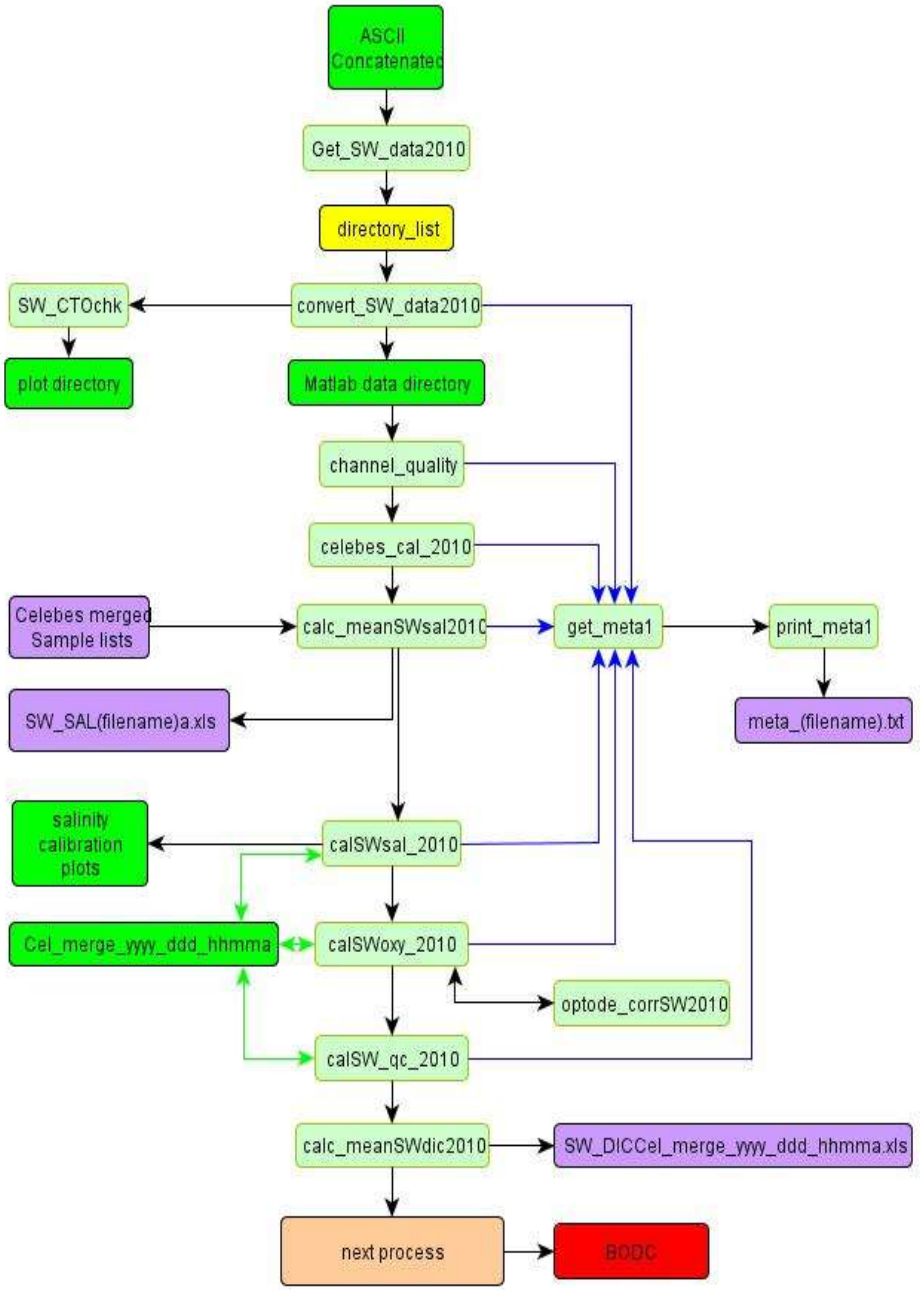
DATA AND SAMPLES TRANSFERRED FROM M.V. PACIFIC CELEBES TO NOC. FLOWCHART A



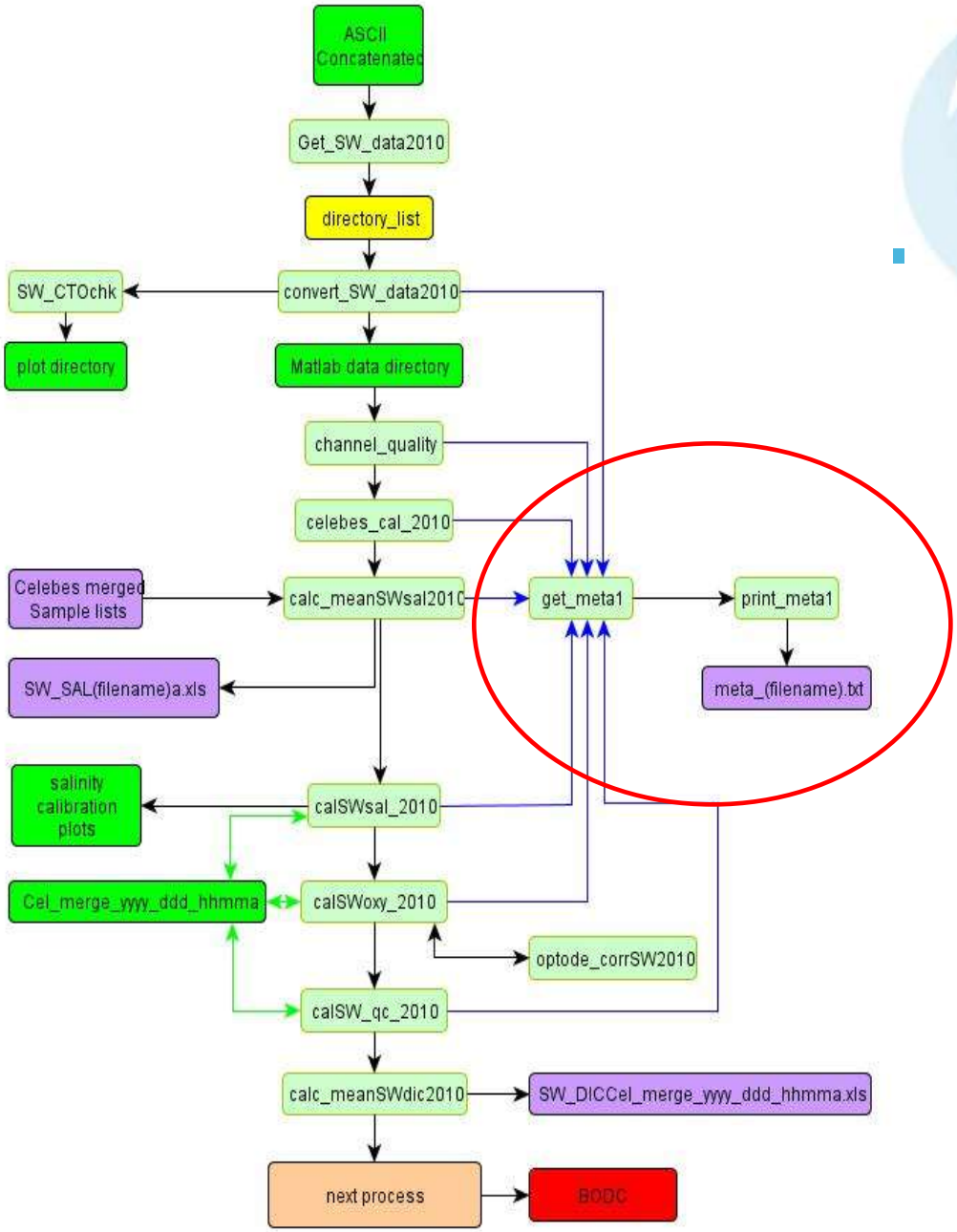
DATA AND SAMPLES TRANSFERRED FROM M.V. PACIFIC CELEBES TO NOC. FLOWCHART A



