(Non)-intervention strategies for TC forecasting
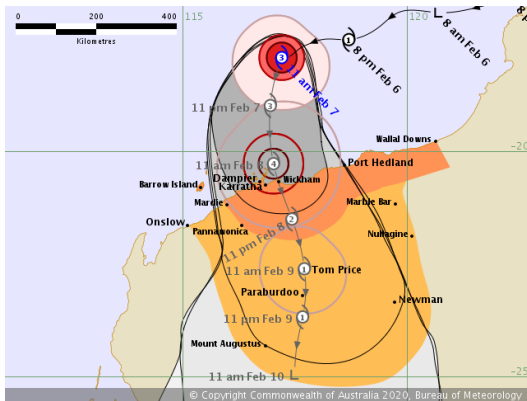
Traditional subjective process Vs overwhelming info: sat/NWP etc

Increasing demands for hazard/impact

and probabilistic info

Objective methods in the TC Process – how useful are they?
When to use them?
Where should we be headed in the future?

Joe Courtney, joe.courtney@bom.gov.au
TC operational and research practitioner
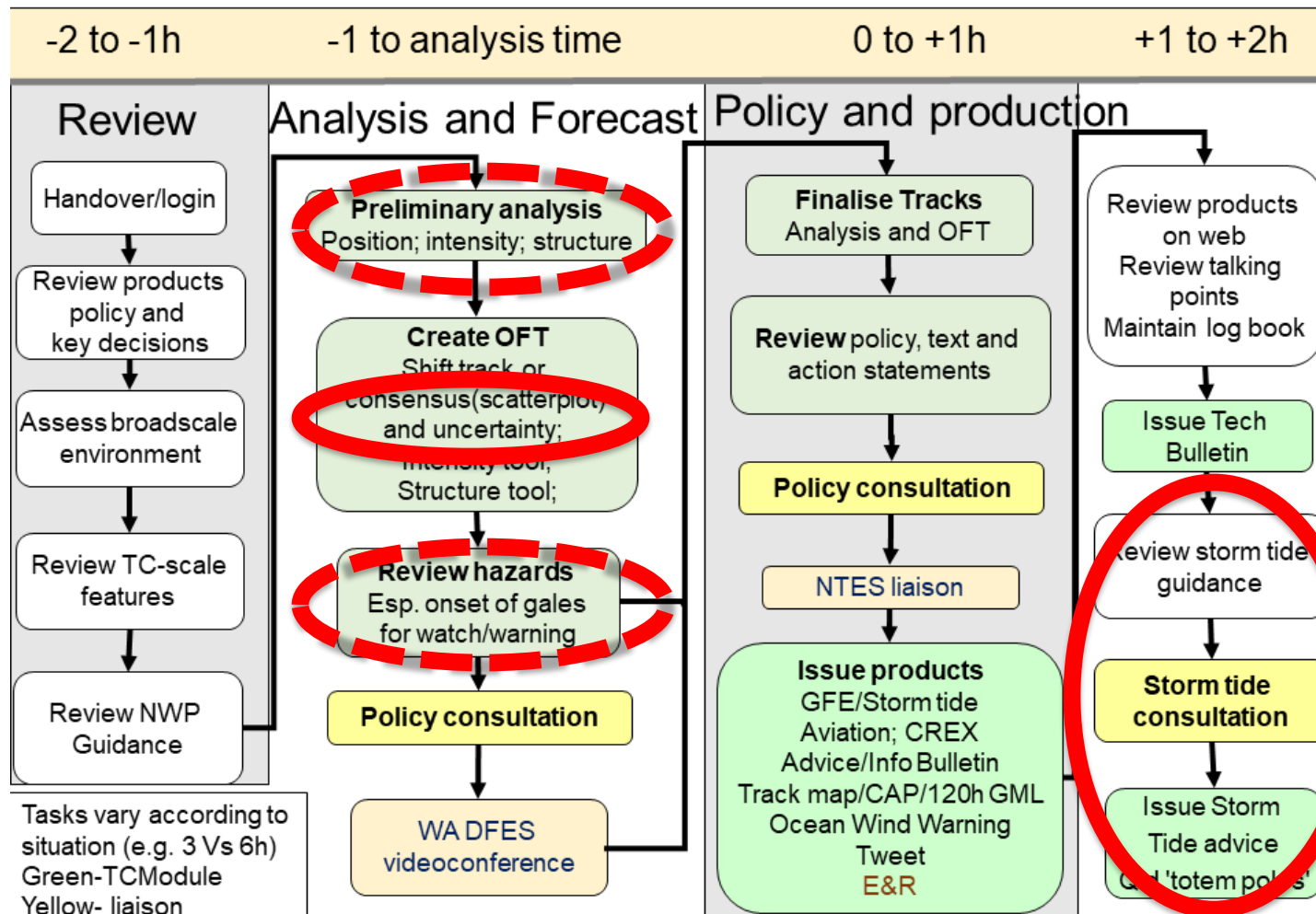BoM Training Centre, Perth

