Forum for Operational Oceanography

Perspectives from the FOO Surface Waves Working Group

Mark Hemer (CSIRO)

Alex Babanin (Univ. Melb)

Paul Boswood (Qld DSITI)

Diana Greenslade (BoM)

~~Jess Kolbusz (Carnegie)~~

Ryan Lowe (UWA)

Daryl Metters (Qld DSITI)

Tim Moltmann (IMOS)

Roger Proctor (IMOS)

Emma Sommerville (IMOS)

Craig Steinberg (AIMS)

Greg Williams (RPS MetOcean)

Following FOO 2015

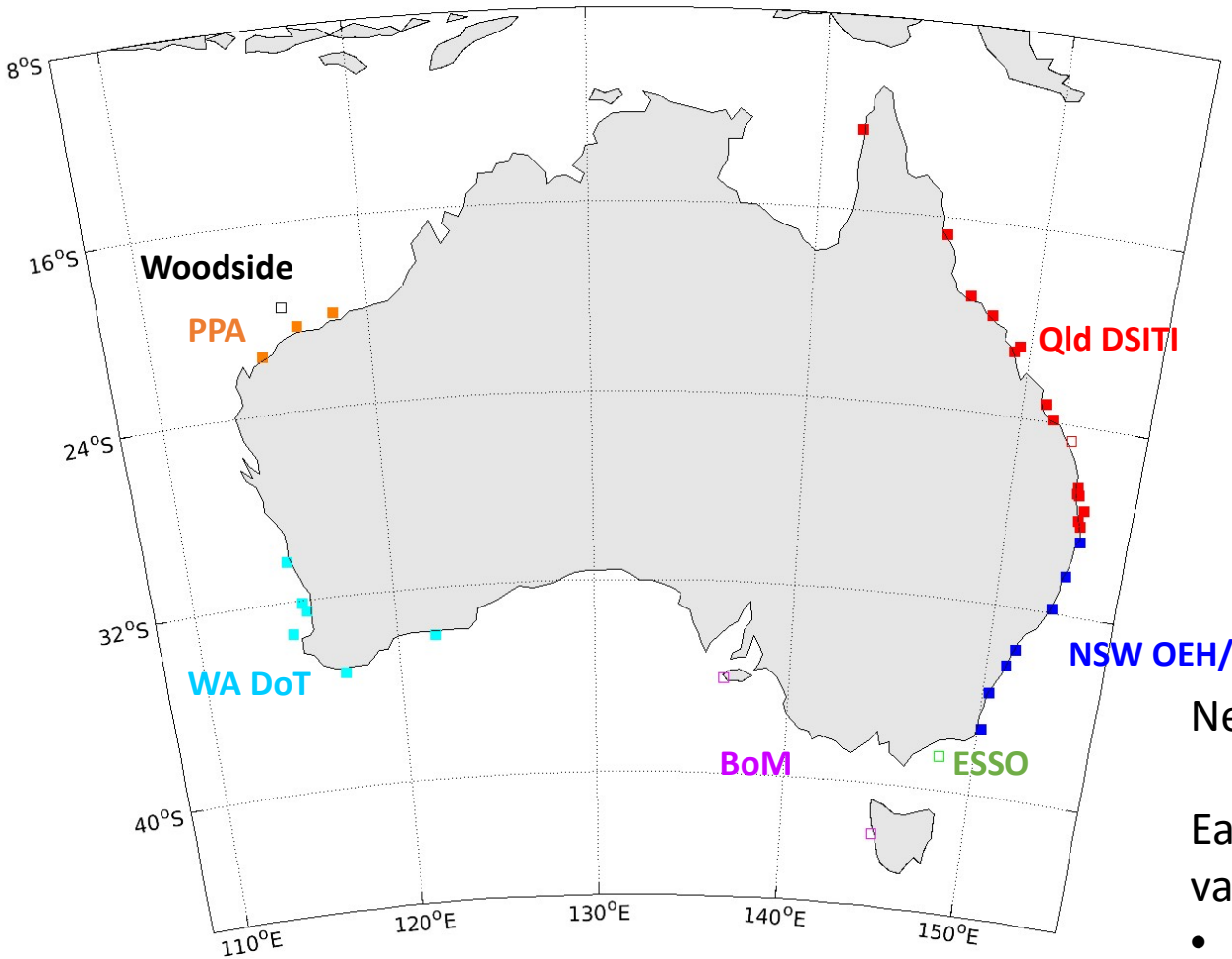
- Many reasons identified at FOO2015 motivating formation of the FOO SWWG
  - Source of error in swell
  - Combining spectral and phase-resolving wave models
  - Ocean (vs lake) observations to inform source-term development
  - Shallow water bathymetry for nearshore waves
- Group held first meeting in February 2016, with 4 meetings since.

