DA in OCEAN 3D+1

Backdrop:

- Lagrangian data are information-rich but come in forms that are constrained by the architecture of both the instruments and the observational experiments
- Subsurface measuring devices have an inevitable Lagrangian dimension
- Tension between nonlinearity and dimension in DA, but LaDA can break that barrier

Overarching Goals:

- Optimize use of Lagrangian data
- Gain insight into optimal observing strategies
- Assess uncertainty due to observational constraints

Marquette University/University of North Carolina at Chapel Hill

DA in OCEAN 3D+1

Vertical information propagation

How much info is there for the entire water column from a specific depth?

Observations at unknown locations

Can we improve DA by simultaneous estimation of observation location?

Use of autonomous vehicles to collect subsurface data

Can we effectively use DA and control in concert?

Challenges

Vertical information propagation

1. Need informative model problems
2. Multi-depth?
3. Adjust to glider issues

Observations at unknown locations

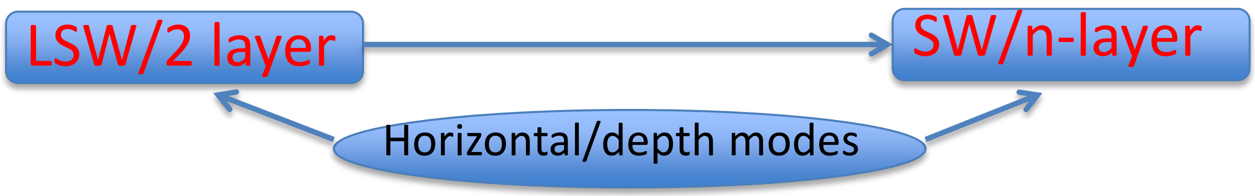
1. Space and time scales
2. Constraints of surfacing locations
3. Uncertainty

Use of autonomous vehicles to collect subsurface data

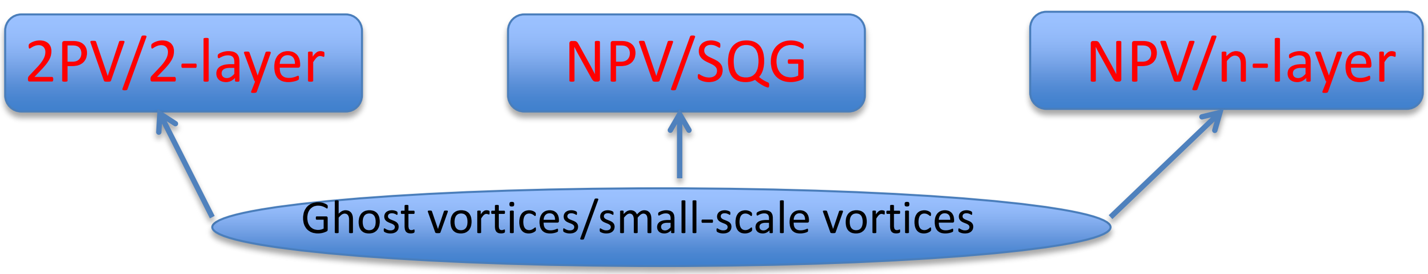
1. Circularity
2. Specifics and scales of VC

2-Year Plan

1. Collaborate with WHOI to develop effective and informative multi-layer model problems together with key questions and OSSEs



2. Collaborate with UCSD to develop 3D point-vortex models



3. In both scenarios above, implement and develop en-route DA

4. Pose glider/AUV control problem in scenarios (with UCSB, RSMAS and CUNY)

Ultimate Goal: Comprehensive observing system design with optimal use of Lagrangian type data; feedback to mission control of vehicles in field