R&D workshop, 23 November 2020

Forecast process:
challenge do all this in 3h!
Role of objective methods throughout?

TCWC Forecast Process

Recent objective methods being used

Australian Government
Bureau of Meteorology

Storm Tide ROMS

MSL	**1.49 m (0.00 m)**	18 Mar 22:20
HAT	**3.14 m (1.65 m)**	18 Mar 22:20
Most likely scenario	**2.96 m (1.47 m)**	18 Mar 22:20
Forecast tide line	**2.95 m (1.46 m)**	18 Mar 22:20
2% exceedance TWL	**3.87 m (2.38 m)**	18 Mar 22:20
25% exceedance TWL	**3.13 m (1.64 m)**	18 Mar 22:20

Track consensus

03:00 30/1 (+12)
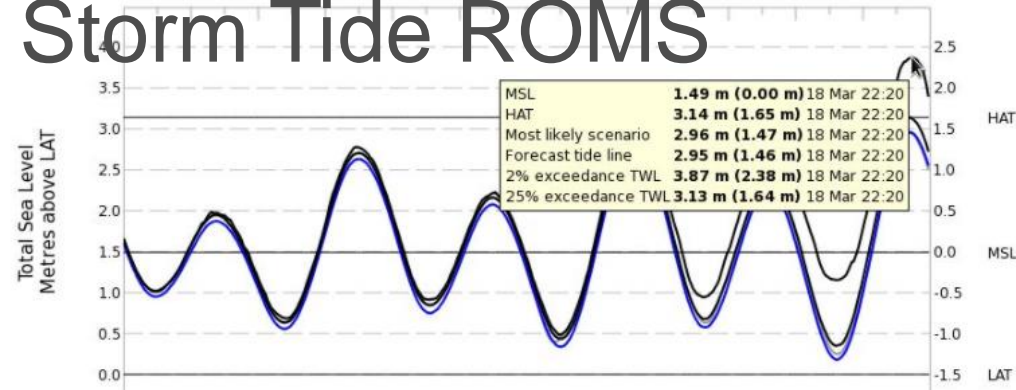
EC bias correction wind/wave risk

Track uncertainty

06:00 8/2 (+24)