Group Discussions

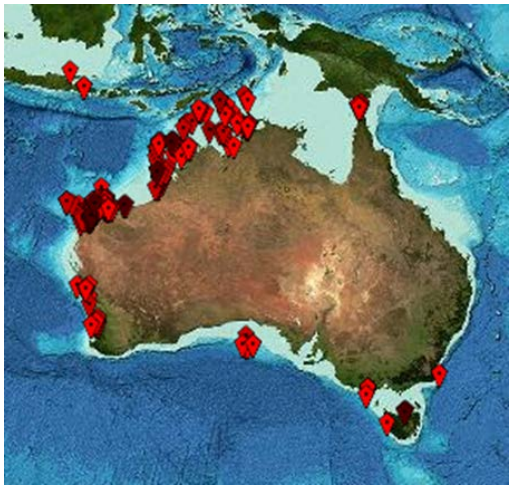
- Have focussed predominantly on data availability to support Australia's marine community
- Review of National Marine Science Plan white-papers - Waves feature in three chapters:
  - Energy Security
  - Dealing with Climate Variability and Change
  - Sovereignty, Security and Natural Hazards
- Summarised as:
  - Wave obs are patchy in space, time, quality; there is a need for a standardised, centralised repository
  - Many stakeholders can utilise wave obs, and access and analysis offers economic benefits
  - Models (forecast and hindcast) need validation with obs for credibility; forecasts and hindcasts are suffering from lack of obs.

Australia's in-situ wave observing network

Public



Industry (RPS QC wind/wave)



