



Norwegian  
Meteorological  
Institute

# RETROSPECT

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Research and Development Department

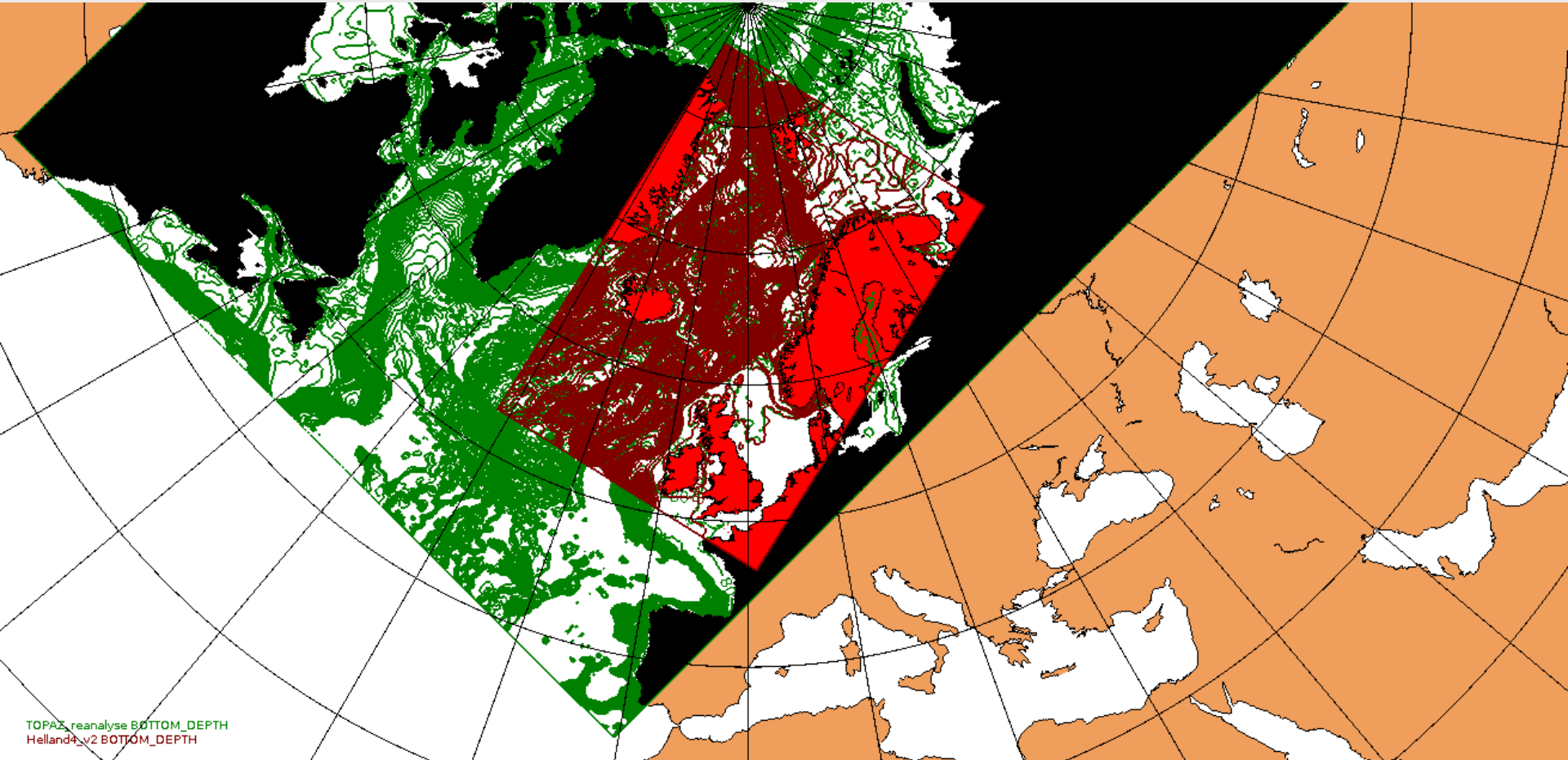
Division for Ocean and Ice

# The project

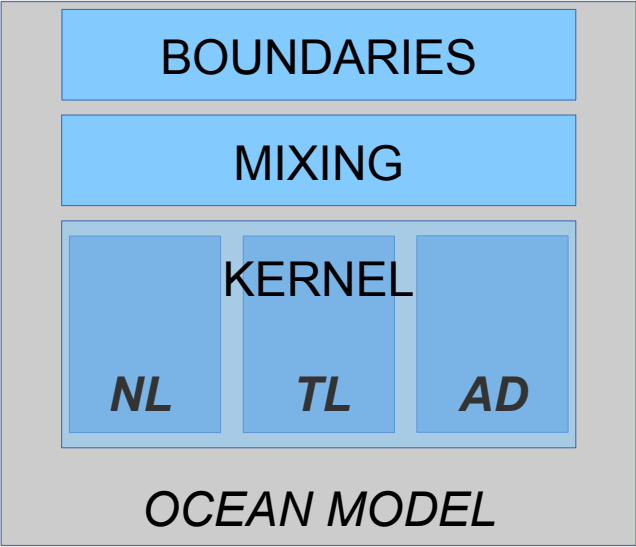
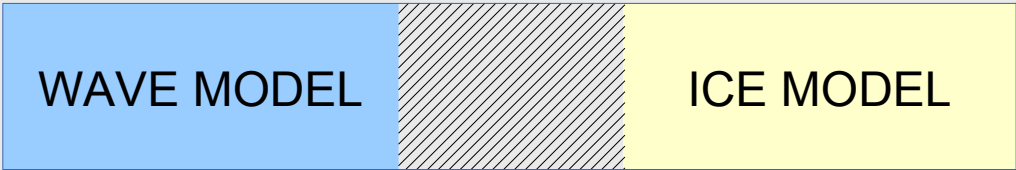
- Funded by the Research Council of Norway through the programme PETROMAKS2 from Jan. 2015 to Dec. 2017.
- A no cost extension is extremely likely.
- The partners are
  - Norwegian Meteorological Institute (lead),
  - Institute of Marine Research,
