Classifying coastal environments on Alaska's North Slope

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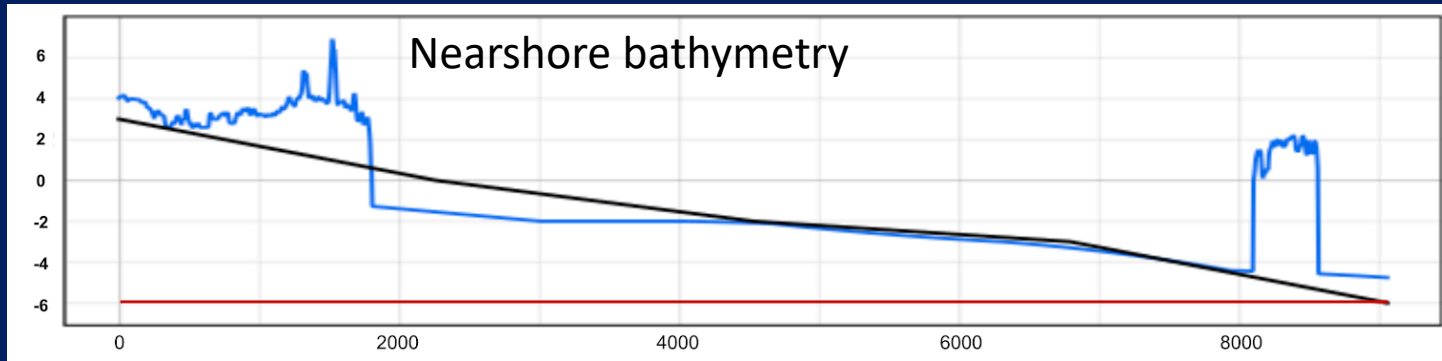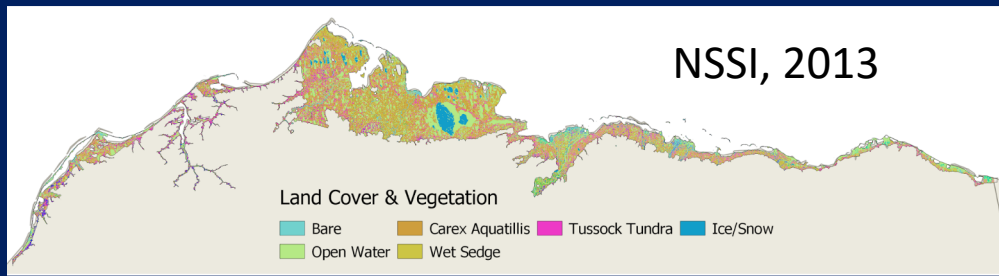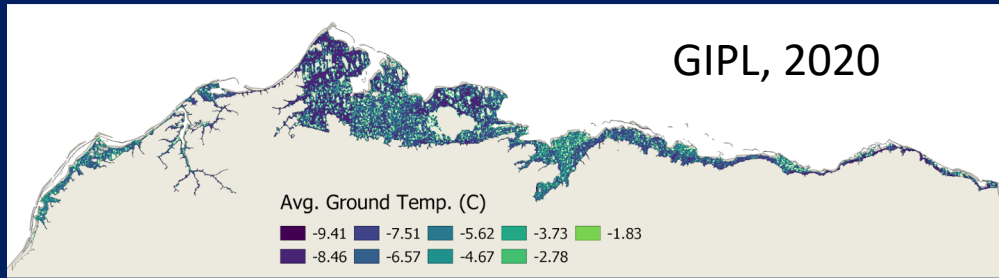