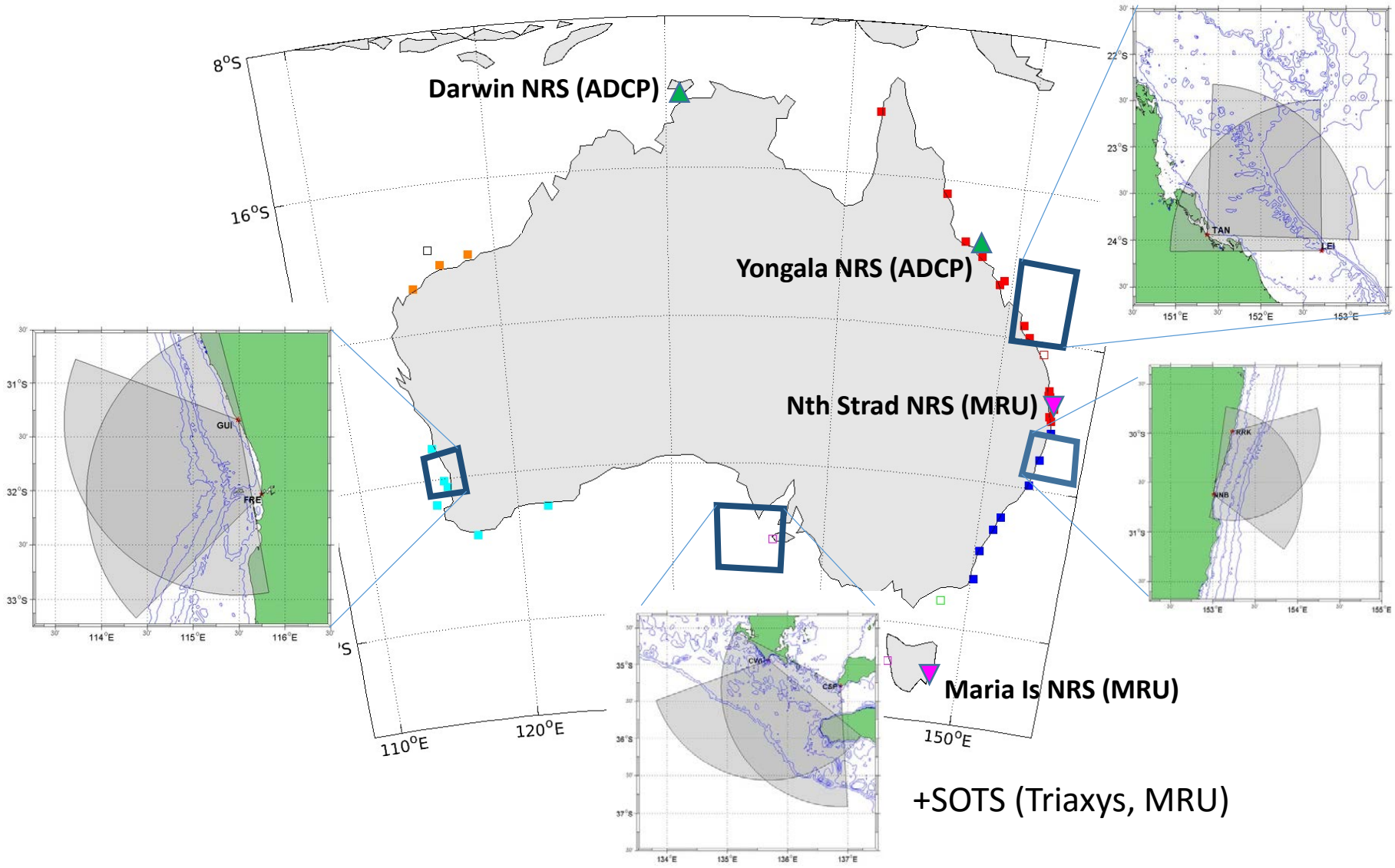
Network not centralised

Each custodian has variations of:

- Sampling strategy
- Analysis & QA/QC procedures
- Archived variables.

