This repository contains the code modifications and Matlab scripts used for Pilcher et al., [2017].

The model source code is freely available from the MITgcm website here
http://mitgcm.org

NARR atmospheric forcing is available from the NOAA/OAR/ERSL PSD at
http://www.esrl.noaa.gov/psd. Lake ice forcing is available from the U.S. National Ice
Center http://www.natice.noaa.gov/products/great_lakes.html.

The model initial condition files are not uploaded here due to size constraints. They need
to be created as binary files, uniform in all spatial dimensions, using the values found in
Table 2 of Pilcher et al., [2015] and Table 1 of Pilcher et al., [2017].

Modify
This directory contains the modified files that configure the MITgcm to Lake Michigan.
These files will overwrite the files of the corresponding name during compilation. The
pre_quagga directory is used for the pre-quagga Lake Michigan model build, while the
quagga directory is used for the quagga build. Select one or the other during compilation.

Run
This directory contains the data files that are required to run the model, and should be
placed in a scratch directory. There are a number of forcing file declarations here that
will need updated directory names.

Matlab_scripts
This folder contains the Matlab scripts used to generate the figures in Pilcher et al. [2017]

The LMgrid1.kronos.nc file is the grid file that is generated from the model run. It is not
included here due to space constraints.

Directory names will have to be modified for use. Also pay attention to the dimensions
that the netcdf files are loaded with, because this can change depending on the netcdf
version and function.

Some scripts use netcdf files while others use .mat files. All netcdf files are produced
from the raw model output using nco operators. The Matlab files are generated with the
scripts provided here. Generally, these are the calc* scripts that are then used in the plot*
scripts.

References:

Pilcher, D.J., G.A. McKinley, V. Bennington, and H. Bootsma (2015), Physical and
    biogeochemical mechanisms of internal carbon cycling in Lake Michigan, *J.
    Geophys. Res. Oceans, 120*(3), 2112-2128, doi:10.1002/2014JC010594.

Pilcher, D.J., G.A. McKinley, J. Kralj, H. Bootsma, and E. Reavie Modeled sensitivity of Lake Michigan productivity and zooplankton to changing nutrient concentrations and quagga mussels, *J. Geophys. Res. Biogeosciences,* in revision.