

Priorities for potential sites for the  
**4 HR ocean/coastal/sea-ice patches**  
of 120 km<sup>2</sup> during nominal phase

R. Morrow, S. Gille, N. Steunou,

# Objectives of the HR open ocean patches

- to provide a few regions with extra information beyond the fast-sampling cal/val period  
=> a limited time series to explore information not retained via the OBP
- **Waves** : Observe and better understand the HR wave field, its effect on SSH biases and its modulation across the swath and across fronts. Experiments in different seasons / wave conditions, instrumented Sentinel Supersites – Agulhas, Iroise sea, ...
- **CalVal sites** – Ocean CalVal continues throughout the nominal phase at certain sites. Opportunity for multiple data collection and validation
- **HR data** over intensive ocean in-situ or airborne campaigns
- **Sea-Ice** : Extra Antarctic demonstration sites for SWOT SAR-IN HR capabilities over sea-ice – freeboard, sea-ice volume
- **Coral Reefs** : Demonstration sites for SWOT SAR-IN capabilities around coral reefs – circulation at high-low tide around coral reefs, flushing?
- Offshore extension of key **coastal-estuarine zones or islands**  
(different from trades needed in present HR mask map for coastal zones)

Subject already addressed in preliminary way by ...

# **High Resolution Data Coverage (HRDC) Working Group (WG)**

Co-Chairs: Y. Chao and S. Biancamaria

+ 42 members

+ input from NASA/CNES project/engineering teams

SDT Meeting, Paris, June 17-19, 2013

## HR mask (Version 2): Ocean (to be prioritized)

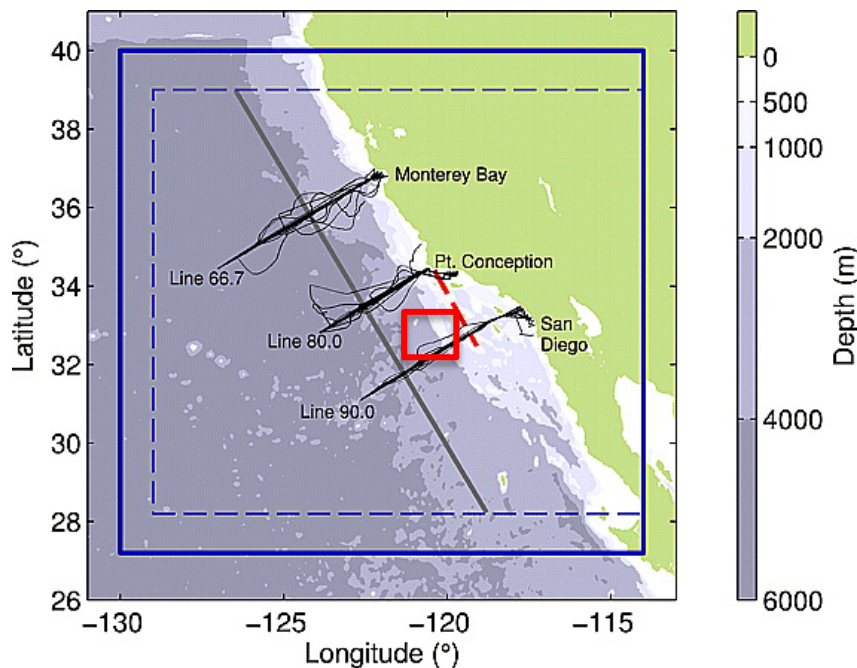
- **Ocean patches (120kmx120km)**
  - US west coast (AirSWOT, CalCOFI & FLIP Obs)
  - Others (e.g., marginal ice zones, high-sea-state regions, coral reefs)
- **Missing islands ?**
  - Hawaii
  - Galapagos
  - South Georgia
  - Kerguelen
  - Crozet
  - ...



## 2017 HR mask map

# Ocean Patch Example: US West Coast

relatively benign wave climatology - swell dominated



- Multi-decade history of 4 times per year CalCOFI sampling.
- Now using gliders for continuous measurement.
- Region accessible by plane (Lidar, AirSWOT, DopplerScatt, ....)
- Wave measurements have been characterized from FLIP (e.g. 32.4 N, 119 W).
- How does sea state bias change with wave energy?