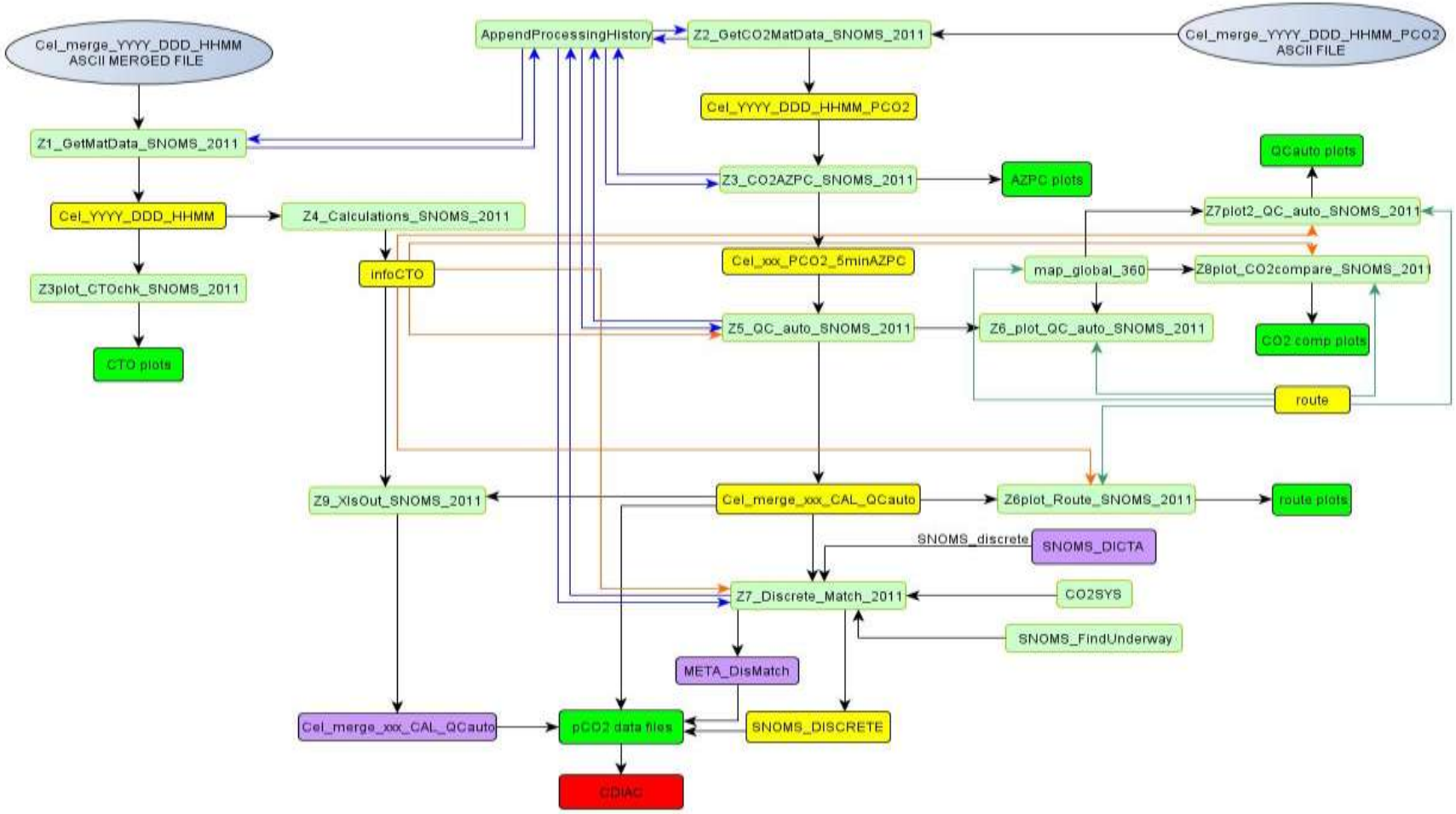
UNDERWAY DATA PROCESSING FLOWCHART B



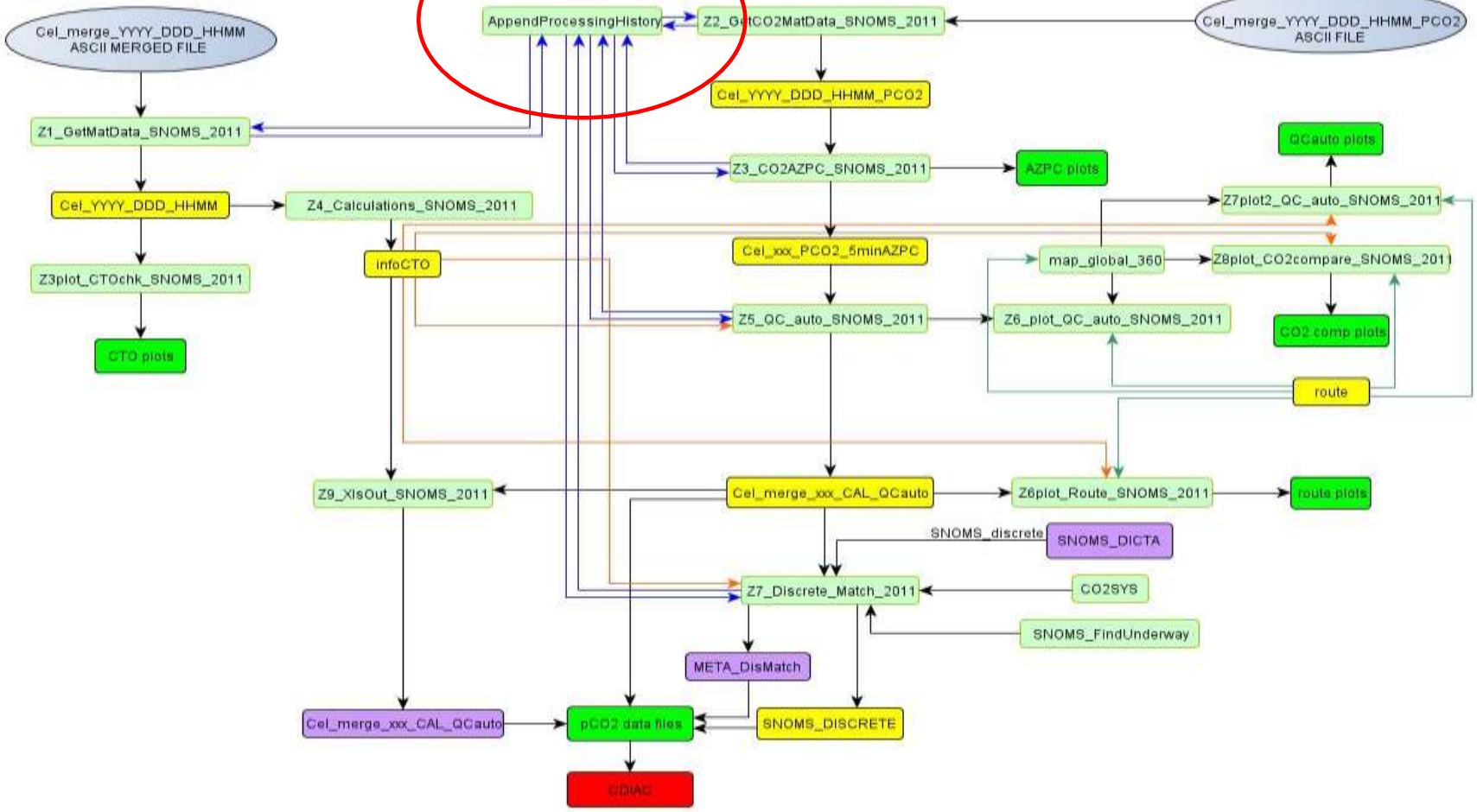
UNDERWAY DATA PROCESSING FLOWCHART B



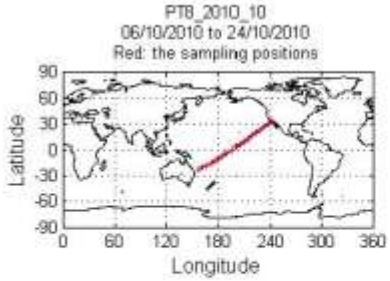
DISSOLVED INORGANIC CARBON AND TOTAL ALKALINITY (DIC / TA) PROCESSING FOLLOWING VINDTA ANALYSIS. FLOWCHART D.

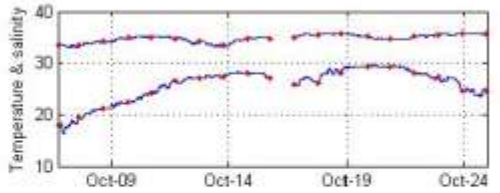


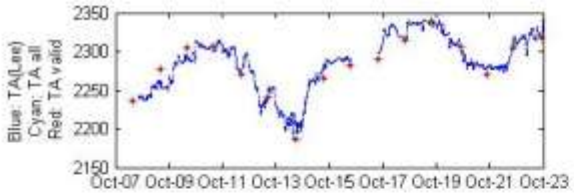
DISSOLVED INORGANIC CARBON AND TOTAL ALKALINITY (DIC / TA) PROCESSING FOLLOWING VINDTA ANALYSIS. FLOWCHART D.

