# A Matlab package to process large-scale sea ice core data

M. Vancoppenolle

February 26, 2017

Processing hundreds or thousands of sea ice core data is cumbersome and boring. There are many issues: missing data, different core lenghts and different depths for ice core sections.

To facilitate this task, I coded for myself a few matlab 2015 functions performing standard tasks, like reading a group of file, interpolating ice core profiles on the same grid, etc... all the things that one always needs and takes most of the analysis time.

Since these routine could be useful to other people, I figured I would share them. They are by no means complete or guaranteed.

They are based on the ASPeCt excel log sheets described used in *Meiners et al.* (2012) and more thoroughly in *Miller et al.* (2015).

## 1 Importing the ASPeCt ice core log sheets

The first step is to store your data into the ASPeCT logsheet format, and this before analysis. Store your files in a single directory, with no subdirectories. Then you can upload the required information into matlab. The routines *bepsii_read_general.m* and *bepsii_read_profile.m* will help you to do this. For instance, to extract a chlorophyll fast-ice database, this is what you would need to do:

```
Ndmin = 1;      % minimum accpetable number of core sections
Ndmax = 61;     % maximum number of depths to look for
dir_list="/Users/Martin/Boulot/BEPSII_data"; % directory to explore

% Read Ice Core info: Cruise, Date, ... from directory "dir_list"
[Cruise, Date, lat_fast, lon_fast, CoreID, diameter, hi, hs, fb, Nr] =
bepsii_read_general(dir_list);

% Read Chla profile data: chla_fast will have the chl data, ...
[chla_fast, z_fast, zm_fast, dz_fast, cl_fast, tsl_fast, Nr_fast,
Nd_fast, Nb_fast, Nc_fast, Ncs_fast, i_chla_fast, i_nochla_fast] = ...
bepsii_read_profile_frip(dir_list, {'chla'}, Ndmin, Ndmax);
```

## 2 List of functions

- **bepsii_read_general**: Reads all files ice core general description
- **bepsii_read_profile**: Reads all file profile data for a given variable
- **bepsii_interpol_cpl**: Interpolates variable 2 onto cores with variable 1
- **bepsii_interpol_std**: Interpolates a profile onto a standard vertical grid
- **bepsii_brine**: Computes brine fraction and salinity given bulk salinity and temperature
- **bepsii_carb_csts**: Computes carbonate system equilibrium constants
- **bepsii_carb_convert**: Computes carbonate system from TA and pCO2
- **bepsii_mm**: Computes monthly means from a series of cores

## References

Meiners, K. M., M. Vancoppenolle, S. Thanassekos, G. S. Dieckmann, D. Thomas, J.-L. Tison, K. R. Arrigo, D. Garrison, A. McMinn, D. Lannuzel, P. van der Merwe, K. Swadling, W. Smith, I. Melnikov, and B. Raymond (2012), Chlorophyll a in Antarctic sea ice from historical ice core data, *Geophysical Research Letters*, *39*, L21602, doi:10.1029/2012GL053478.

Miller, L. A., F. Fripiat, B. T. T. Else, J. Bowman, K. A. Brown, R. E. Collins, M. Ewert, A. Fransson, M. Gosselin, D. Lannuzel, K. M. Meiners, C. Michel, J. Nishiokan, D. Nomuar, S. Papadimitriou, L. M. Russell, L. L. Sorensen, D. N. Thmas, J.-L. Tison, M. A. van Leeuwe, M. Vancoppenolle, E. W. Wolff, and J. Zhou (2015), Methods for Biogeochemical Studies of Sea Ice: The State of the Art, Caveats, and Recommendations, *Elementa*, *3*, 000,038, doi:10.12952/journal.elementa.000038.