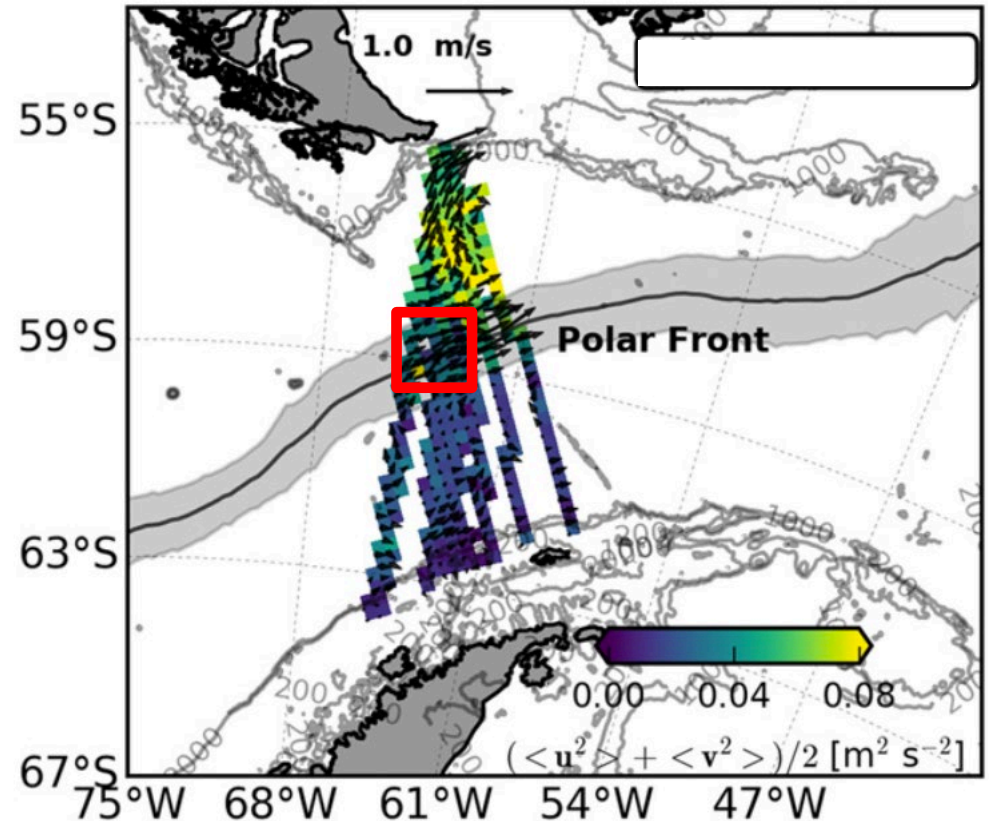
# Ocean Patch Example: Drake Passage

## Option 1:

- L. M. Gould crosses Drake Passage ~20 times per year
- Sample over Polar Front (centered at 59°S, 65°W)
- Gould will provide in situ meteorological, ADCP (currents), and TSG (temperature and salinity) for comparison.

## Option 2:

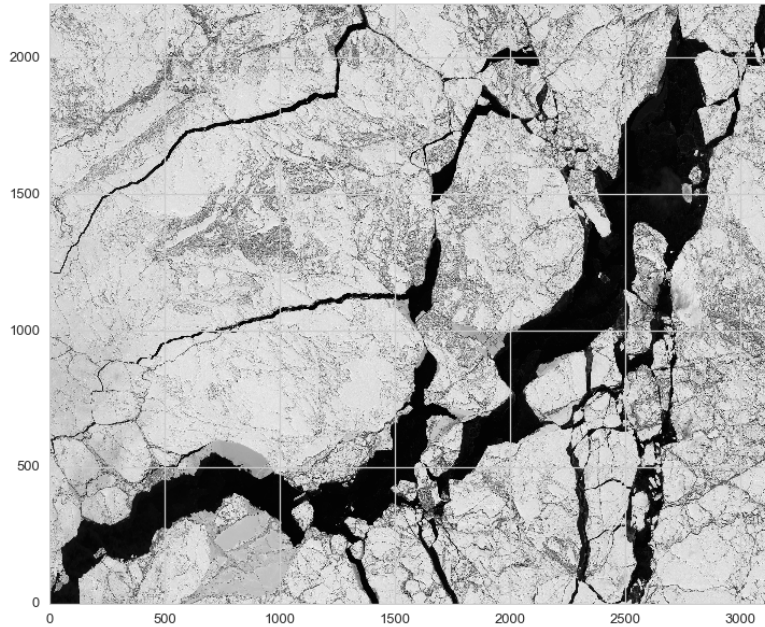
- Center at OOI mooring site at 54.47°S, 89.28°W, which has meteorological data and 3-axis motion measurements.
- Status uncertain for 2021 timeframe.