  - Nansen Environmental and Remote Sensing Center,
- with international collaboration with
  - Eric Chassignet (FSU),
  - Andrew Moore (UCSC),
  - Nils Gustafsson (SMHI).
- Two postdocs and one PhD + researchers, instruments, ship time.

# Motivation

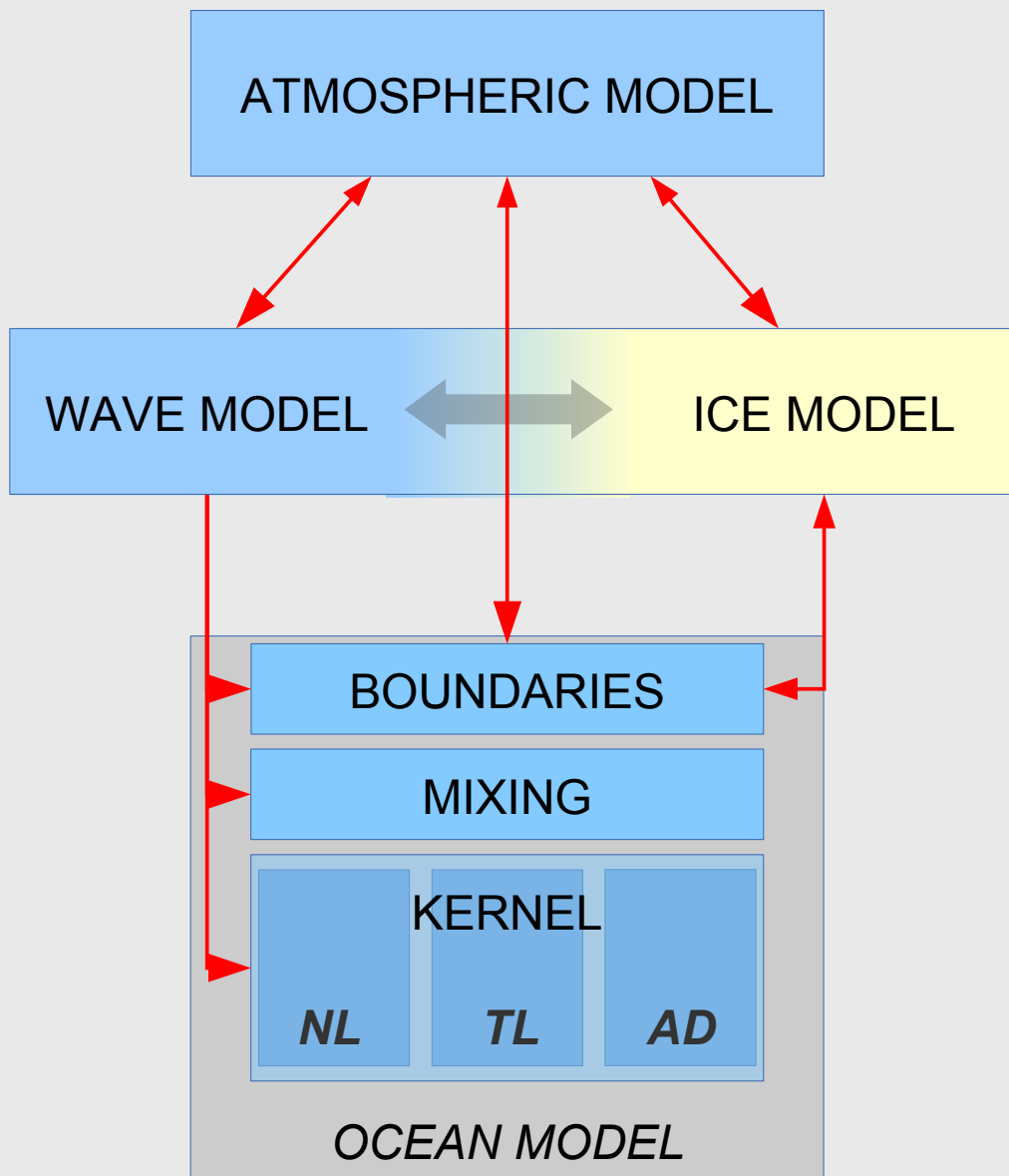
- MET, IMR and NERSC have national and international responsibilities that require operational ocean modeling,
- the area we are responsible for is very large, and the number of available (in-situ) observations is very small,
- our users are mostly interested in the transport in the upper ocean.



