Calibration, validation and bio- fouling prevention of optical sensors in Alg@line project

Seppo Kaitala, Jukka Seppälä, Petri Maunula SYKE Jerico WP4 workshop, 9.2.2012

SYKE

Management



Alg@line dataflow



Ferrybox-software controls operations of automatic flow-through and watersampling equipment onboard



Magement with ferrybox software



Checking data with ferrybox analysis



Finnmaid Diary 2010

| Week Date Who | Mit-files G=good, U=usefull,but fixed B=bad, leaved to original_files folder If corcections, how Parameters ja georecords original_files | device | Samplin gyes/no maintenance comments |
|------------------|--|---|---|
| 4 27.1.2010 PeMa | FM100121 G FM100123 G FM100124 G FM100126 G | SEABIRD TSG 45 Calibration of conductivity13.1.2010 | |
| 7 16.2.2010 PeMa | FM100127 G FM100129 G FM100130 G FM100201 G FM100203 G FM100205 G FM100206 G FM100208 G FM100210 G FM100212 G FM100213 G FM100215 G | SEABIRD TSG 45 | Samples ok FM100215 G salinity comparison |

Annual variation of chlorophyll *a* (mg m-3) in the Western Gulf of Finland and in the Northern Baltic Proper



Chlorophyll a validation of chlorophyll-a fluorescence

against chlorophyll-a analysis with extraction.



Phycocyanin Fluorescence in the Baltic Sea



Seppälä et al. (2007) ECSS 73

Detection of Baltic Cyanobacteria

Optical detection of phytoplankton typically yields a bulk Chlorophyll *a* signal, no taxonomic information.



Chla in living cyanobacterial cells fluoresces very weakly.



Chlorophyll-a validation of chlorophyll-a fluorescence against chlorophyll-a analysis with extraction (upper)



validation of same records with phycocyanin as auxiliary parameter (lower).



Measuring both Phycocyanin and Chla fluorescence will improve Chla concentration estimates.



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Longitude, Gulf of Finland

One of the tasks is to ensure the routine validation of real-time production In Algaline monitoring this is partly carried out with the difference of 2 parallel observations of temperature; termometer by the water inlet and the termosalinograph. Red is current observations, gray is previous cruise data.



Real Time Quality Control of biogeochemical measurements

| Table 1: Quality flag scale. Codes marked | Meaning | | | | | | | | |
|---|---|--|--|--|--|--|--|--|--|
| in red are mandatory following the RTQC | | | | | | | | | |
| procedure Code | | | | | | | | | |
| 0 | No QC was performed | | | | | | | | |
| 1 | Good data | | | | | | | | |
| 2 | Probably good data | | | | | | | | |
| 3 | Bad data that are | | | | | | | | |
| | potentially correctable | | | | | | | | |
| | | | | | | | | | |
| 4 | Bad data | | | | | | | | |
| 4 5 | Bad data Value changed | | | | | | | | |
| 4 5 6 | Bad data Value changed Below detection limit | | | | | | | | |
| 4 5 6 7 | Bad dataValue changedBelow detection limitIn excess of quoted | | | | | | | | |
| 4 5 6 7 | Bad dataValue changedBelow detection limitIn excess of quotedvalue | | | | | | | | |
| 4 5 6 7 8 | Bad dataValue changedBelow detection limitIn excess of quotedvalueInterpolated value | | | | | | | | |
| 4 5 6 7 8 9 | Bad data Value changed Below detection limit In excess of quoted value Interpolated value Missing value | | | | | | | | |