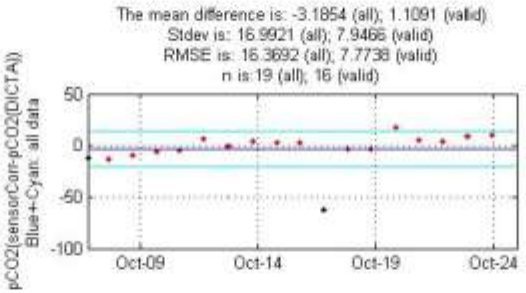


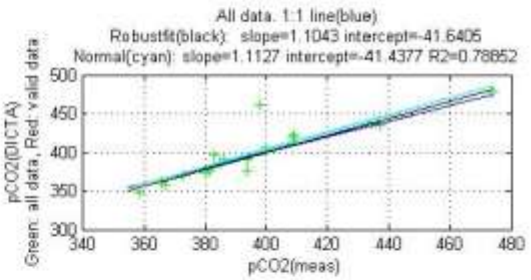
ALKALINITY, DIC, $_pCO_2$ QUALITY CONTROL BY COMPARISON TO CLIMATOLOGICAL DATA

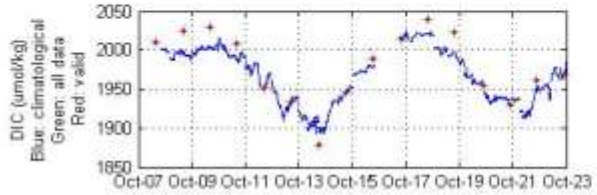


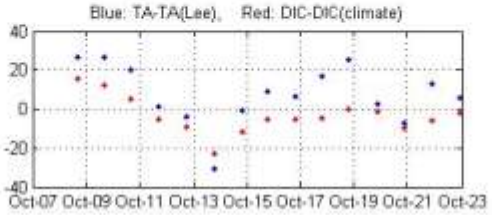


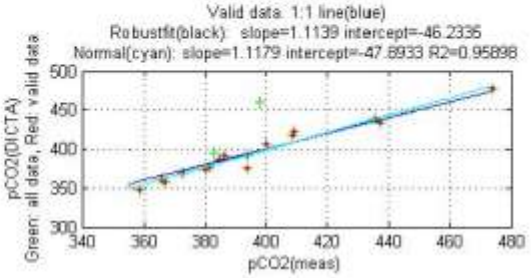




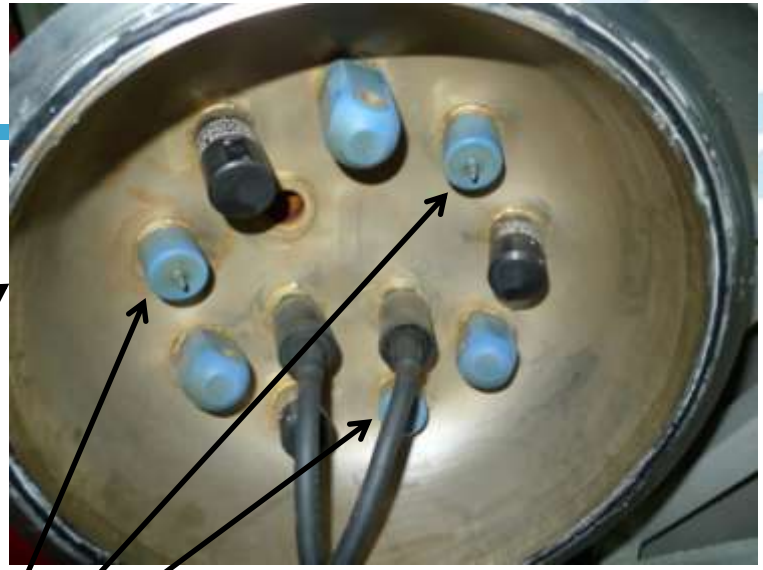




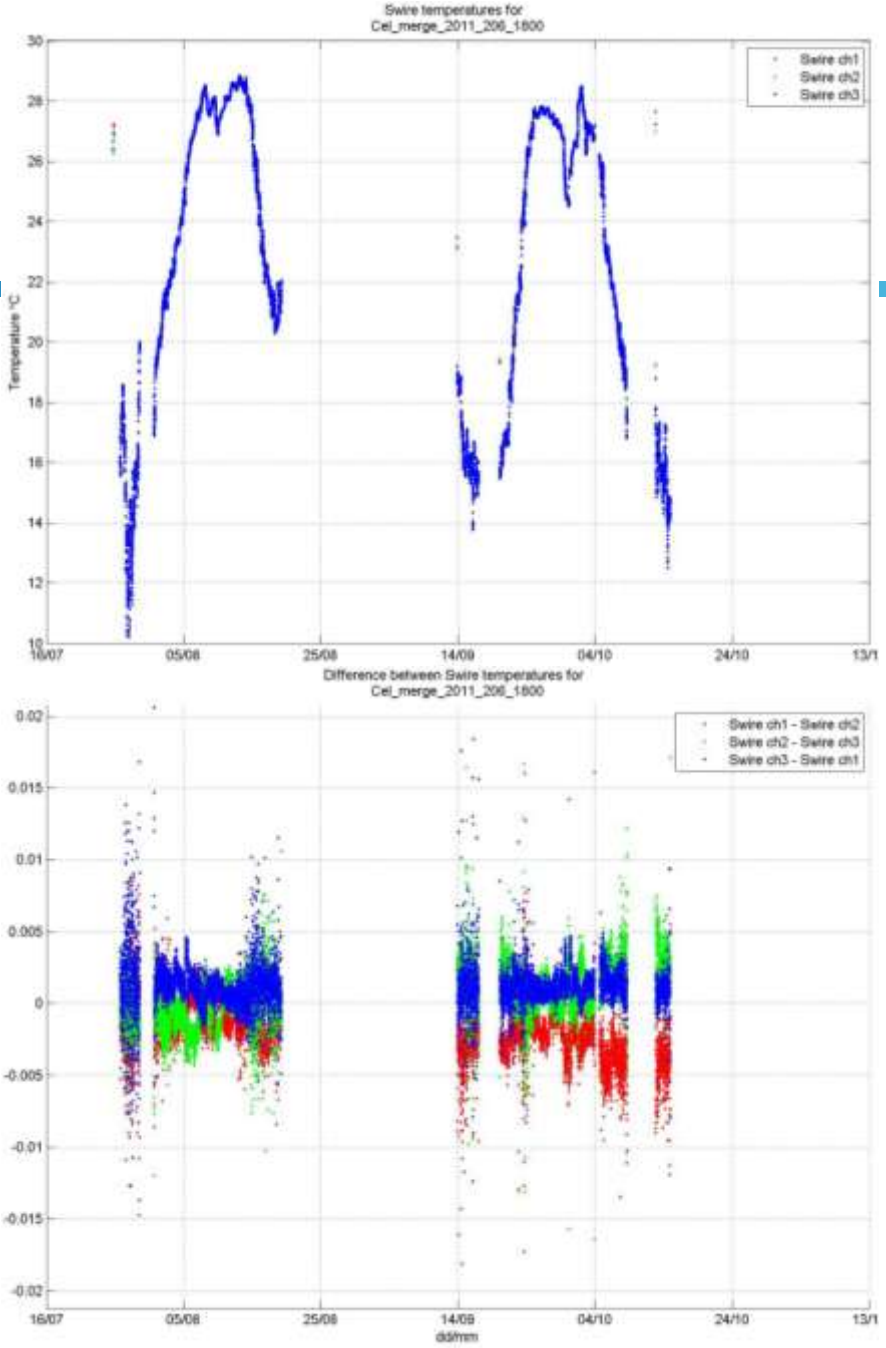




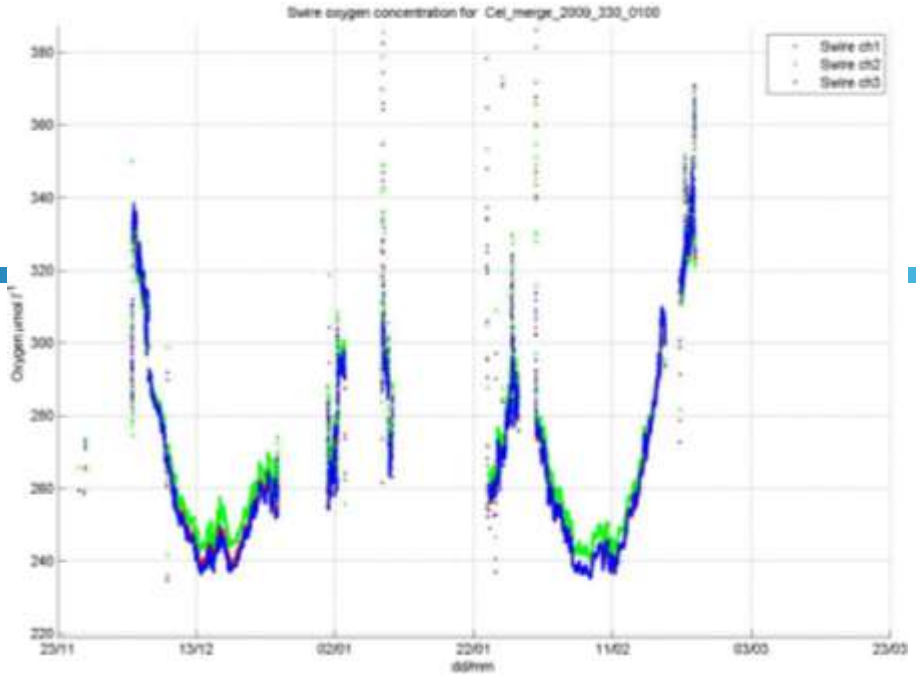
AANDERAA TRIPLICATE SENSORS
3 TEMPERATURE
3 CONDUCTIVITY
3 OXYGEN

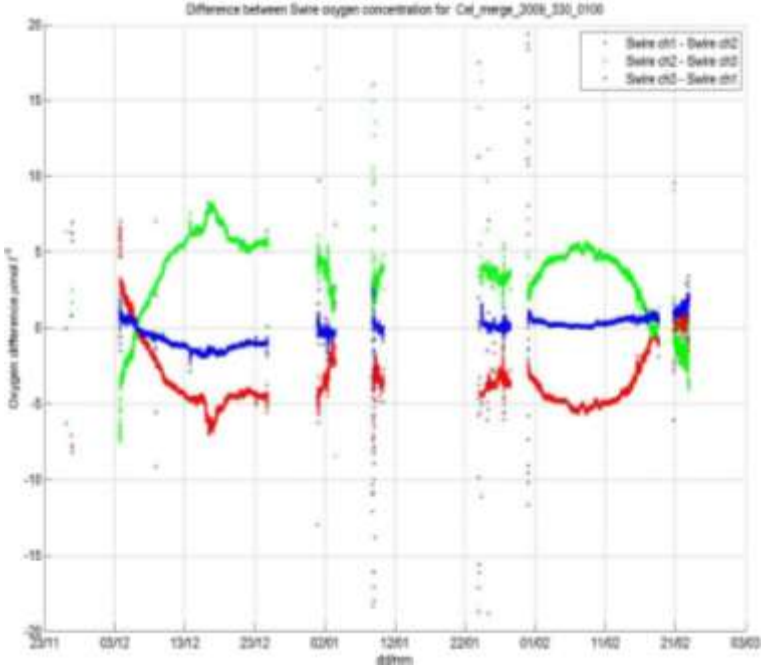


PACIFIC TRIPLICATE TEMPERATURE DATA

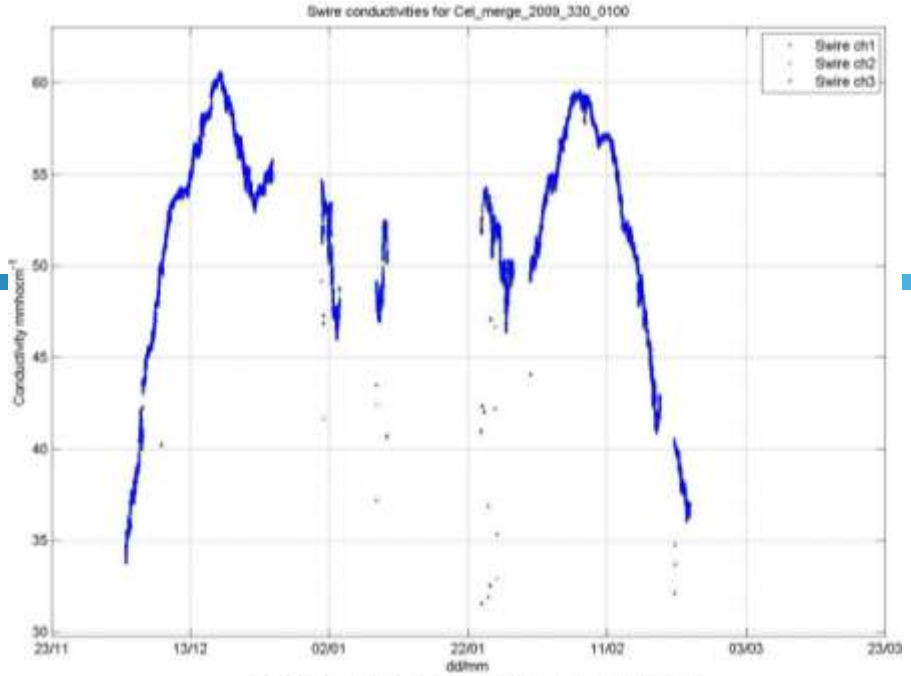


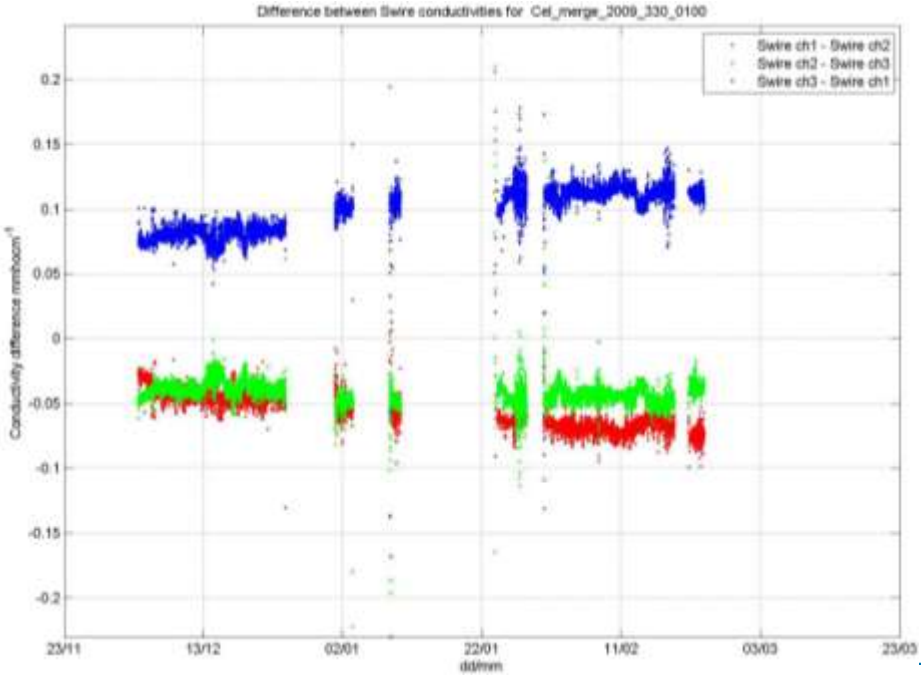
PACIFIC TRIPLICATE OXYGEN DATA



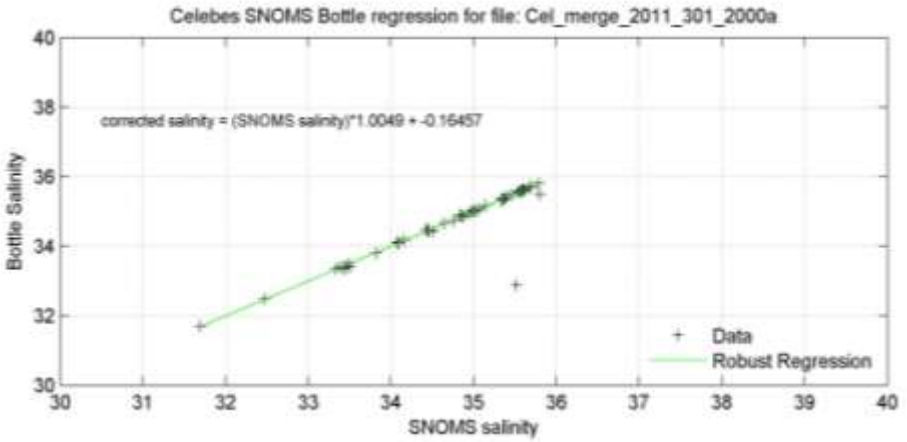


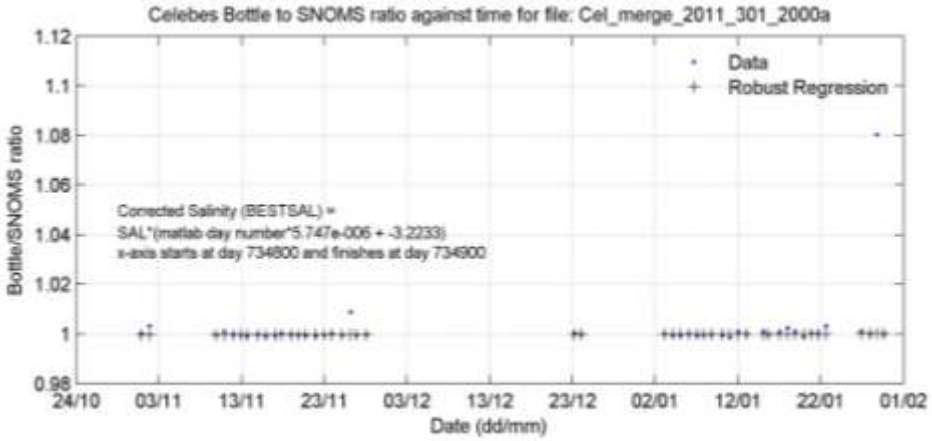
PACIFIC TRIPLICATE CONDUCTIVITY DATA

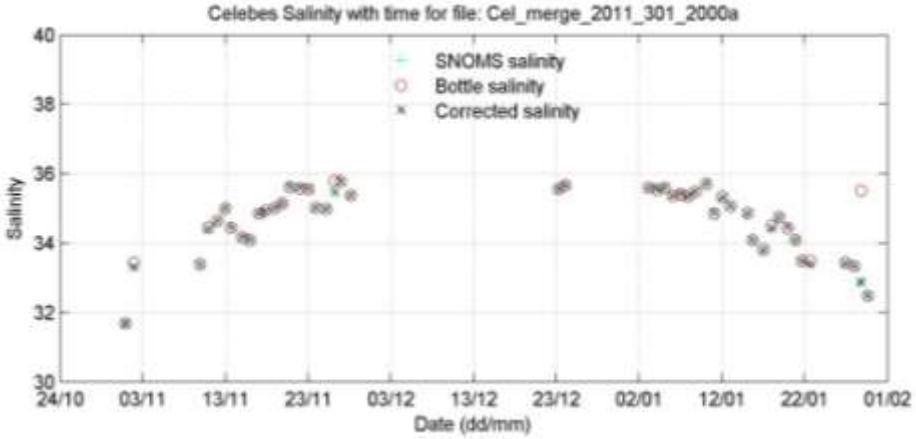




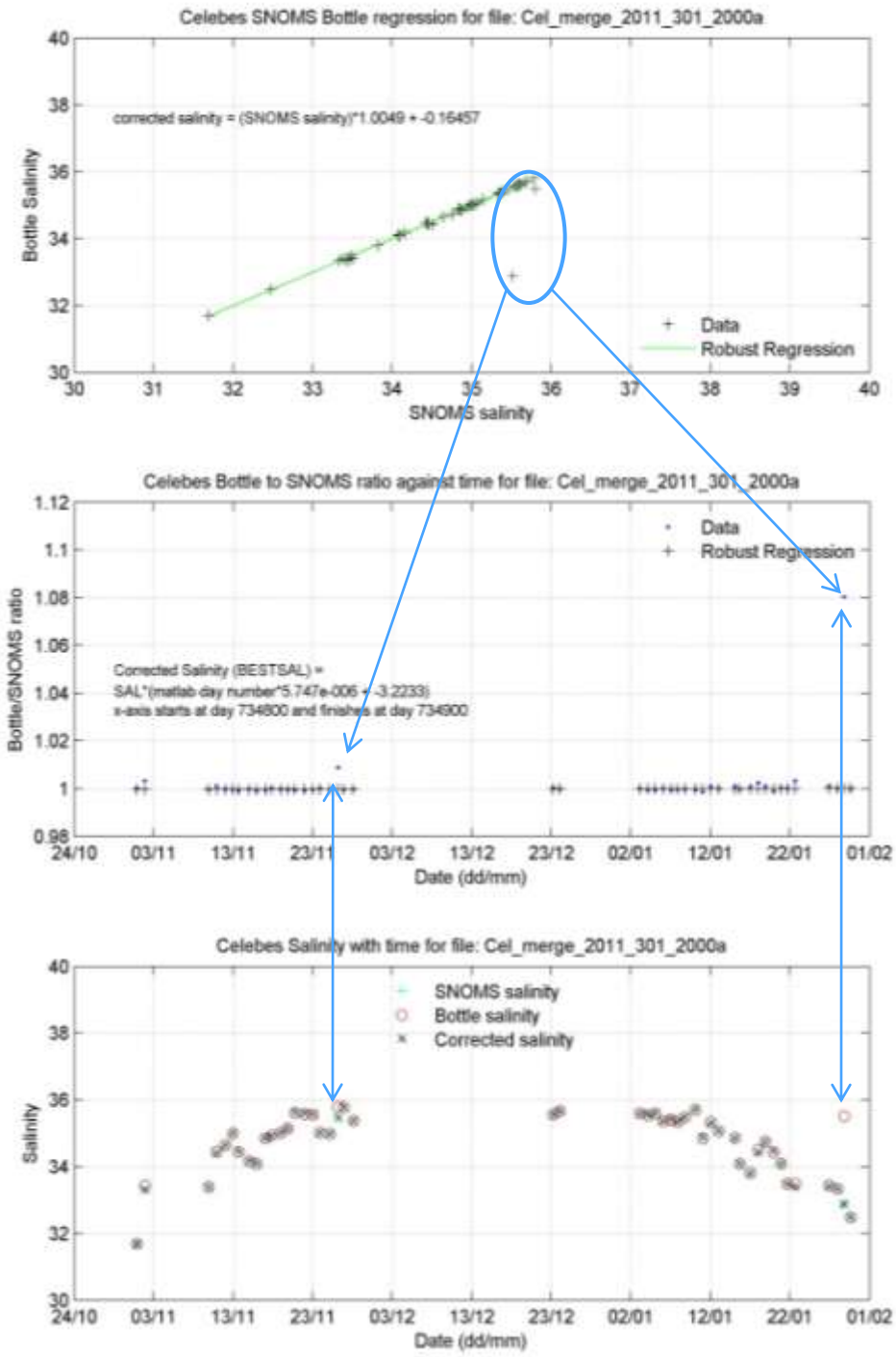
DAILY SAMPLE COMPARISON







SALINITY CORRECTION



BEST PRACTICE - OPERATIONAL

- *Pre-deployment sensor calibration*
- *Training of ship's crew in sample taking*
- *Limited duration sensor deployment – 3 months*
- *Regular Monitoring of real-time data – daily if possible*
- *Shutdown of flow-through system and cleaning in port*
- *Sample logistics*