ATMOSPHERIC MODEL

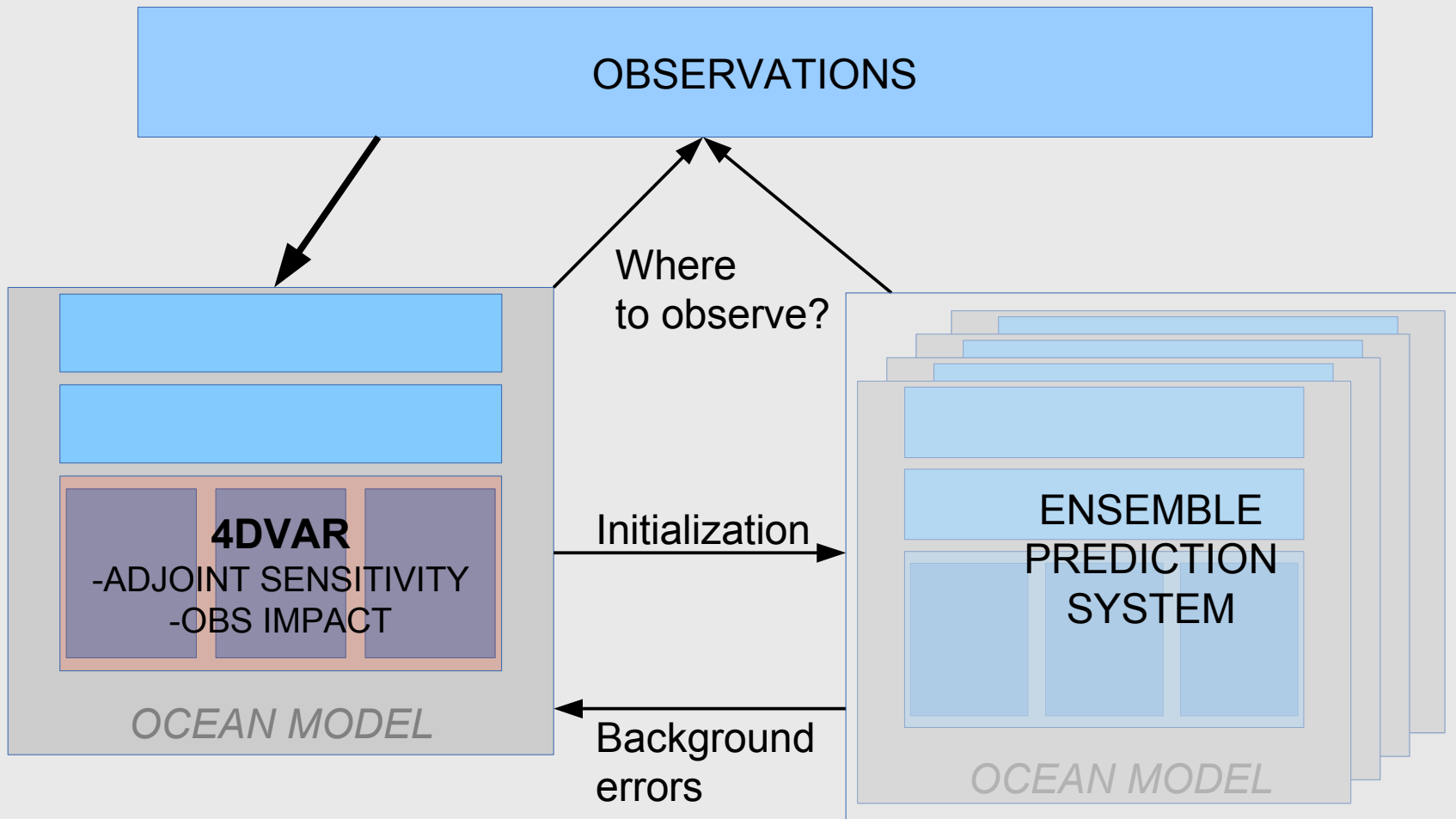


The modeling system consists of several components, which