Incorporating vertical swimming behavior to model larval behavior within HYCOM

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Statement of Problem

Panulirus argus (Caribbean/Florida spiny lobster) larvae are largely transported through ocean currents

They are probably spawned near reefs and shallow water – for us, FL Keys region

They swim vertically with a diurnal pattern

SO - - where do they go?

Do they get caught up in eddies and the Tortugas gyre?

Or do most of them get swept out of the region through the strong Florida current?

South Florida economy and ecology need to know

The Model

- Nested 80-84 W 22-27 N (T.Townsend)
- Currently using 1/8 degree grid, 19 layers

From an arch*.b file:

- CMWF monthly forcing: wndspd_0; radflx-25w; COADS precip; Levitus climatology.
- Nested in ATLd0.08/3.1; SSS relax; KPP mixed layer; Jerlov IA;
- Sigma(15-2m)/Z(4): dp00/f/x=3m/1.125/12m; FLAd0.08/src_2.1.03_19;
- 21 'iversn' = hycom version number x10
- 22 'iexpt ' = experiment number x10
- 1 'yrflag' = days in year flag
- 63 'idm ' = longitudinal array size
- 58 'jdm ' = latitudinal array size

BIO Component

- Initialized in layer containing 50 m depth
  uniformly in (i,j) nominal conc. 1 gm/m^3
- Freely advected same as salinity
- Swim speed introduced to move
  down between 4 pm and 8 pm
  up between 4 am and 8 am
  at rate of 2 mm./s.
- Control "larvae" have w = 0
- When T < 10^0 larvae "die"
- RESULTS:

FUTURE WORK

- Introduce biological interactions as in NZPD type models (Wallcraft)
- Introduce horizontal swimming - - perhaps anti-diffusive in direction of prey?
- Introduce tides - - the postlarvae seem to use them to drift/swim toward the coast for settling to a benthic lifestyle.
- PROCURE FUNDING!!