Flaged data to database

| | Liberatior | n Sans | | ~ 10 | ~ |) 🗛 🖌 | | | | 11 | 1.11 | | | J | % | 000. 500. ++0 500. | | | <u>-</u> | E | <u>*</u> | • E | | | |
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| _ | A | B C | D | E | F | G | н | | 1 | | | к | L | M | | 0 | P | 0 | R | S | т | U | V | w | x |
| 1 Dat | te d | d Time | at | Lat | dla | Lon | alo \ | Nsan | nple | 0 | w s | Sospd | asp | Sosal | asal | Sotemp | ate S | Soxtemp of | ixte | Sochifi | achfl 3 | Sopcfl (| pcfl | Soturb | atur |
| 2 201 | 11-05-10 | 2 01:39:46 | 2 | 53.96945 | 2 | 10.90168 | 2 | | | 0 | 2 | 13.1 | 2 | 5.662 | 2 | 16.168 | 2 | 11.433 | 4 | 9.646 | 2 | -9999 | 4 | 4.2898 | 4 |
| 3 201 | 11-05-10 | 2 01:40:05 | 2 | 53.9704 | 2 | 10.90295 | 2 | | | 0 | 2 | 13.3 | $\overline{2}$ | 11.482 | 2 | 12.199 | 2 | 11.436 | 2 | 2.8938 | 2 | -9999 | 4 | 1.8798 | 2 |
| 4 201 | 11-05-10 | 2 01:40:26 | 2 | 53.97142 | 2 | 10.90422 | 2 | | | 0 | 2 | 13.6 | 2 | 11.624 | 2 | 11.874 | 2 | 11.459 | 2 | 2.5662 | 2 | -9999 | 4 | 1.687 | 2 |
| 5 201 | 11-05-10 | 2 01:40:45 | 2 | 53.97245 | 2 | 10.90545 | 2 | | | 0 | 2 | 13.8 | 2 | 11.627 | 2 | 11.789 | 2 | 11.473 | 2 | 2.6026 | 2 | -9999 | 4 | 1.4942 | 2 |
| 6 201 | 11-05-10 | 2 01:41:05 | 2 | 53.9735 | 2 | 10.90675 | 2 | | | 0 | 2 | 14 | 2 | 11.619 | 2 | 11.747 | 2 | 11.48 | 2 | 2.639 | 2 | -9999 | 4 | 1.446 | 2 |
| 7 201 | 11-05-10 | 2 01:41:26 | 2 | 53.9746 | 2 | 10.90807 | 2 | | | 0 | 2 | 14.3 | 2 | 11.597 | 2 | 11.729 | 2 | 11.506 | 2 | 2.6208 | 2 | -9999 | 4 | 1.3978 | 2 |
| 8 201 | 11-05-10 | 2 01:41:45 | 2 | 53.97565 | 2 | 10.90932 | 2 | | | 0 | 2 | 14.4 | 2 | 11.583 | 2 | 11.723 | 2 | 11.507 | 2 | 2.6208 | 2 | -9999 | 4 | 1.3496 | 2 |
| 9 201 | 11-05-10 | 2 01:42:05 | 2 | 53.9767 | 2 | 10.91058 | 2 | / | | 0 | 2 | 14.4 | 2 | 11.567 | 2 | 11.722 | 2 | 11.576 | 2 | 2.6208 | 2 | -9999 | 4 | 1.3014 | 2 |
| 10 201 | 11-05-10 | 2 01:42:25 | 2 | 53.97775 | 2 | 10.91207 | 2 | / / | | 0 | 2 | 14.5 | 2 | 11.565 | 2 | 11.728 | 2 | 11.647 | 2 | 2.639 | 2 | -9999 | 4 | 1.3014 | 2 |
| 11 201 | 11-05-10 | 2 01:42:45 | 2 | 53.97872 | 2 | 10.91367 | 2 | $\langle \nabla$ | | 0 | 2 | 14.6 | 2 | 11.566 | 2 | 11.735 | 2 | 11.743 | 2 | 2.73 | 2 | -9999 | 4 | 1.2532 | 2 |
| 12 201 | 11-05-10 | 2 01:43:05 | 2 | 53.97965 | 2 | 10.91538 | 2 | | | 0 | 2 | 14.8 | 2 | 11.556 | 2 | 11.759 | 2 | 11.832 | 2 | 2.6936 | 2 | -9999 | 4 | 1.2532 | 2 |
| 13 201 | 11-05-10 | 2 01:43:25 | 2 | 53.98052 | 2 | 10.91705 | 2 | | $\langle \rangle$ | 0 | 2 | 14.9 | 2 | 11.543 | 2 | 11.804 | 2 | 11.892 | 2 | 2.7664 | 2 | -9999 | 4 | 1.3496 | 2 |
| 14 201 | 11-05-10 | 2 01:43:45 | 2 | 53.98147 | 2 | 10.91892 | 2 | | | 0 | 2 | 15 | 2 | 11.544 | 2 | 11.861 | 2 | 11.925 | 2 | 2.7846 | 2 | -9999 | 4 | 1.3496 | 2 |
| 15 201 | 11-05-10 | 2 01:44:05 | 2 | 53.98238 | 2 | 10.92068 | 2 | \sim | | 0 | 2 | 15.1 | 2 | 11.553 | 2 | 11.933 | 2 | 11.986 | 2 | 2.8392 | 2 | -9999 | 4 | 1.3496 | 2 |
| 16 201 | 11-05-10 | 2 01:44:25 | 2 | 53.98332 | 2 | 10.92245 | 2 | | | 0 | 2 | 15.1 | 2 | 11.563 | 2 | 12 | 2 | 12.024 | 2 | 2.8756 | 2 | -9999 | 4 | 1.3496 | 2 |