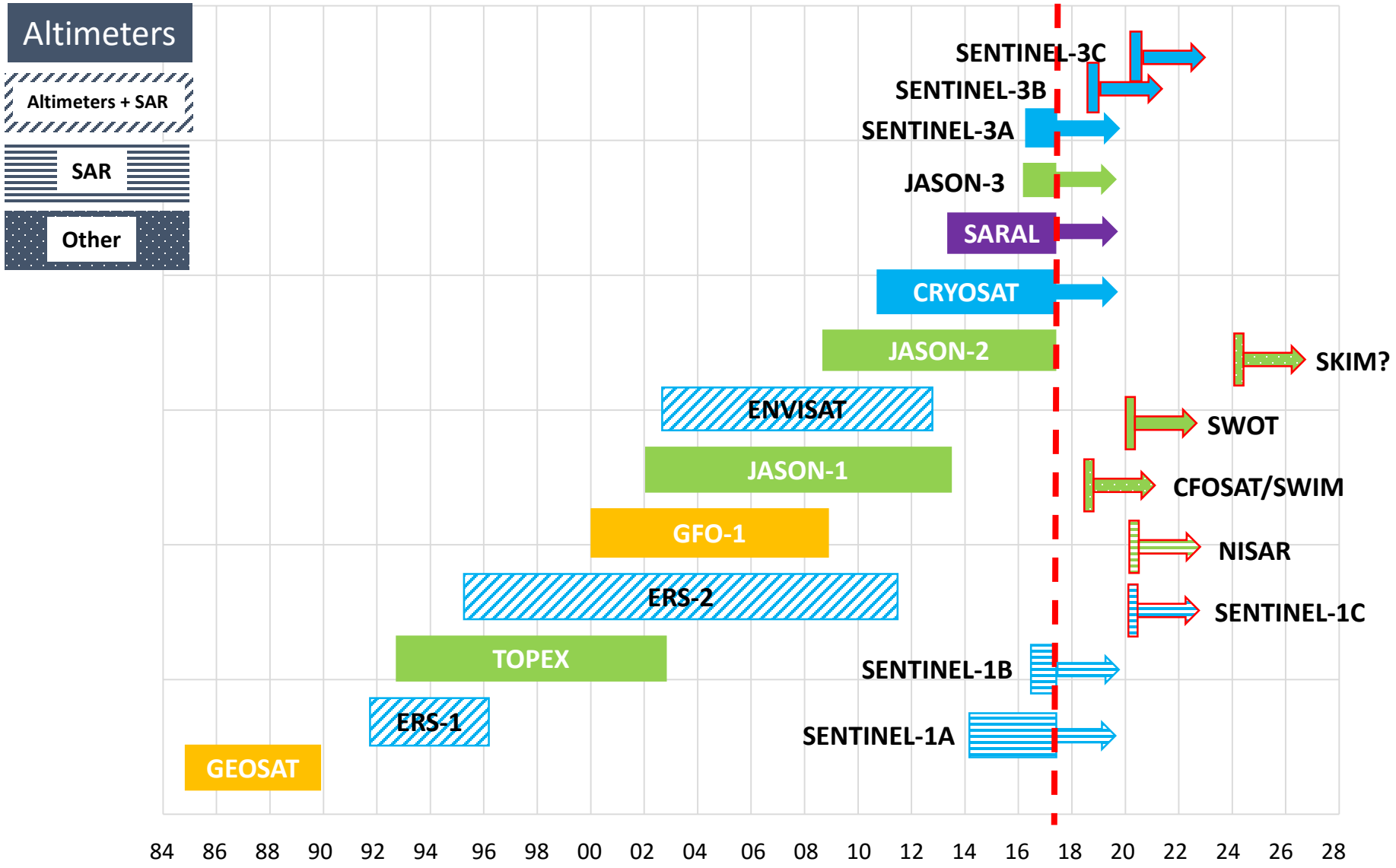
Australia's wave observing network

IMOS ANMN NRS & ACORN WERA HF Radar Sites



+SOTS (Triaxys, MRU)

SRS Wave Measurements



New IMOS SRS Waves sub-facility

Wave platform inter-comparisons

- Many new platforms now available for wave measurements
- AIMS, Qld DSITI & Scripps and other interested partners

propose to inter-compare existing and emerging platforms:

Coastal arrays of waverider buoys

Drifters &/or tethered buoys

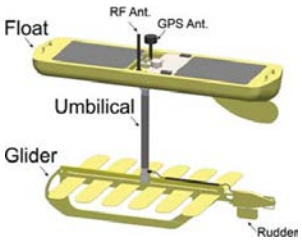
Wave capable ADCPs in coastal locations

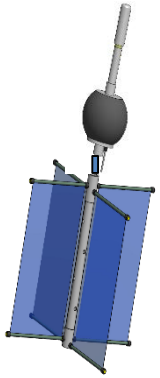
(e.g. Yongala, Darwin NRS)

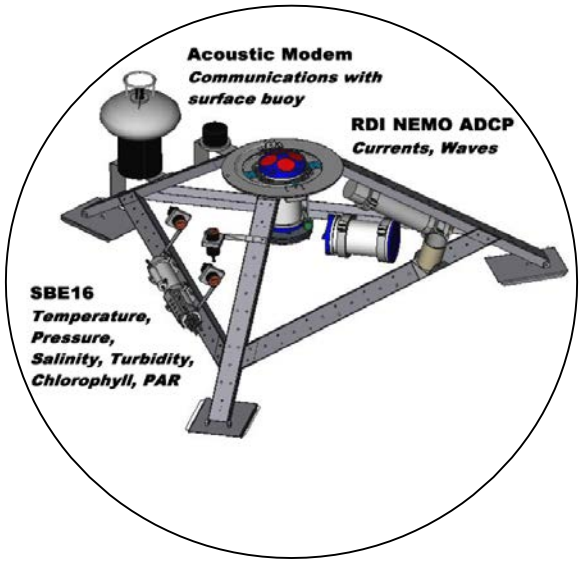
Ocean Surface RADARs

Satellite Altimeters (SWOT)

WaveGlider (2018 Townsville-Hobart)