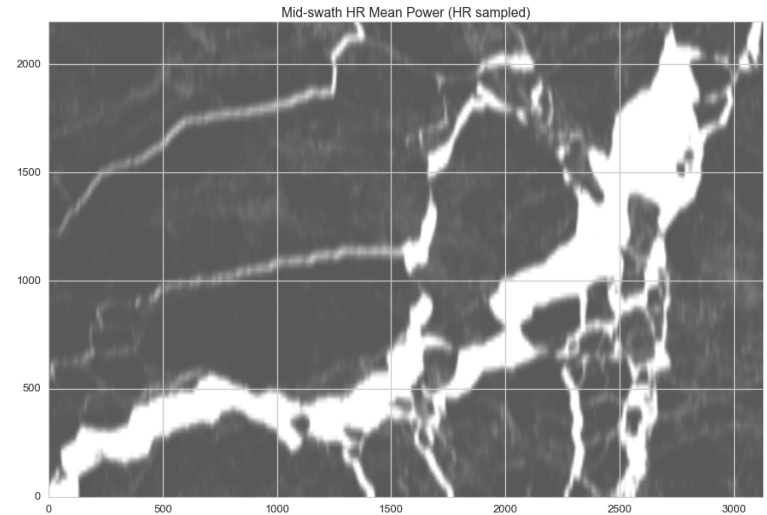
Rocha et al, 2016



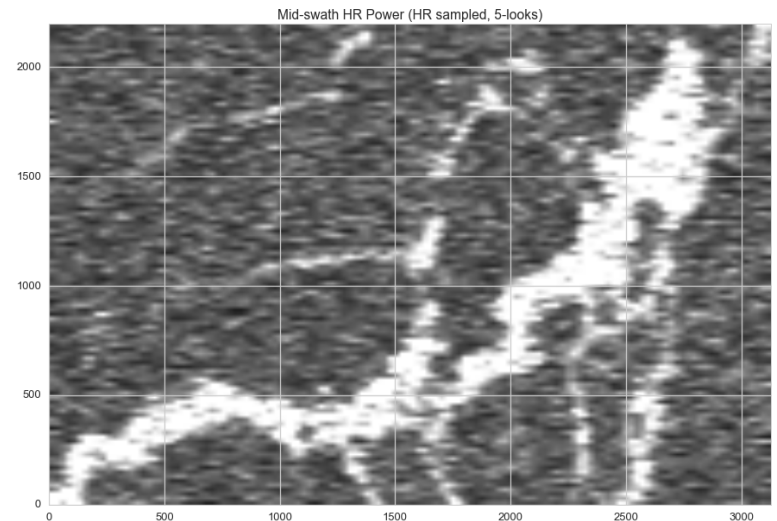
# Ocean Patch Example: Sea-Ice Zones



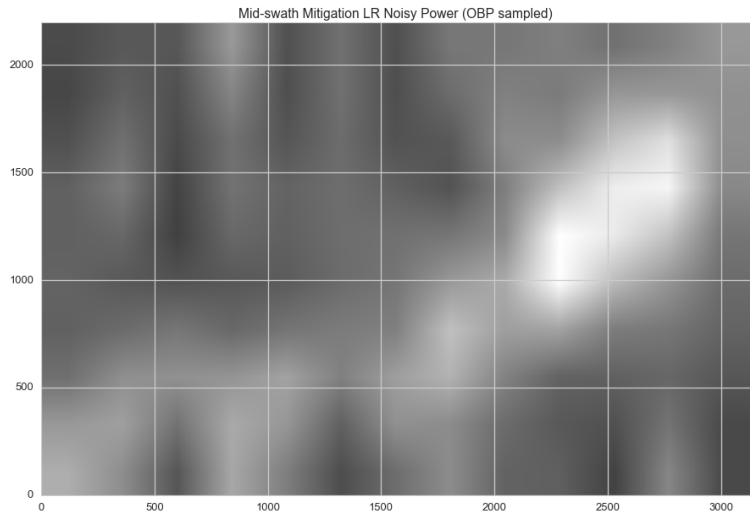
1) Mid-swath : Simulated HR Mean power



2) Simulated HR Mean power, 5 looks

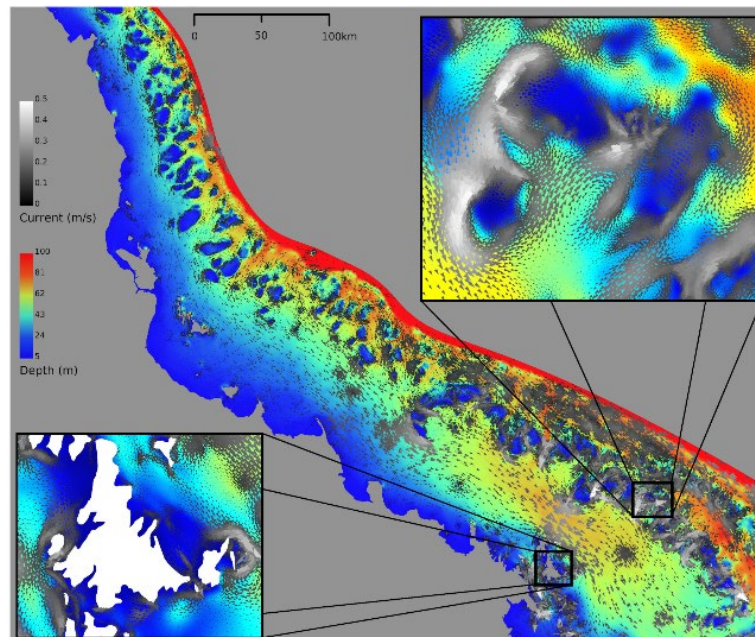
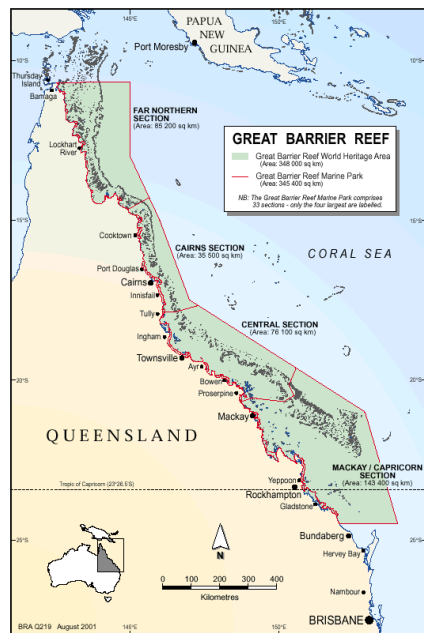


3) Simulated LR (250 m) OBP noisy power, 5 looks



# Ocean Patch Example – Coral Reefs

- Fine-scale hydrodynamic modelling of coral reefs → difficult to validate
- Coral reefs are fixed perturbations of the radar signal, but with varying observability - high and low tide, high and low waves
- High applications potential – inter-reef connectivity for biology, pollution, shipping...
- HR patch over one site with models, in-situ data : validation of OBP algorithms in key perturbed environment
- Many volunteers needed for the in-situ studies on a 2-week rotation



