

SUMMARY OF UPDATES TO OW TOOL, December 2007

During 2007 the OW tool was tested in the Atlantic and Southern oceans and, as a result, a lot of modifications have been made. This document summarises these updates.

1. Modified the covariance matrix that was used in “calculate_pieciwisefit.m”. It is now a vertical covariance function that estimates the vertical dependence between float levels. The lateral dependence between profiles in a time series has been removed, because each profile is now assumed to be an independent sample of the drift of the conductivity sensor. This increases the degrees of freedom for floats that do not move a lot. The build covariance routine “build_pwl_lvcov.m” is thus replaced by “build_pwl_lvcov_ptmp.m”.

2. Removed “map_planar_data_grid.m”, “map_planar_data_grid_t.m”, “plane_fit.m”, “covarxy_pv.m” and “find_indices.m”. They have been rewritten into two routines “map_data_grid.m” and “covarxyt_pv.m”. The codes have been vectorised and extra computations for the covariance matrix and the weights have been removed. So, the codes should now run faster. An important point to note here is that “map_data_grid.m” now uses optimal interpolation weighted mean as the a priori estimate instead of the previously used planar fit. The error estimate thus includes contributions from both the mapping and the mean estimation.

3. Cleaned up some variables and redundant lines in “update_salinity_mapping.m” to improve Matlab memory usage and the coordinates around the 0-360° longitude boundary. It now also checks for bad reference data (those outside $3 \times \text{rms}$) to make sure the mapped field is reasonable.

4. Improved labeling of the longitude axis at the 0-360° longitude boundary in “plot_diagnostics_ow.m”.

5. In anticipation of having “good” Argo data included in the reference database in the near future, “get_region_ow.m” and “retr_region_ow.m” have been modified. They now exclude the Argo float being analysed from being selected as Argo reference data. Also, the codes can now take reference data of varying lengths.

6. Added JB Sallee’s Subantarctic Front (SAF) selection criteria as a feature that users can turn on/off. JB’s function is called “frontalConstraintSAF.m”, and requires “TypicalProfileAround SAF.mat”, which is now stored in /data/constants. Because of this new feature, “ow_config.txt” now has a new parameter MAP_USE_SAF. Also, the mapping output file in /data/float_mapped has a new output variable “use_saf”. This variable is a $1 \times n$ vector of either 1 or 0, 1 = use SAF separation in the mapping, 0 = do not use (same as “use_pv”). You have to add this variable to your existing map_*.mat files, or the codes will bomb!

7. Modified “find_besthist.m” so that it now returns selected historical data that are unique.
8. Removed README_mapping.pdf and README_piecewise.pdf. Description of the mapping and fitting algorithms will be in a manuscript (in preparation). The README file has been extended. You can open README with Notepad and it should print nicely in landscape mode.
9. Included instructions on how to prepare the reference database for OW in an updated document README_prepare_refdbase_ow.pdf. OW can take reference data of varying lengths, so reference data do not need to be interpolated or truncated. All reference data should be stored as full-depth profiles.
10. Please email bowens@whoi.edu and awong@ocean.washington.edu if you see any more bugs.

---- Annie Wong, 19 December 2007