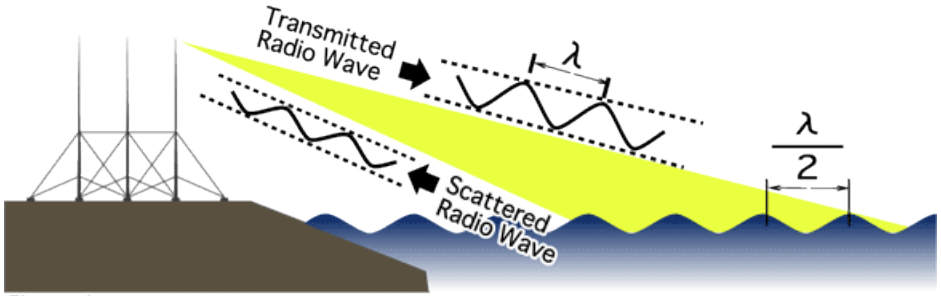
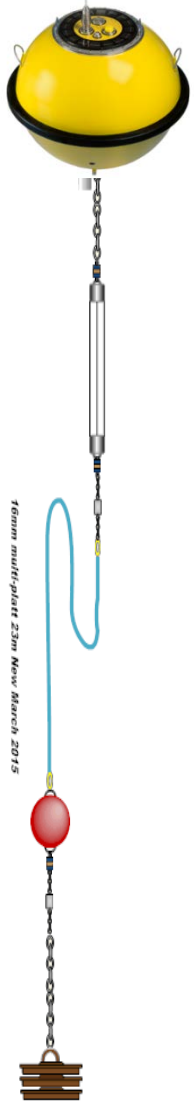


Figure 1



Australian Wave Model Datasets

Operational

- BoM AUSWAVE-G, AUSWAVE-R
- Industry

Hindcasts

- CAWCR Wave Hindcast (1979-present; Durrant et al., 2014; Hemer et al., 2017)

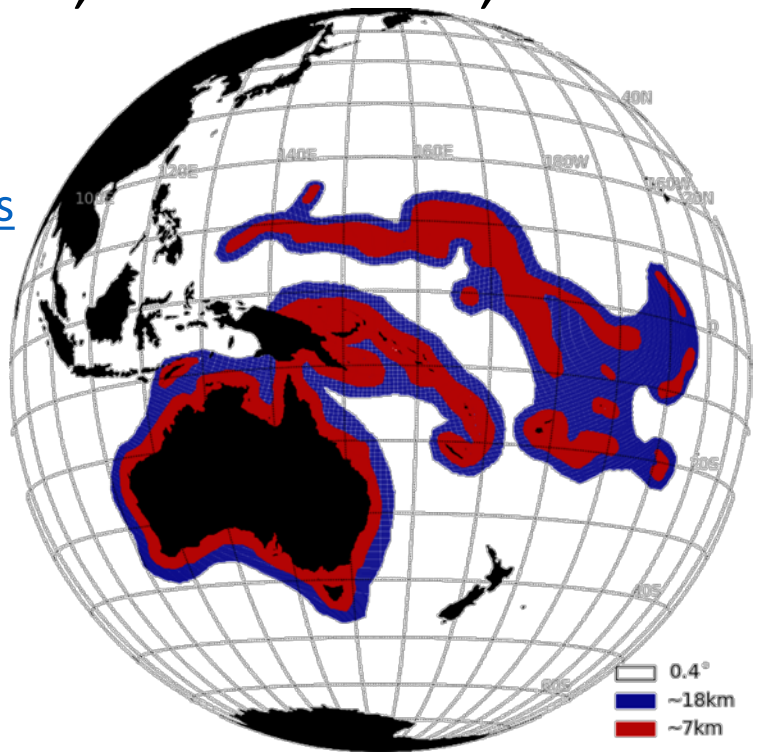
http://dx.doi.org/10.4225/08/523168703DCC5