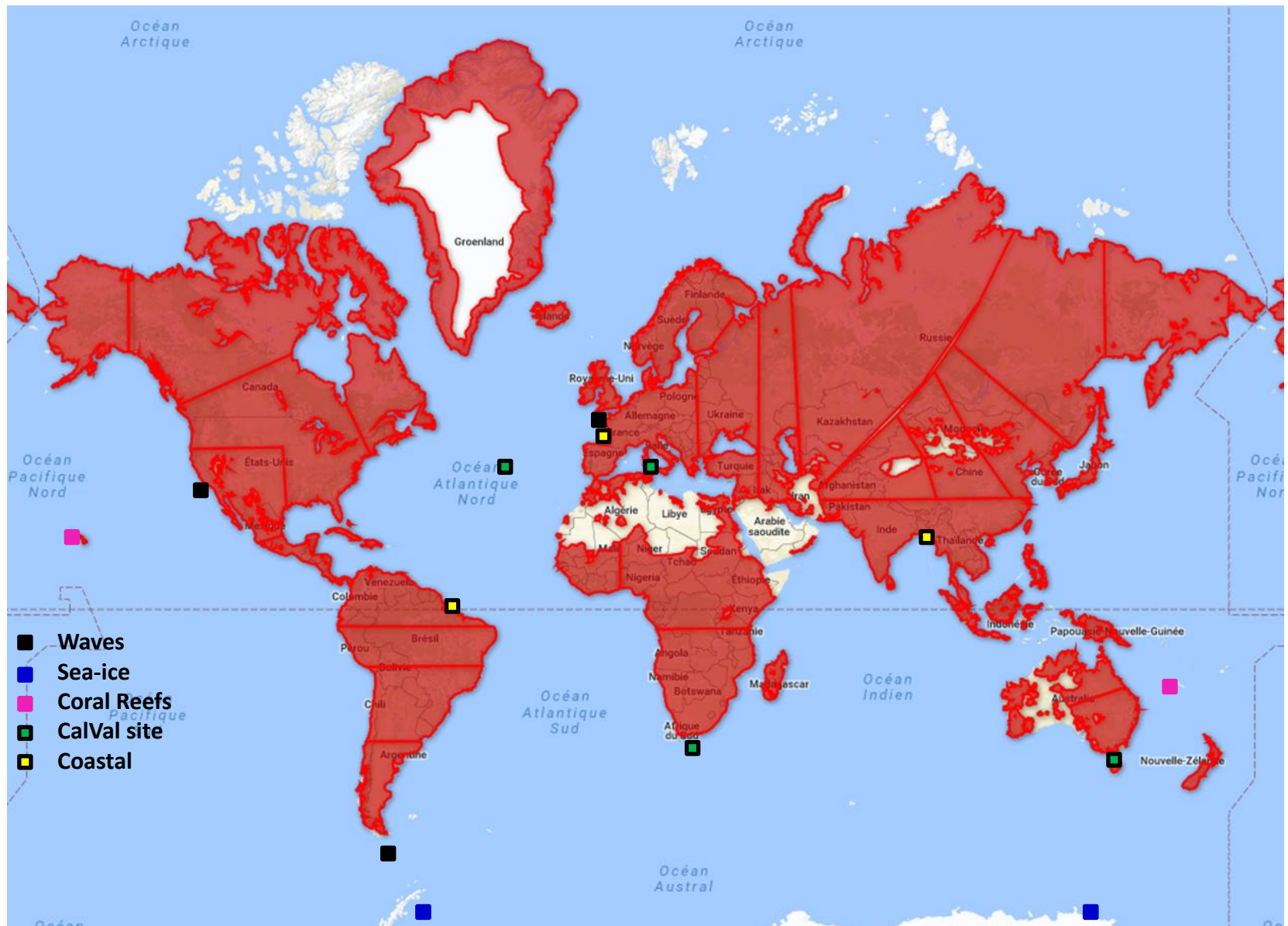


# Planning for HR ocean patches in nominal phase

- Prioritise clear plan for first 12 months of nominal phase from Oct 2021
- Propose strawman plan for following years
- Call of opportunities every 6 months to revise the future ocean patches mask for science studies ...
  - coastal, sea-ice, coral reefs,
  - sub-mesoscale in-situ campaigns,
  - new and innovative opportunistic science (e.g., Tropical Instability Waves, the Gulf Stream, the Kuroshio Extension, and the Agulhas Retroflexion region, Eastern boundary currents),
  - => island wake regions (e.g., downstream of the Galapagos, Kerguelen)

# Strawman plan

4 open ocean patches of 120 km x 120 km, 3 years, seasonally varying



# Strawman plan

4 open ocean patches of 120 km x 120 km, 3 years, seasonally varying (3 mon = 5.5 cycles)

	Oct 2021 – Sep 2022	Oct 2022 – Sep 2023	Oct 2023 – Sep 2024
Waves	1. California 2. Drake (6 mon austral winter ) 2. Iroise (6 mon boreal winter)	1. Waves site x (6 mon)	1. Waves site x (6 mon)
Sea-ice	3. Antarctic (6 mon austral winter)	3. Antarctic (6 mon, austral summer)	3. Antarctic (6 mon)
Coral reefs			1. Coral sites (2x 3 mon)
CalVal Site	4. Ocean CalVal site(s)	4. Ocean Val site	4. CalVal site
Science opportunities (incl coastal)	3. Science (6 mon, boreal winter)	2. Science opportunity 3. Science (6 mon, boreal winter)	2. Science opportunity 3. Science (6 mon, boreal winter)

Discussion here and in ocean and coastal splinters. (Volunteers for an email Working Group). When is the deadline for this?