facilitates modular design

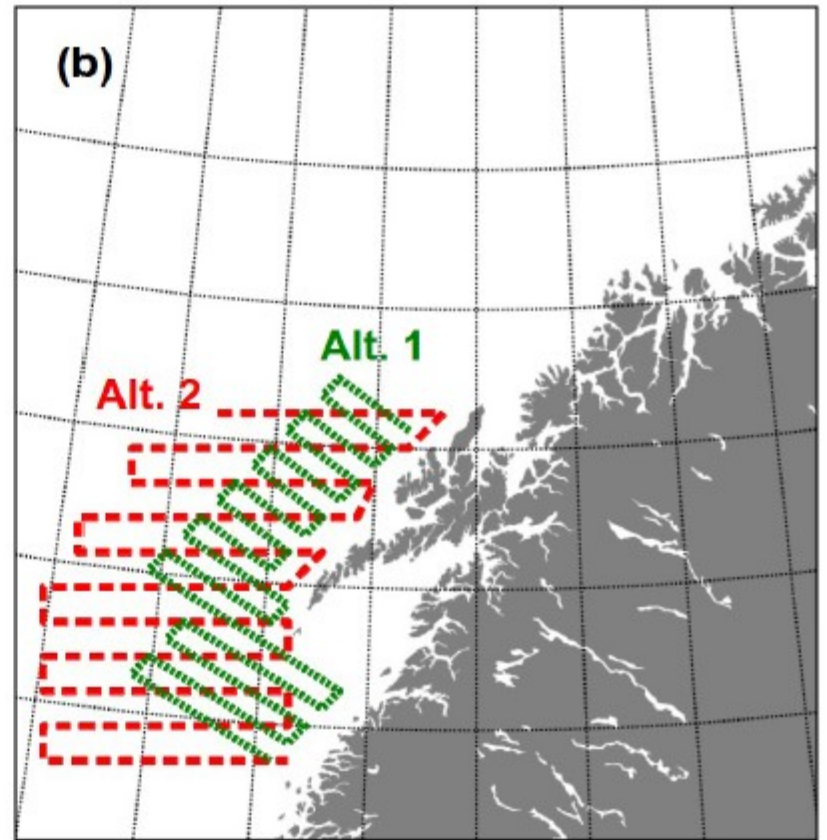
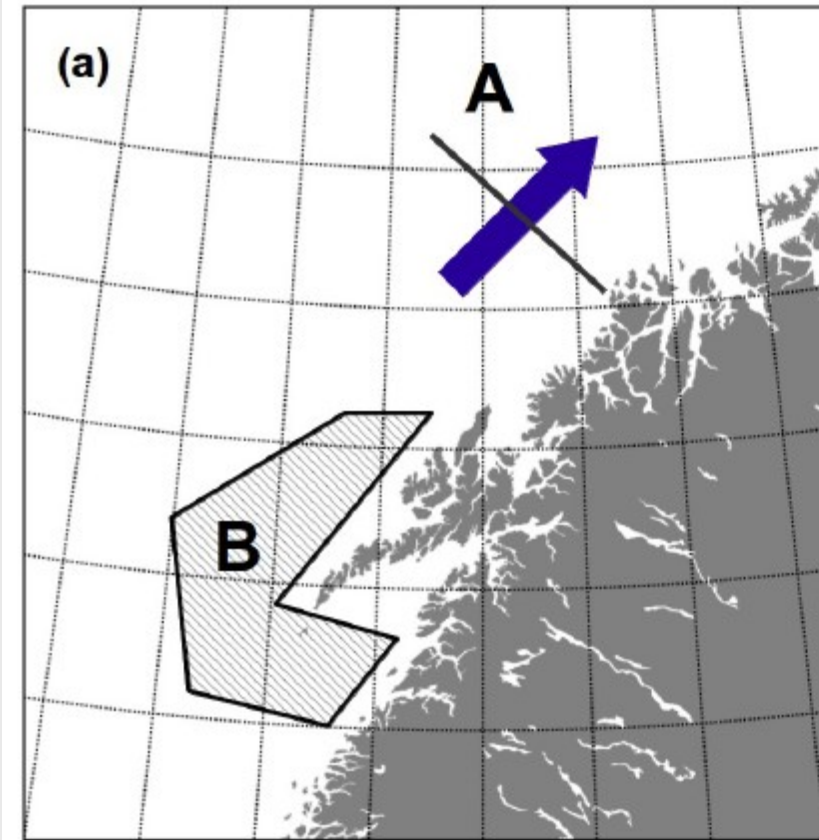