Atlas: http://www.nationalmap.gov.au/renewables

- NSW OEH (1979-2016)
- Other Service Provider models

Many other regional models

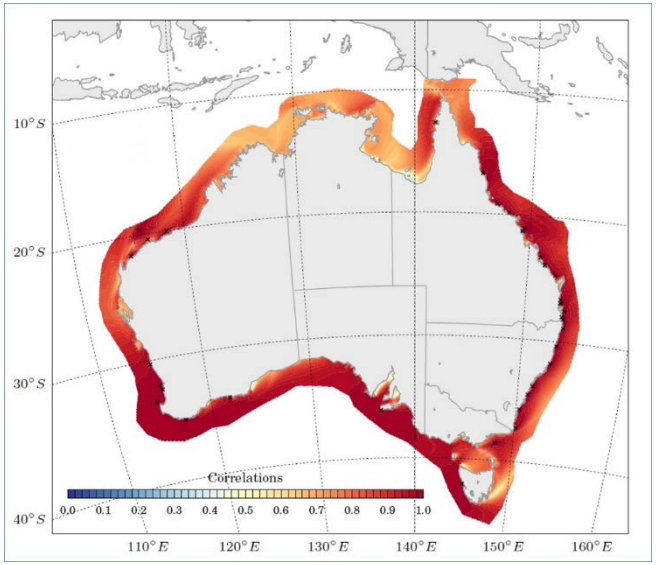
Wave climate projections



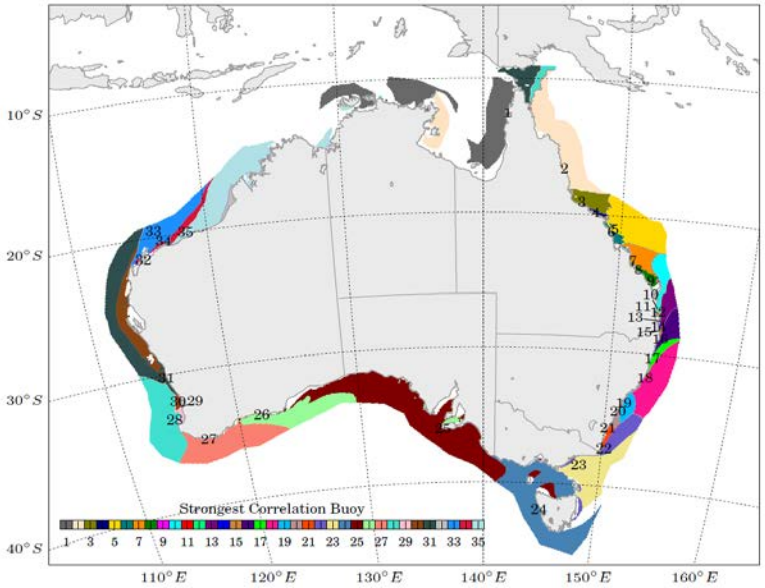
Identifying gaps in wave observation network

(Greenslade et al. *in prep*)

Maximum Correlation



Area represented by each buoy



- Possibility for new wave buoy supported via IMOS (project provisionally accepted)
- In order to identify significant gaps in existing network, the spatial coherence of the wave field needs to be considered
- Spatial coherence determined using CAWCR wave hindcast
- For every grid point in hindcast, calculate correlation between (modelled) mean monthly wave height at that location, and (modelled) mean monthly wave height at all buoy locations
- Repeated for Tm and Dm

