

Tropical Pacific Observing System 2020

- International project to rethink the backbone observing system ... born in crisis, make opportunity
- Systematic approach: Define requirements
- 1st Report left unresolved issues, identified pilot and process studies to make progress on those.
- 2nd Report will focus on BGC and model/observation integration (...). To be written this year; this workshop can be influential.

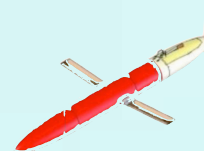
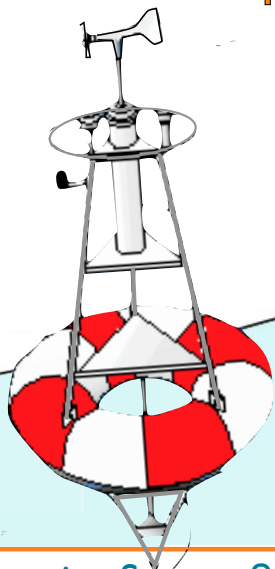
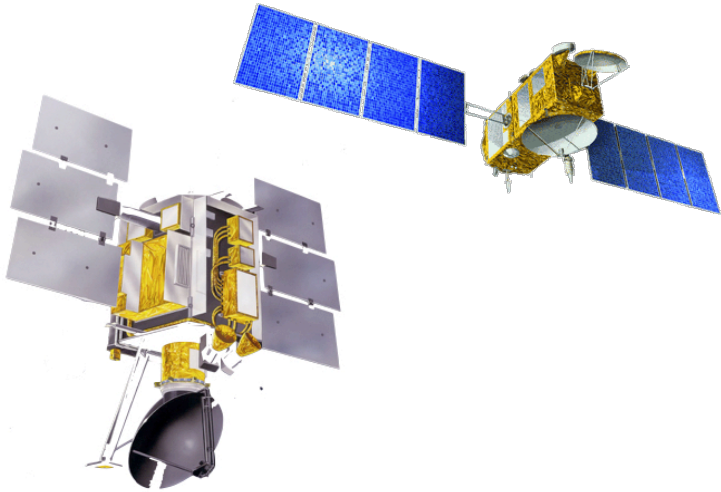
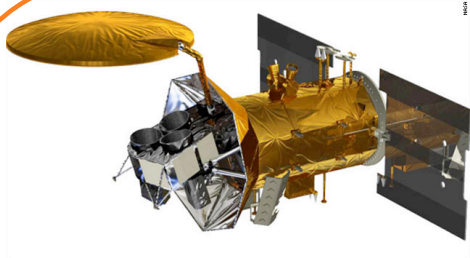


An integrated vision

Complementary “backbone” technologies:

- Satellites give global coverage, **horizontal** detail
- Moorings sample across **timescales**, allow co-located ocean-atmosphere observations, velocity sampling
- Argo resolves fine **vertical structure**, adds salinity, maps subsurface T and S, connects to subtropics

Assimilating models integrate diverse observations
TPOS data reaches our stakeholders primarily as
the output of an assimilation



Integration requires assimilation systems

that can make use of the different strengths of our diverse sampling, and can use that diversity to overcome the weaknesses of each technology.

Observe + Model \Rightarrow Ingest \Rightarrow Analysis \Rightarrow Forecasts

How will we get the full benefit of our strategy?

What is the path forward?

- getting (and assessing) the “right” data?
- improving the underlying physical models?
- advancing the assimilation systems (coupled DA?)

All of these are years-long projects to improve.

They will not be solved this week. What's the next step?



The tropical Pacific as a broad interior plus four “boundary layers”:

Surface, Equatorial, Eastern and Western

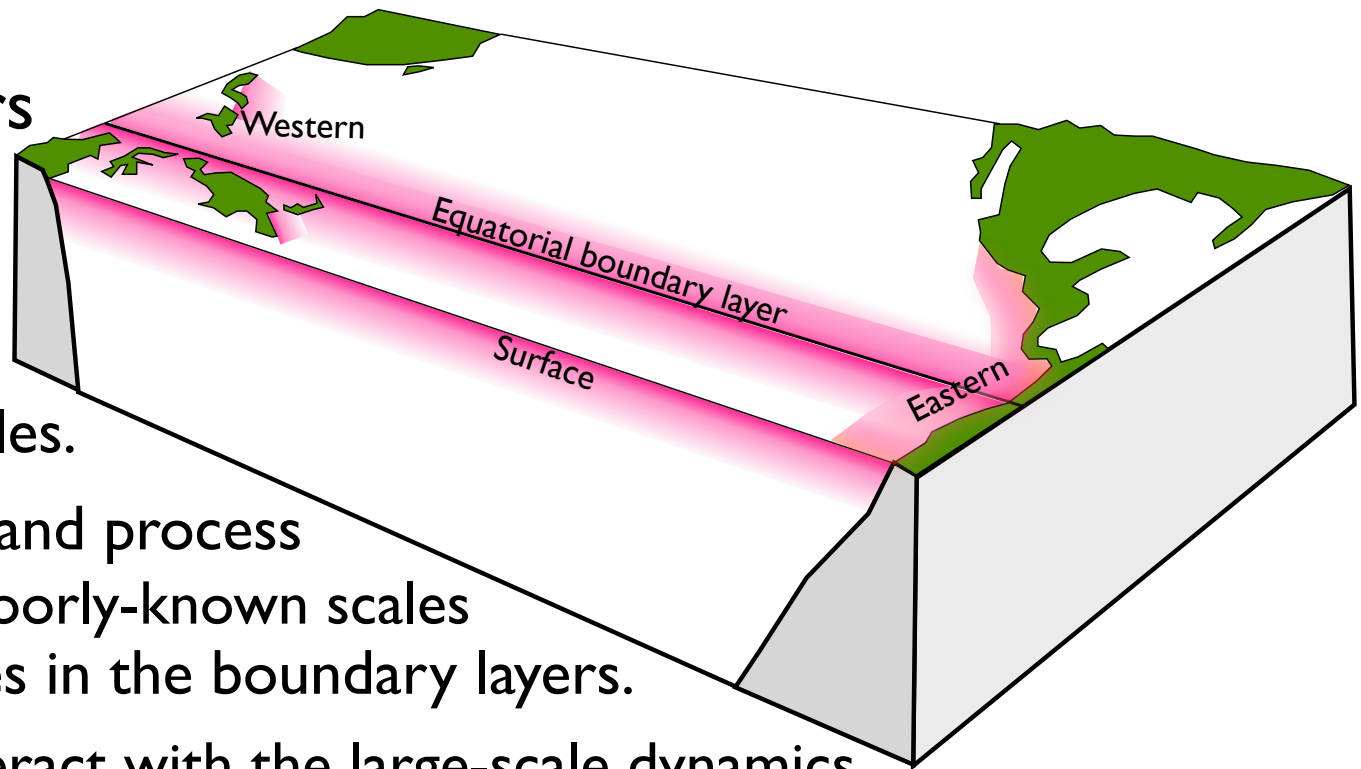
The boundary layers
are the hard parts

For the broad interior
we can often specify
goals and sampling scales.

But many of our pilot and process
studies are driven by poorly-known scales
or undefined objectives in the boundary layers.

→ Rectify into and interact with the large-scale dynamics.

Our job here is in large part to clarify these targets.



Much of the TPOS 2020 plan is based on scale estimates
(and this is even more true of other basins' efforts)

But for the boundary layers especially,
we must also consider phenomena and processes

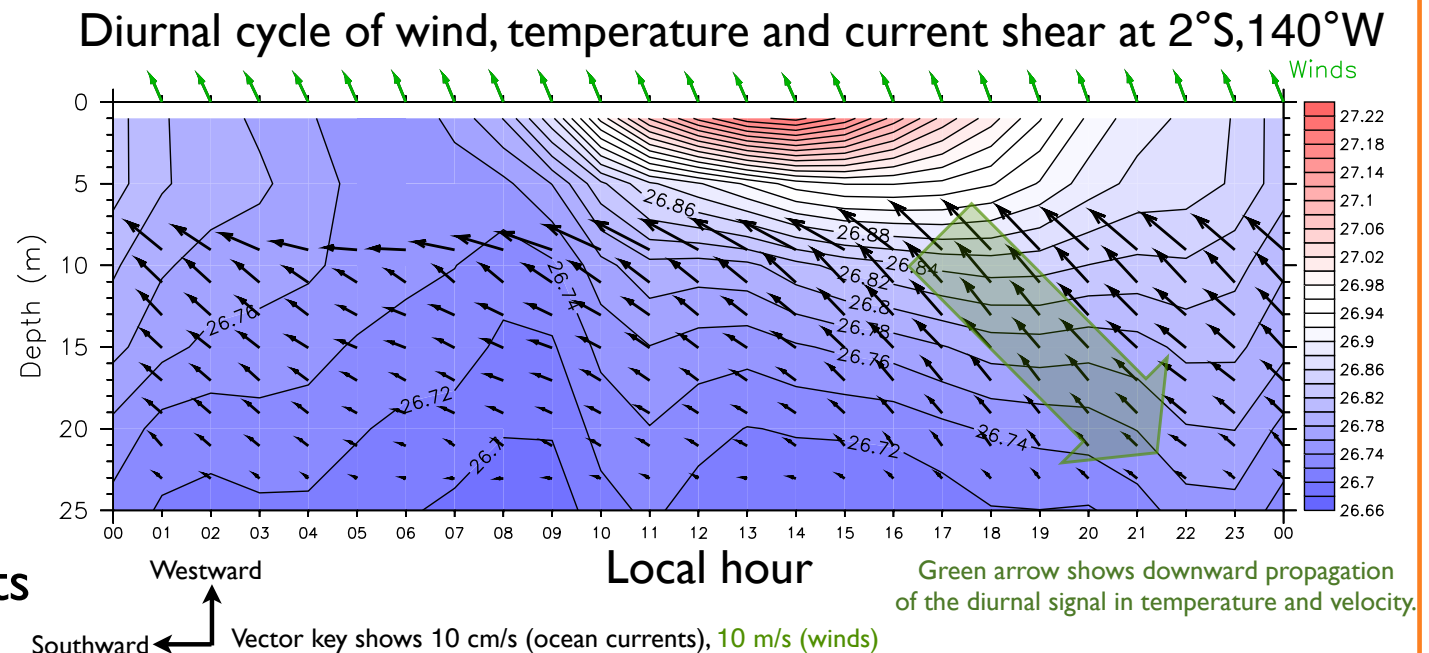
An example:

The diurnal cycle.

Do we need to observe
this everywhere?

How far can we go with
models, satellites and
limited in situ sampling?

Can process experiments
“teach” models to infer
the action of such processes?



(OOMD/TPOS mooring-enhancement pilot. Realtime data!)
(Kessler/Cronin/Grissom 2017)



Criteria for TPOS 2020 process studies

- Our fundamental responsibility is to build the backbone observing system (which makes everything else possible)
- We are also responsible to guide the scientific and technical evolution of the system: New technologies and emerging scientific challenges

We will never observe everything ... we must rely on models/DA

Thus, we seek process studies that:

- Are explicitly coordinated with parameterization development: Identify a path to improvement that needs specific observational guidance not available from the sustained obs (CPT model)
- Increase the ability of models and assimilation systems to infer the action of a process from ongoing sparser sampling, and thus steer refinements of the sustained sampling ...