## Past and ongoing research:

Improved physical description by coupling these components.



RETROSPECT is about devising observation strategies

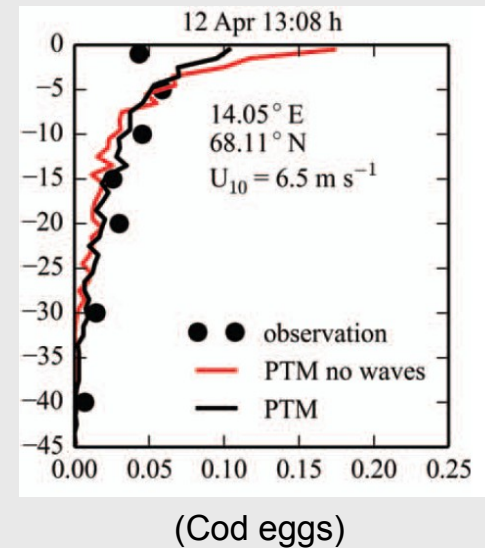
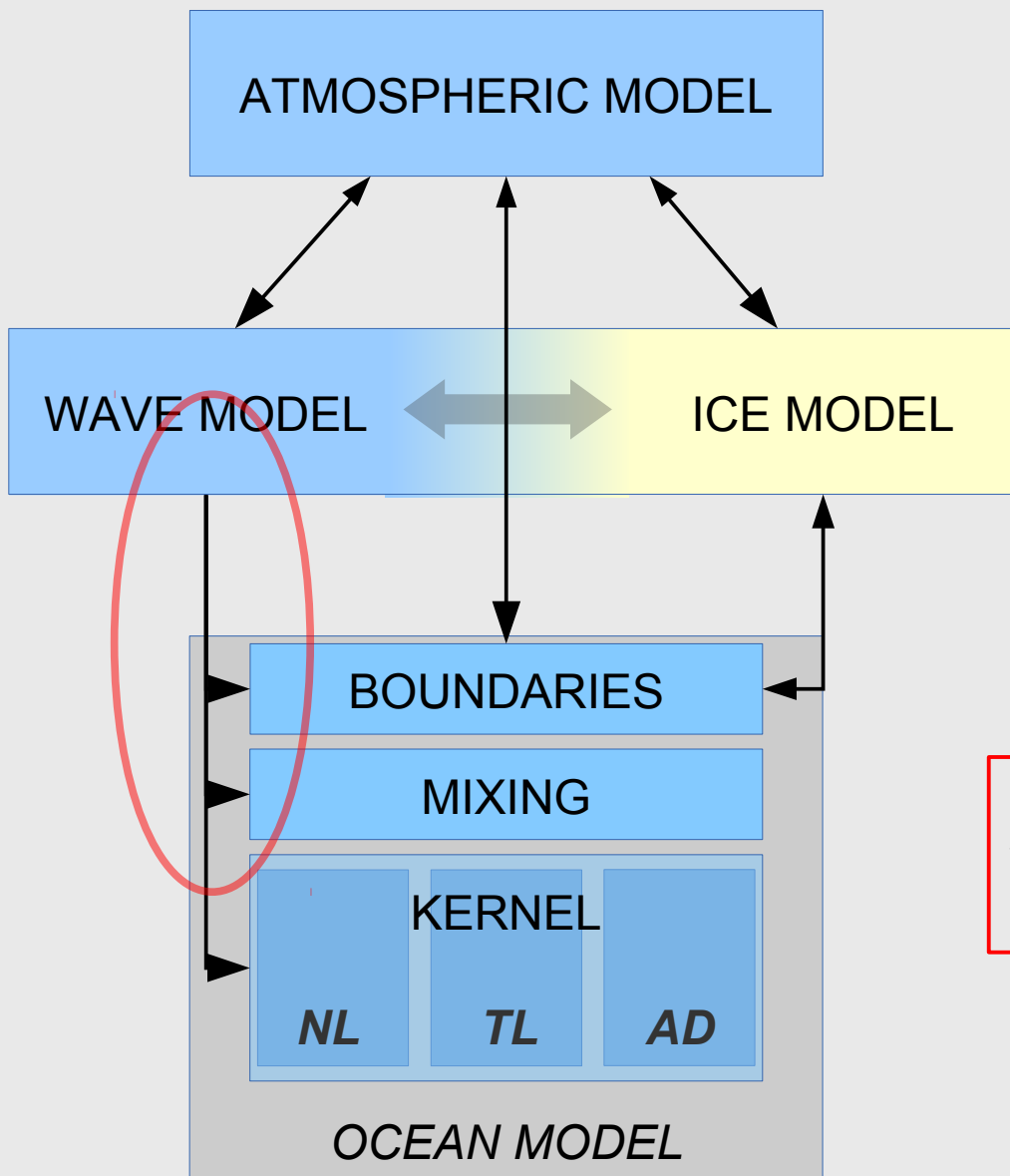