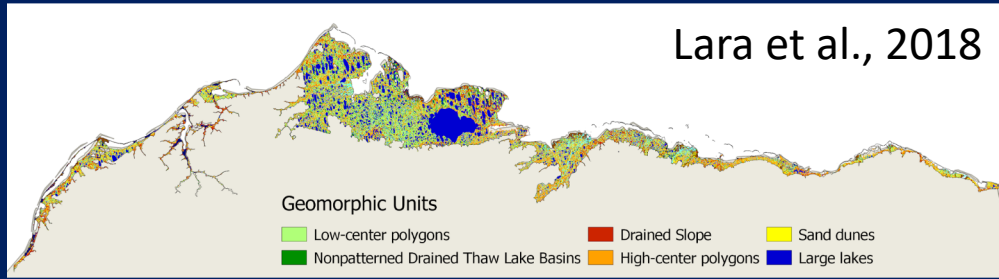
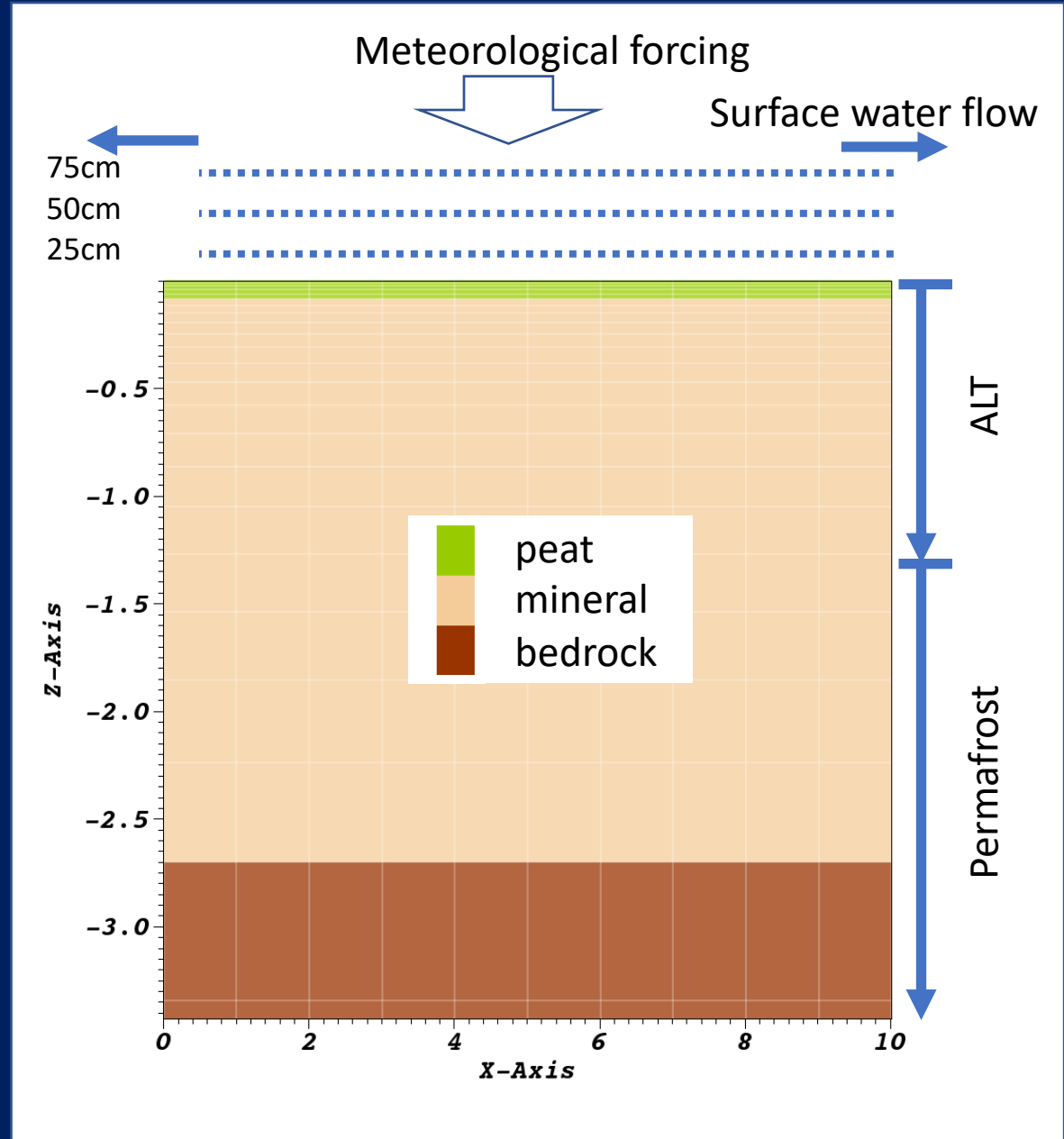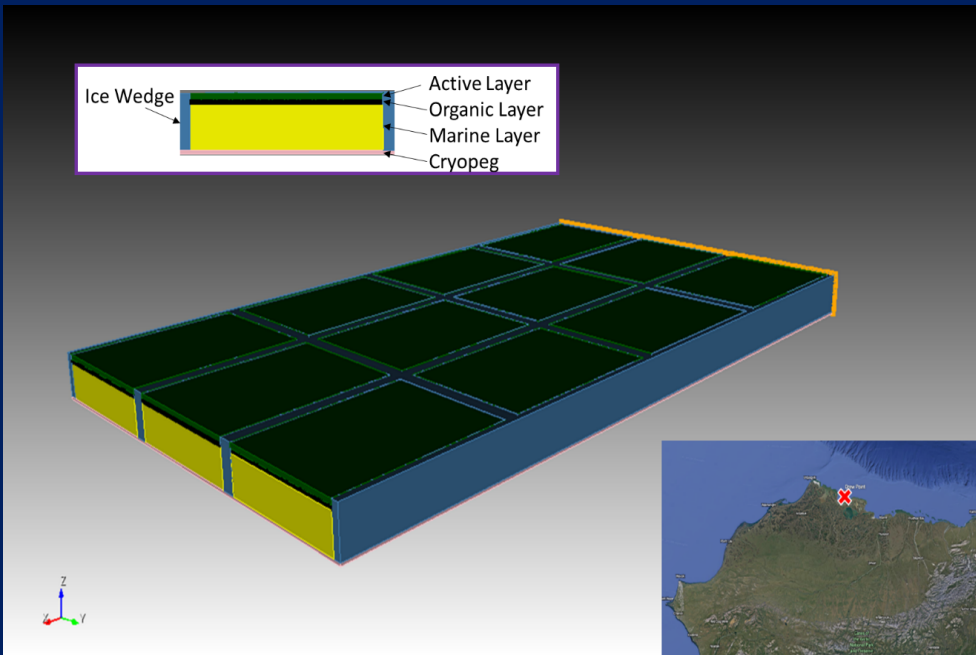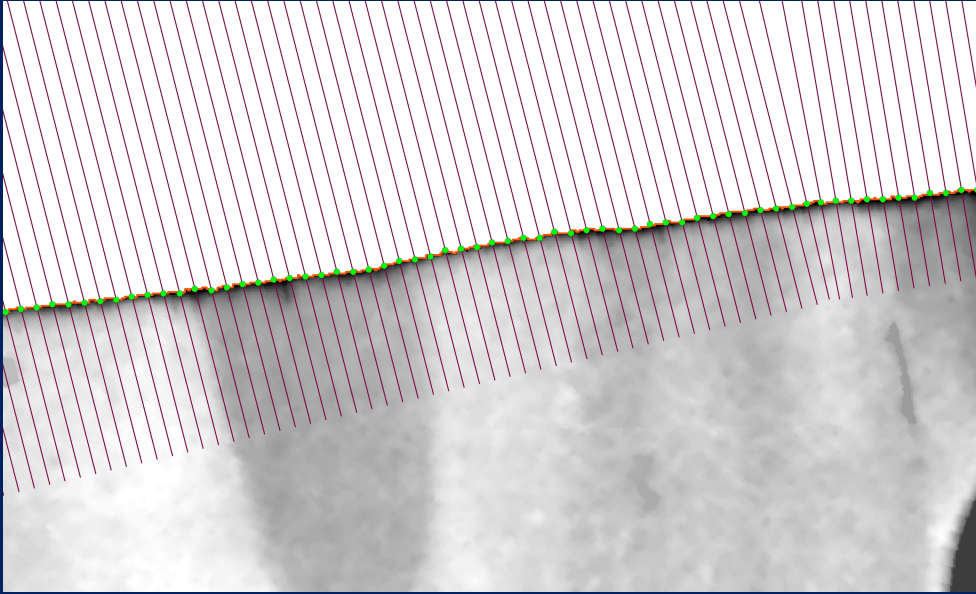[1]Los Alamos National Laboratory