Considerations

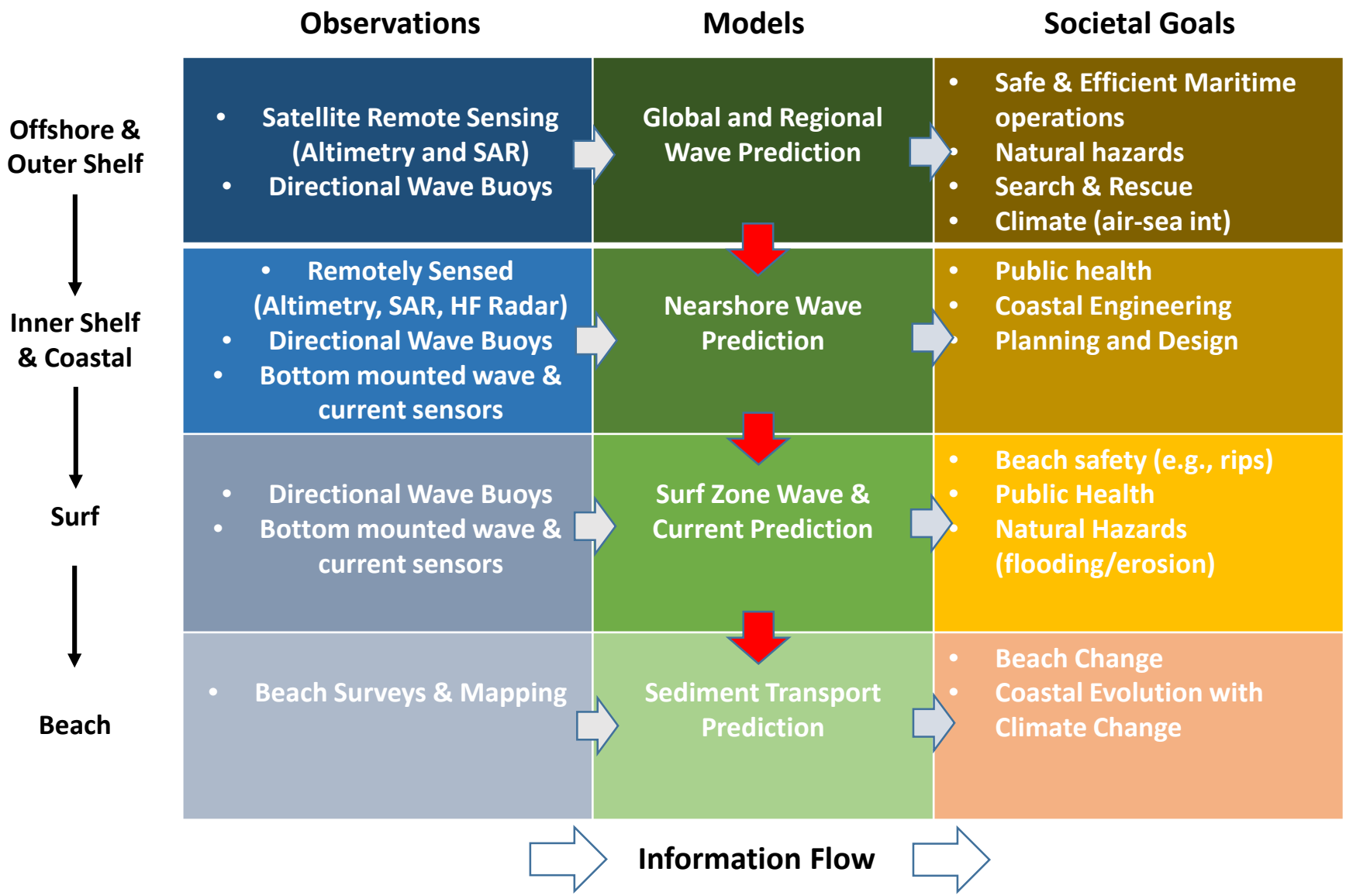
The SWWG has focused on observation coverage.

Little consideration (to date) has been given by group to distinguishing:

- *Application of the data (e.g., offshore or coastal infrastructure, public safety, weather forecasting, research, etc)*
- *Real-time &/or availability*
- *Temporal coverage (Historical, Continuous, Seasonal or 'spot')*
- *Data-quality (Raw, QA'ed, computer QCed, or expert QCed data)*

