Operational results of Temperature and Salinity Quality Control at Coriolis for CMEMS based on improved MinMax approach

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Since 2019, a novel quality control (QC) procedure for temperature and salinity observations is implemented and active at the Coriolis data facility in the near-real-time (NRT) qualification framework. The MinMax approach compares an observation to a local validity interval with bounds estimated from the historical variability through minimum/maximum values (Gourrion et al. 2020). A significant improvement of both the efficiency (total number of good detections) and the robustness (ratio of bad to good detections) of the procedure is obtained through an adhoc extrapolation of the sample minimum and maximum values ; this can be understood as a simulation of the missing variability in the historical observations used as reference.

Figure 1 shows some examples of ARGO salinity profiles as screenshots of the inspection tool used operationally to visualize the automatically raised detections. The left panel likely illustrates a case of biofouling in the conductivity cell that perturbates the measurement in some ascending profile at all pressure levels above 1100 dbar. The right panel displays a case of platform for which the conductivity cell is experiencing a positive and increasing temporal drift.

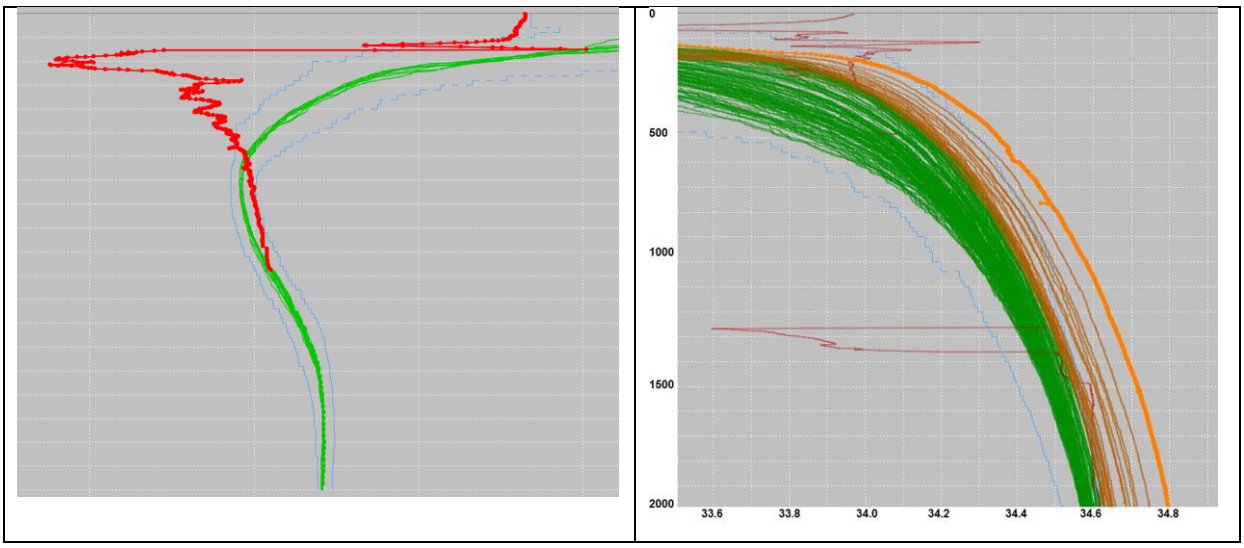

Figure 1: Left panel : Salinity profiles from ARGO profiler (green), one cycle is flagged as 'bad' with QC = 4 (red). Right panel : Salinity profiles from ARGO profiler (green) with cycles flagged as 'bad potentially correctable' with QC = 3 (orange).

Here, the case of conductivity drift is of particular interest as the Min/Max method has allowed since early 2019 earlier detections of the ARGO platforms affected by such a sensor failure with increased

occurrence in the last years (see http://www.argodatamgt.org/Data-Mgt-Team/News/Message-to-Argo-users-about-an-increased-occurrence-of-salinity-erros-in-the-real-time-Argo-data-stream).

For CMEMS, the ARGO profiles with automatic NRT detections are not distributed ; in a second step, an operator checks the detections and may confirm them, especially in the cases illustrated in Figure 1. Beside these useful error detections, the method may also provide erroneous detections. As an illustration, Figure 2 shows a time series over about one year of the number of good and bad detections. For ARGO, it appears that 85 % of detections are confirmed, while 15 % are erroneous detections. When the operator faces an erroneous detection, the distribution is unlocked, and the data are finally made available to CMEMS with a few days delay after observation. If the bad detection is found to be caused by an erroneous Min or Max value in the reference fields, he/she may modify manually the operational reference fields in the concerned geograpical/depth grid cell.

Figure 2: time series of number of total/good/bad Min/Max alerts for the CMEMS-INSTAC ARGO dataset.

In the presentation, the latest method developments made at OceanScope in order to further reduce the ratio of bad/good detections will be presented ; updated operational statistics over 2020 will follow, demonstrating the benefits on the quality of the main datasets concerned, the CMEMS-INSTAC and ARGO NRT T/S products.

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References

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