'Intervention': understanding limitations and communicating these to customers
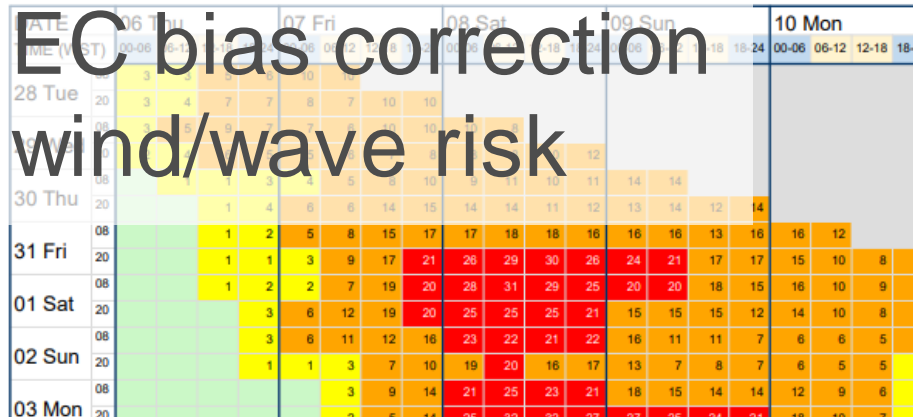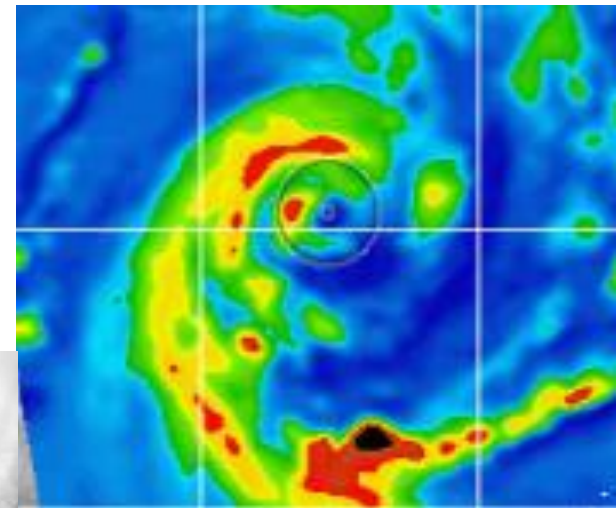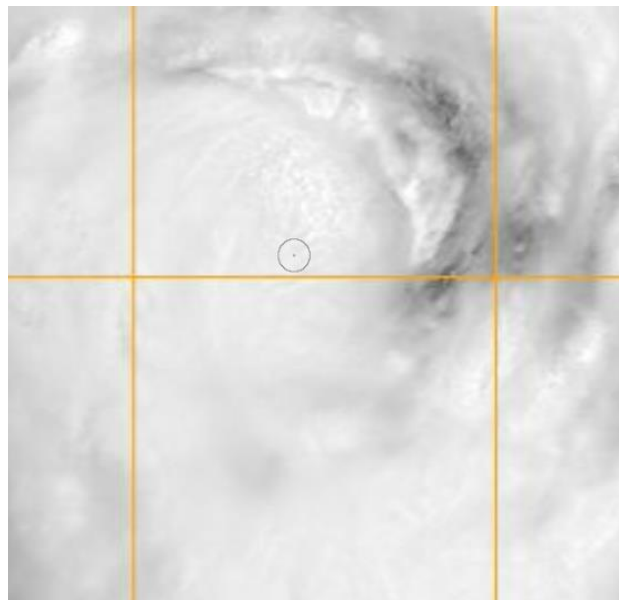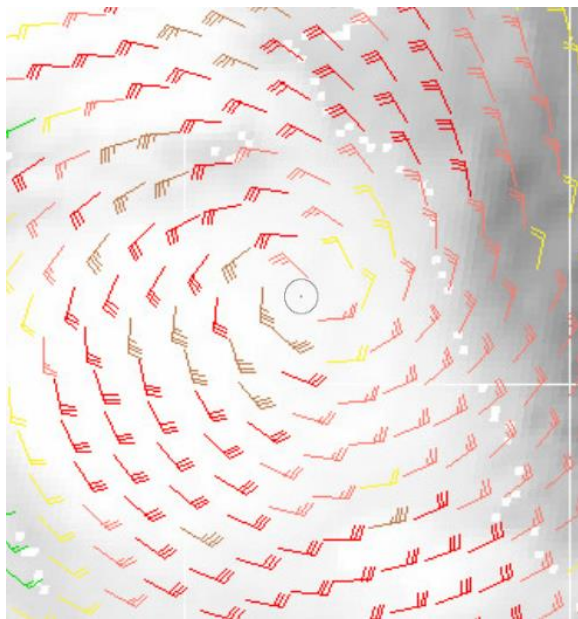
Analysis: position subjective