| 17 201 | 11-05-10 | 2 01:44:45 | 2 | 53.98423 | 2 | 10.9242 | 2 | | | 0 | 2 | 14.8 | 2 | 11.582 | 2 | 12.043 | 2 | 12.047 | 2 | 2.9302 | 2 | -9999 | 4 | 1.3978 | 2 |
| 18 201 | 11-05-10 | 2 01:45:05 | 2 | 53.9851 | 2 | 10.9259 | 2 | | | 0 | 2 | 14 | 2 | 11.604 | 2 | 12.095 | 2 | 11.938 | 2 | 2.9484 | 2 | -9999 | 4 | 1.3978 | 2 |
| 19 201 | 11-05-10 | 2 01:45:26 | 2 | 53.98593 | 2 | 10.92752 | 2 | | | 0 | 2 | 13.4 | 2 | 11.614 | 2 | 12.134 | 2 | 11.785 | 2 | 2.9848 | 2 | -9999 | 4 | 1.3978 | 2 |
| 20 201 | 11-05-10 | 2 01:45:45 | 2 | 53.98668 | 2 | 10.92897 | 2 | | | 0 | 2 | 12.2 | 2 | 11.622 | 2 | 12.165 | 2 | 11.686 | 2 | 2.9484 | 2 | -9999 | 4 | 1.446 | 2 |
| 21 201 | 11-05-10 | 2 01:46:05 | 2 | 53.9874 | 2 | 10.9303 | 2 | | | 0 | 2 | 11.2 | 2 | 11.644 | 2 | 12.139 | 2 | 11.63 | 2 | 2.912 | 2 | -9999 | 4 | 1.446 | 2 |
| 22 201 | 11-05-10 | 2 01:46:26 | 2 | 53.98808 | 2 | 10.93155 | 2 | | | 0 | 2 | 10.4 | 2 | 11.684 | 2 | 12.066 | 2 | 11.466 | 2 | 2.8028 | 2 | -9999 | 4 | 1.3978 | 2 |
| 23 201 | 11-05-10 | 2 01:46:45 | 2 | 53.9887 | 2 | 10.93267 | 2 | | | 0 | 2 | 9.7 | 2 | 11.73 | 2 | 11.974 | 2 | 11.411 | 2 | 2.73 | 2 | -9999 | 4 | 1.3496 | 2 |
| 24 201 | 11-05-10 | 2 01:47:06 | 2 | 53.98928 | 2 | 10.93378 | 2 | | | 0 | 2 | 9.2 | 2 | 11.744 | 2 | 11.886 | 2 | 11.328 | 2 | 2.6572 | 2 | -9999 | 4 | 1.3496 | 2 |
| 25 201 | 11-05-10 | 2 01:47:26 | 2 | 53.98983 | 2 | 10.93482 | 2 | | | 0 | 2 | 8.5 | 2 | 11.735 | 2 | 11.786 | 2 | 11.295 | 2 | 2.5844 | 2 | -9999 | 4 | 1.3496 | 2 |
| 26 201 | 11-05-10 | 2 01:47:45 | 2 | 53.9903 | 2 | 10.93572 | 2 | | | 0 | 2 | 7.9 | 2 | 11.72 | 2 | 11.686 | 2 | 11.292 | 2 | 2.5116 | 2 | -9999 | 4 | 1.205 | 2 |
| HAPP | \Sheet1 | / | | <u> </u> | | | | | | | - 111 | | | | | | | | | | | | | | |
| | | | | | - (| 🕑 🔹 🧲 | > • | | - (1) | | - 7 | | 5. | A | | | | | | | | | | | |
| | A1 1 2a 2 20 3 20 4 20 5 20 6 20 7 20 8 20 9 20 10 20 11 20 12 20 13 20 14 20 15 20 16 20 20 20 20 20 21 20 22 20 23 20 24 20 25 20 26 20 | Liberation A1 Date 2 2011-05-10 3 2011-05-10 4 2011-05-10 5 2011-05-10 6 2011-05-10 7 2011-05-10 8 2011-05-10 9 2011-05-10 10 2011-05-10 12 2011-05-10 13 2011-05-10 14 2011-05-10 15 2011-05-10 16 2011-05-10 17 2011-05-10 18 2011-05-10 19 2011-05-10 20 2011-05-10 21 2011-05-10 22 2011-05-10 23 2011-05-10 24 2011-05-10 25 2011-05-10 26 2011-05-10 26 2011-05-10 26 2011-05-10 | A1 ✓ f(x) A B C 1 Date qd Time 2 2011-05-10 20139:46 3 2011-05-10 201:40:05 4 2011-05-10 201:40:05 5 2011-05-10 201:40:05 6 2011-05-10 201:40:45 6 2011-05-10 201:41:45 9 2011-05-10 201:41:45 9 2011-05-10 201:41:45 9 2011-05-10 201:42:45 10 2011-05-10 201:42:45 12 2011-05-10 201:43:05 13 2011-05-10 201:43:05 14 2011-05-10 201:43:45 15 2011-05-10 201:43:45 16 2011-05-10 201:43:45 18 2011-05-10 201:44:56 20 2011-05-10 201:45:65 21 2011-05-10 201:45:65 22 2011-05-10 201:45:65 23 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Monthly diagnostic plots against latitude



TRANSPAPER and FINNMAID on 26.7.2010, time diff 2 5 h

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TRANSPAPER and FINNMAID on 26.7.2010, time diff 2 5 h

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