- *Sample analysis*

ALGORITHM DEVELOPMENT – A SIMPLE LIST

- Co-location of sample data with underway data
- Combination of discrete sample analysis results with underway measurements
- Decision on which sensor output to use.
- Regression of sample data with underway data
- Processing leading to CO2 data
- Processing leading to salinity data
- Correction of underway data

USEFUL ASPECTS AND DRAWBACKS

- *Availability of document with a description of the processing route from instrument to data centre containing HTML links for traceability* ***Data processing procedures for SNOMS project 2007 to 2012*** *,* ***M. C. Hartman, D. J. Hydes, J. M. Campbell, Z. P. Jiang, S. E. Hartman***

- *yED (used for flowcharts) also uses HTML links to access the originating code which is useful for developement and meta data control.*

- *Current lack of version control*

SOME QUESTIONS

- *How do we improve quality control and streamline prcessing effort?*
- *We need to investigate this by gathering a small group and assessing the current state of affairs. (We are doing this in Jerico)*
- *What can we learn from each other. (again we are doing this in Jerico)*
- *Can we develop within Jerico a Neo Linnean framework, or other, in which to group types of sensor that have common requirements such as biofouling, quality-control, timing of cleaning, calibration checks to help us organise these issues? This should help place new technology and hence anticipate the pit-falls likely to be encountered across platform types.*
- *Altogether the range of experience from across the community will solve the current problems, we don't expect a likely answer to these in Crete. However, we aim to achieve an adherence to best procedure when it comes to items such as version control documentation and traceability. This should lead to a minimum standard for each measurement i.e. a minimum set of events that lead to traceability standard criterion for each measurement type. However…*
- *We should remember that marine metrology is an evolutionary process, should we adress this by creating a structure that refects this?*

A POSSIBLE APPROACH

- *WP3 & WP4 are about lessons learned, WP10 deals with procedural improvements.*
- *Chain of measurements i.e. determine which measurements are dependent upon others and hence develop an order of proceedure.*
- *Would a 'Markov chain' style approach be useful in the following case?*

An example:

1. *Table of sensor compatibility – which sensors can be used together without influencing the individual measurements. Is there a minimum proximity or should sensor 1 be up stream from sensor 2.*
2. *Base standard - What standard is being used for each measurement type.*
3. *Initial calibration of sensor against base standard.*
4. *Installation of sensor on platform.*
5. *Initial operational assessment of sensor.*
6. *If there is no automated system for cleaning, what is theMaximum likely sensor deployment duration before cleaning becomes necessary.What type of cleaning is necessary.*
7. *What is theMaximum likely sensor deployment duration before re-calibration is necessary.*

8. For monitoring period, T Is there a pre-calibration at time T_{pre} that can be applied.
9. For monitoring period, T Is there a post-calibration at time T_{post} that can be applied.
10. Can drift D, at time t, where $T_{pre} < t < T_{post}$ be assessed? (y/n)
11. What is the maximum allowable drift, D_{max}
12. Are there checks against an independent measurement during time t, where $T_{pre} < t < T_{post}$ (y/n).
13. How many independent measurements are available during time t?
14. …….and so on.

WP10.5 TASK

1. *Review data processing undertaken by relevant partners for ferry box system*
2. *Review the compatibility of present processing and with requirements promulgated by my ocean.*
3. *Design and overall algorithm describing data logging and processing and best practice.*
4. *Design specific algorithm based procedures which improve the production of data products and data transfer to users to facilitate utilisation e.g. for data assimilation in models*
5. *Develop code and handbooks(Matlab /octave/python) so that these procedures can be transferred to other users.*

UNIFICATION OF THE DATA PROCESSING ROUTE FOR A SMALL GROUP OF INSTITUTIONS. ARE THERE COMMONALITIES?

- *Similar systems to these have already been independently developed in other institutes. What are the processes that are common between these organisations?*

  For example, do Ifremer and CEFAS have aspects of their processes that can be reduced and synthesised to allow the proceedures to be ported across to other institutes?

- *If we can identify and extract the similarities- the remainder must be the aspects that differ.*

- *The types of information that may be required from users might include:-*

  Platform type, speed, locations, are there historical or climatological data from regions visited. What is the range of measurement made: (Physical, Optical,Chemical, Acoustic, Biological)

A WAY FORWARD?