Subjective: Obs, Radar (no objective), Vis, IR, Microwave, scatterometer (ASCAT, SCATSAT), previous policy (consistency check).
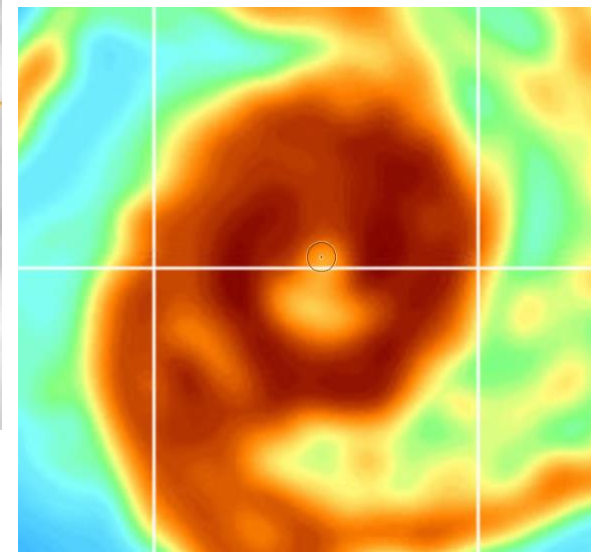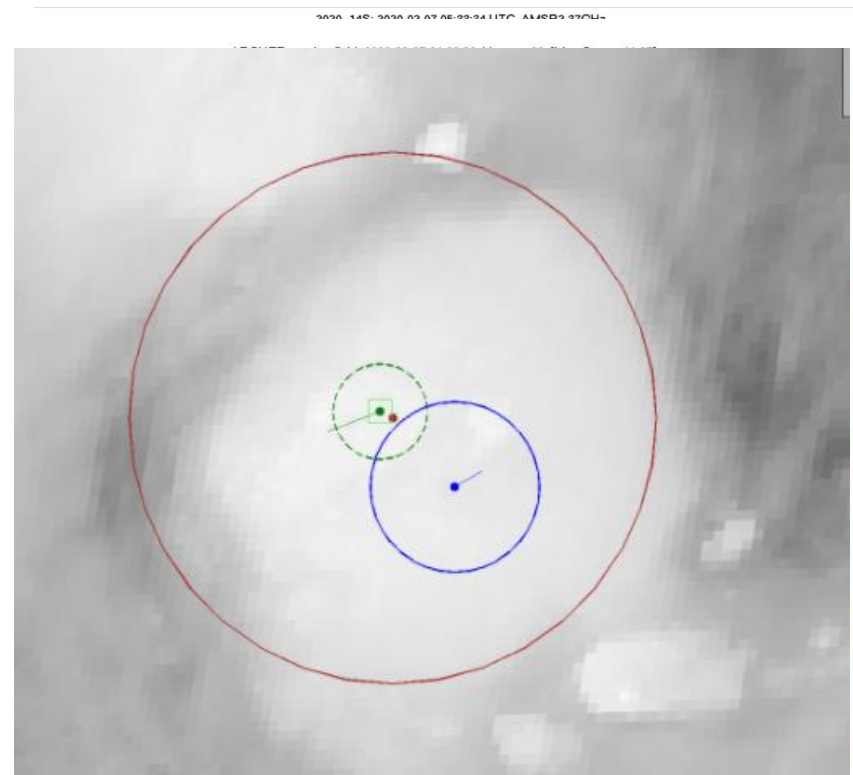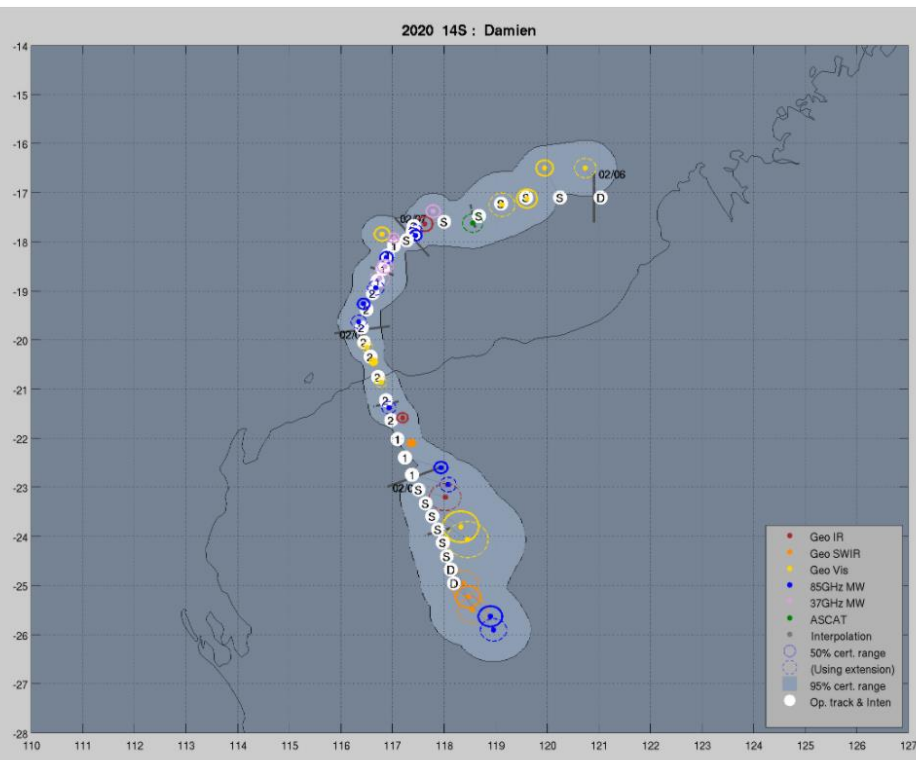