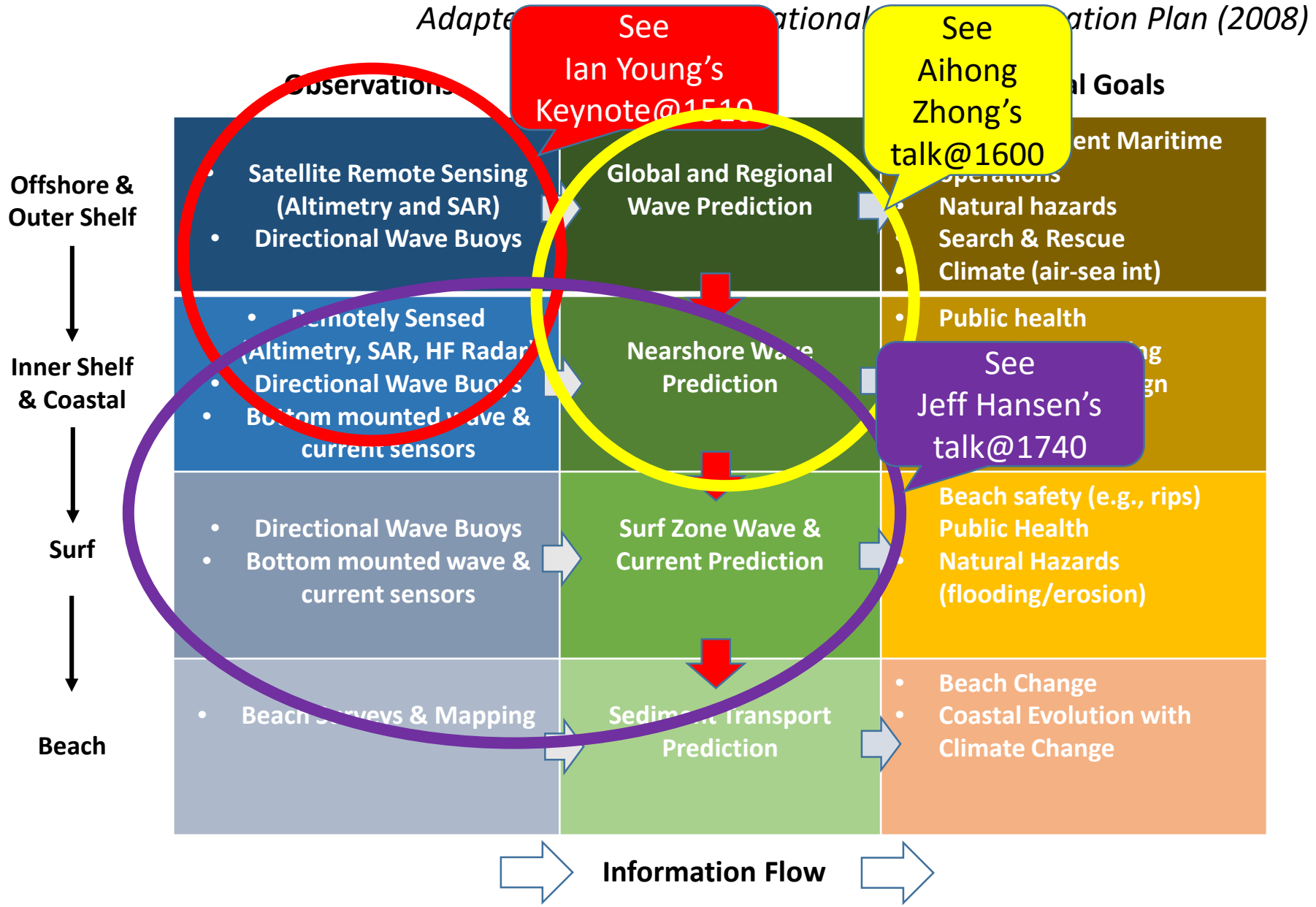
Wave observation Information Flow

Adapted from IOOS Operational Wave Observation Plan (2008)



Wave observation Information Flow

Adapte ational ation Plan (2008)



Concluding Remarks

- After FOO2015, The FOO SWWG was established. If ongoing, stronger industry representation would be welcomed
- Initial priorities focussed on R&D physical challenges for wave community.
- Discussions have focussed on obs coverage, with a need to still identify what is needed to address FOO challenges
- Priorities of the FOO SWWG (or Australian Community with Wave interests) have not been resolved – but need to be.
- Next steps: collaborative research priority setting for waves in Australia

  1st step - solicit research questions from influencers (r&d, service providers, industry, users, policy-makers, funders,…) via multiple channels.

  Starting now…

Opportunity for waves community to identify and discuss priorities is upcoming later in 2017

Register interest/ Submit abstract before Aug 18 to 3windwaves-oceans@uwa.edu.au

24-26 Oct 2017 • Indian Ocean Marine Research Centre
The University of Western Australia, Crawley, Western Australia