(B) cause and (A) effect

What observations are needed?





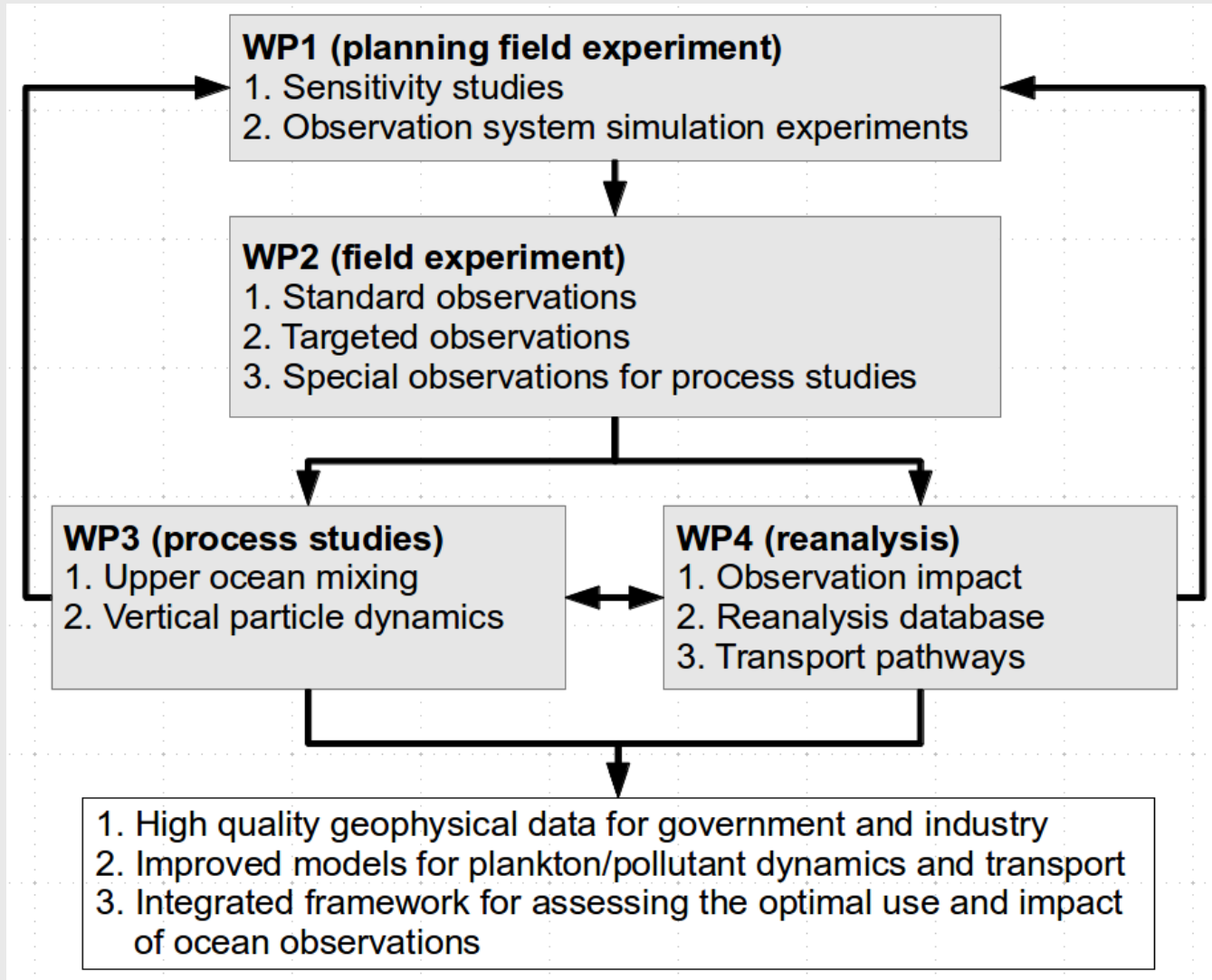


RETROSPECT is also about vertical dynamical balances in the upper ocean



## Transport of cod eggs and larvae

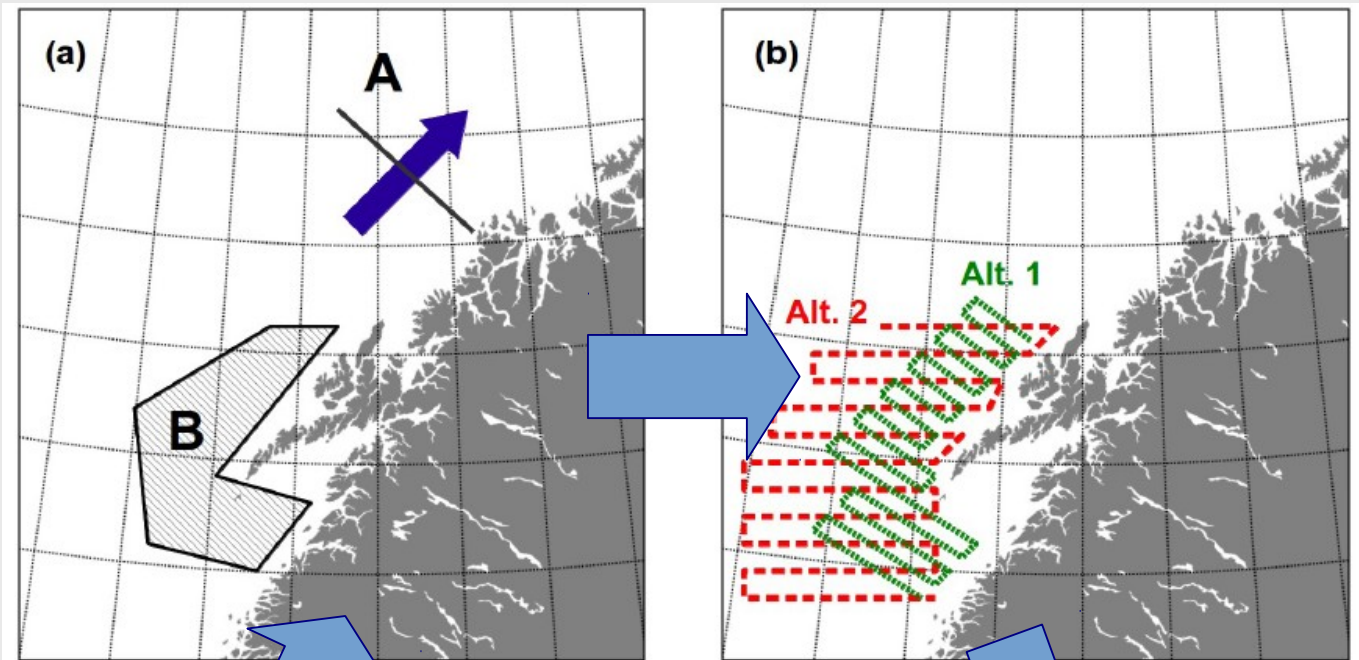
# Work packages in RETROSPECT



## Project time plan

<i>Task/Period</i>	<i>Spring 2015</i>	<i>Fall 2015</i>	<i>Spring 2016</i>	<i>Fall 2016</i>	<i>Spring 2017</i>	<i>Fall 2017</i>
WP1: Sensitivity studies and OSSEs	<b>X</b>		<b>X</b>			
WP2: Field experiment #1		<b>X</b>				
WP2: Field experiment #2				<b>X</b>		
WP3: Ocean mixing parameterisations			<b>X</b>	<b>X</b>	<b>X</b>	
WP3: Vertical balances of buoyant particles			<b>X</b>	<b>X</b>	<b>X</b>	
WP4: Reanalysis and obs. impact			<b>X</b>		<b>X</b>	
WP4: Biophysical modeling				<b>X</b>		<b>X</b>