Images courtesy: NRL.

Analysis: objective position ARCHER technique (CIMSS)

http://tropic.ssec.wisc.edu/real-time/archerOnline/web/index.shtml

ARCHER good when easy but poor when difficult limiting usefulness; good for scat but doesn't include SCATSAT/SMAP/SAR, radar, obs
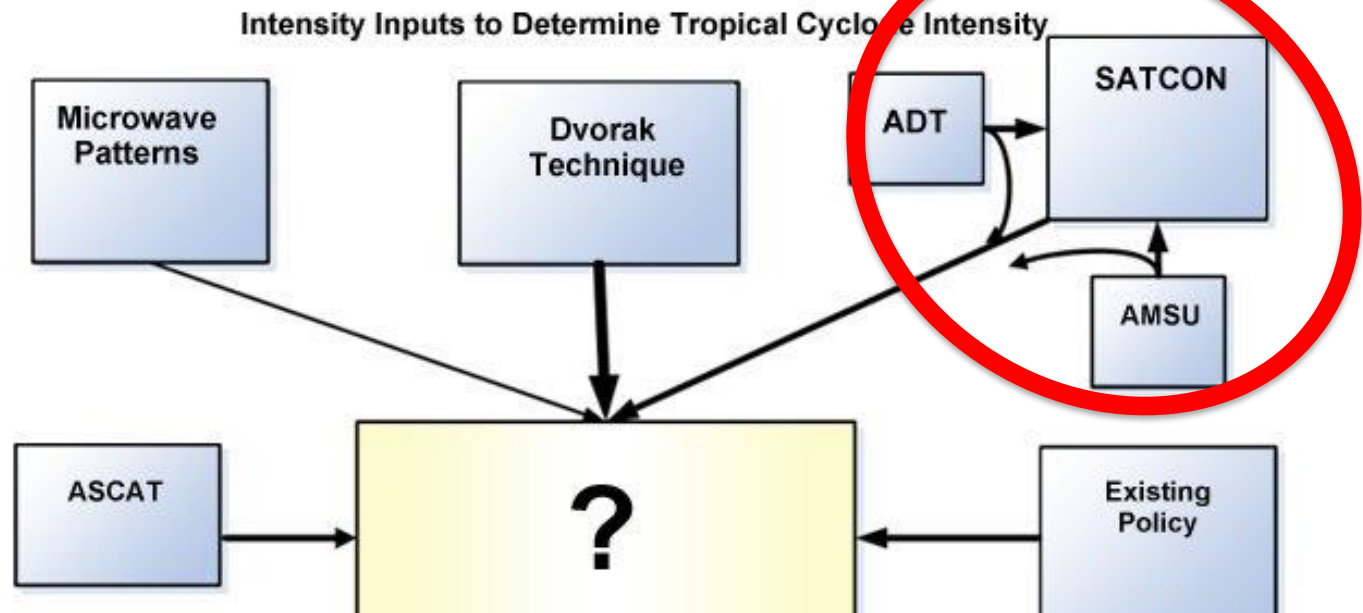
Future: potential but needs major investment