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InteRFACE

Alaska's North Slope has a wide range of conditions

Lara et al., 2018

Geomorphic Units
- Low-center polygons
- Nonpatterned Drained Thaw Lake Basins
- Drained Slope
- High-center polygons
- Sand dunes
- Large lakes

GIPL, 2020

Avg. Ground Temp. (C)
-9.41 -7.51 -5.62 -3.73 -1.83
-8.46 -6.57 -4.67 -2.78

NSSI, 2013

Land Cover & Vegetation
- Bare
- Open Water
- Carex Aquatillis
- Wet Sedge
- Tussock Tundra
- Ice/Snow

Nearshore bathymetry

USGS 2017

EXPLANATION
Shoreline Change Rates (ft/yr)
- -61 to -15
- -15 to -6
- -6 to -1
- -1 to +1
- +1 to +6
- +6 to +15
- +15 to +36

160°W 155°W 150°W 145°W

CHUKCHI SEA   BEAUFORT SEA

Point Barrow
Elson Lagoon
Peard Bay
Drew Point
Cape Halkett
Camden Bay
Barter Island
Kaktovik
Wainwright
Smith Bay
Pogik Bay
Harrison Bay
Prudhoe Bay
Icy Cape
72°N
71°N
70°N
NATIONAL PETROLEUM RESERVE ALASKA
ARCTIC NATIONAL WILDLIFE REFUGE
Demarcation Bay
U.S.-Canadian border

0   50 KILOMETERS
0   50 MILES

Modified from Gibbs and Richmond, 2015; http://dx.doi.org/10.3133/ofr20151048

Wave direction rose

2

Developing coastal typologies for generalized modeling

Challenges

- Lack of spatially extensive and temporally continuous observational data to parameterize and validate models

- Differences of scale for many processes, characteristics, and drivers at the coast

- Identifying, understanding, and quantifying critical process dynamics to develop parameterizations

- Quantifying sensitivity of marine ecosystems to coastal fluxes to identify modeling gaps/inadequacies

- Quantifying land-ocean feedbacks without fully/properly coupled models and without accurate process representations in ESMs