(add at least six months)



```

xterm
include "set_bounds.h"

Compute "true" vertical velocity (w/s).

In ROMS, the terrain-following vertical velocity, omega, is given by:
  Hz * omega = w - d(z)/d(t) - div(z)
where w is the "true" vertical velocity and
  div(z) = pn * u * d(z)/d(x) + pn * v * d(z)/d(y)

The vertical coordinate is a function of several parameter but only
the free surface is time dependent. However, in sediment applications
with stratigraphy, the bathymetry (h) also evolves in time.

Exchange time-averaged fields.
  IF (EIPeriodic(ng).or.NSPeriodic(ng)) THEN
    CALL exchange_u2d_tile (ng, tile,
      & LBi, UBi, LBj, UBj,
      & DU_avg1)
    CALL exchange_v2d_tile (ng, tile,
      & LBi, UBi, LBj, UBj,
      & DV_avg1)
  END IF

#ifdef DISTRIBUTE
  CALL mp_exchange2d (ng, tile, INLM, 2,
    & LBi, UBi, LBj, UBj,
    & NghostPoints,
    & EIPeriodic(ng), NSPeriodic(ng),
    & DU_avg1, DV_avg1)
#endif

Compute contribution due to quasi-horizontal motions along
S-coordinate surfaces: (U1 + Vj)*SR00(z).
  
```



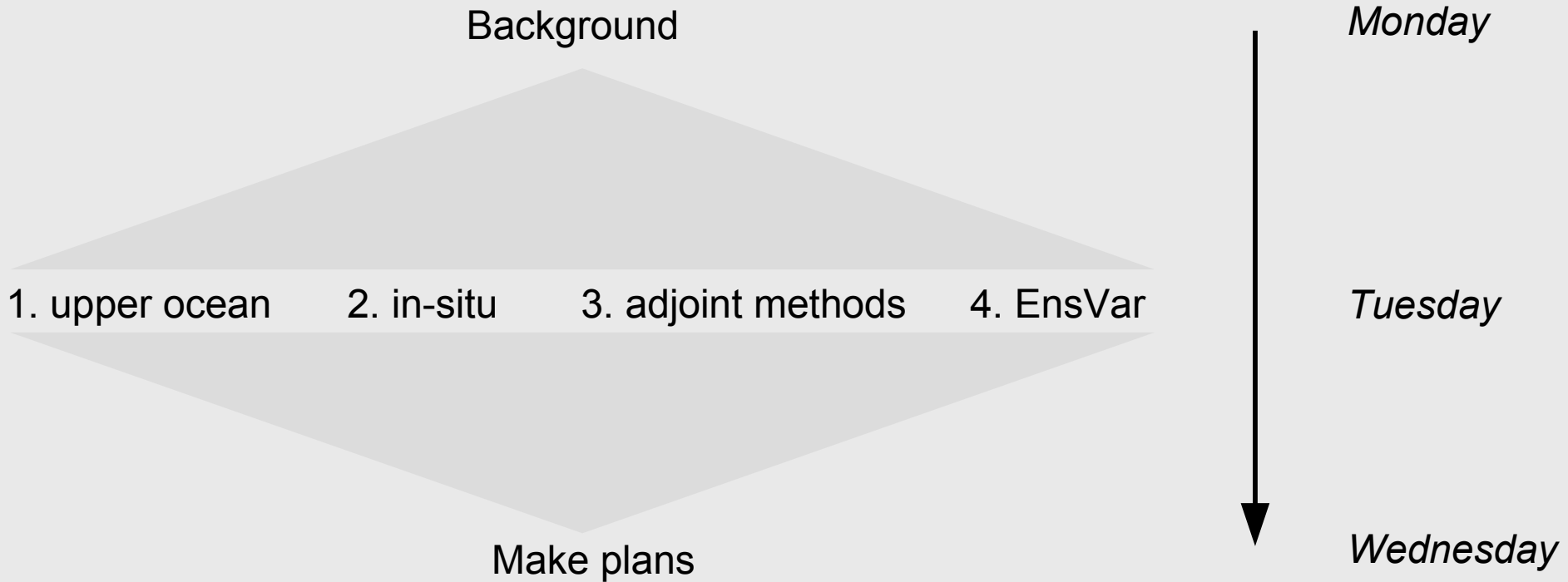
# Status and todo list

- Basic configuration of ROMS is done, the setup is on GitHub.
- We need to
  - configure 4D-Var system
  - set up sensitivity study
  - validate mixing scheme
  - couple to wave model (ROMS)
  - couple to wave model (HYCOM)
  - plan first cruise(s)
  - (...)

# Digression

- Approval was required three times when the vikings negotiated agreements:
  - after the enquiring phase (sober),
  - after the ecstatic phase (not sober),
  - after the critical phase (hung over).

# ...this workshop







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