2020 14S : Damien

Analysis: intensity
more subjective inputs than SATCON
http://tropic.ssec.wisc.edu/real-time/satcon/

Subjective: Obs, Dvorak (Vis&IR), microwave patterns, scatterometer (ASCAT, SCATSAT, SMAP, SAR), NWP, previous policy (consistency check) Vs SATCON

Intensity Inputs to Determine Tropical Cyclone Intensity

SATCON: robust but has known weaknesses requiring forecaster insight; limitations poor for weak systems, ADT only uses IR; doesn't include; SCATSAT, SMAP, SAR, obs,

Future: useful but requires investment

Analysis: structure subjective
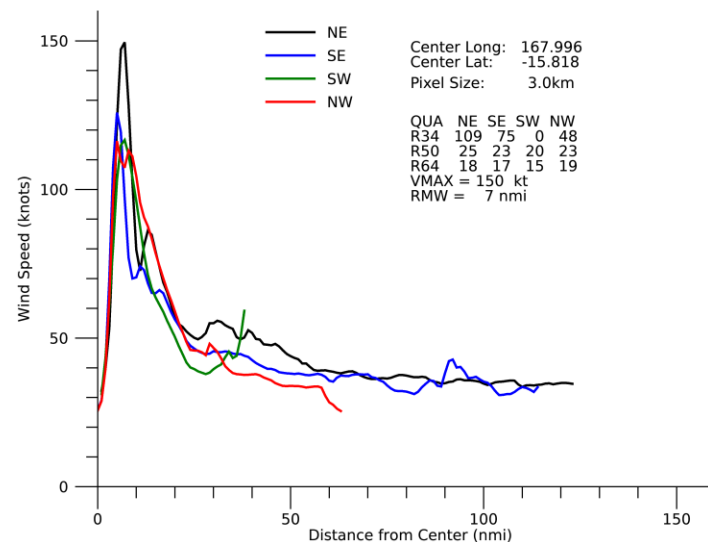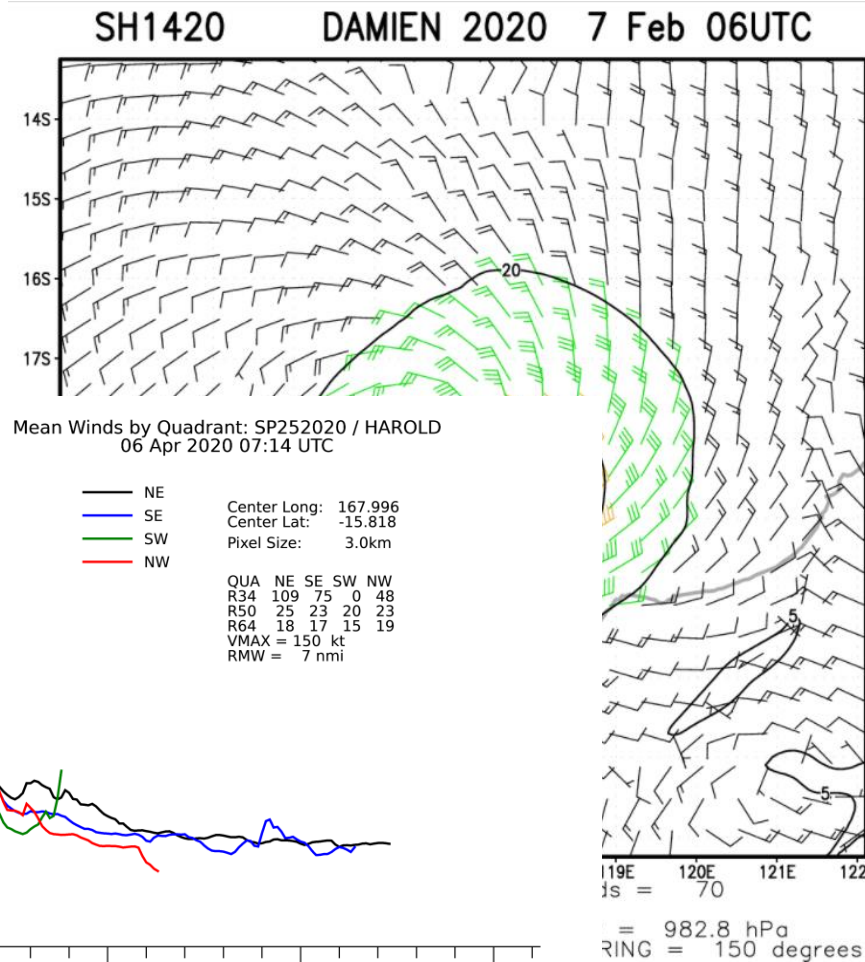## scatterometry; obs; convective patterns; NWP
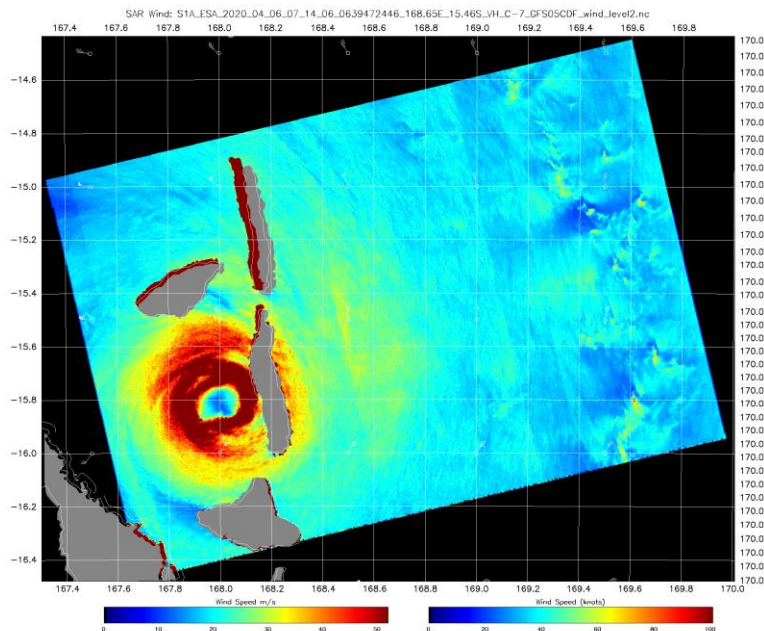## Objective: CIRA MTCSWA
https://rammb-data.cira.colostate.edu/tc_realtime/

MTCSWA: ASCAT; IR; AMSU; CDFT

Requires significant upgrade to be useful

Future: assimilation of observing platforms

into NWP

Forecast intensity
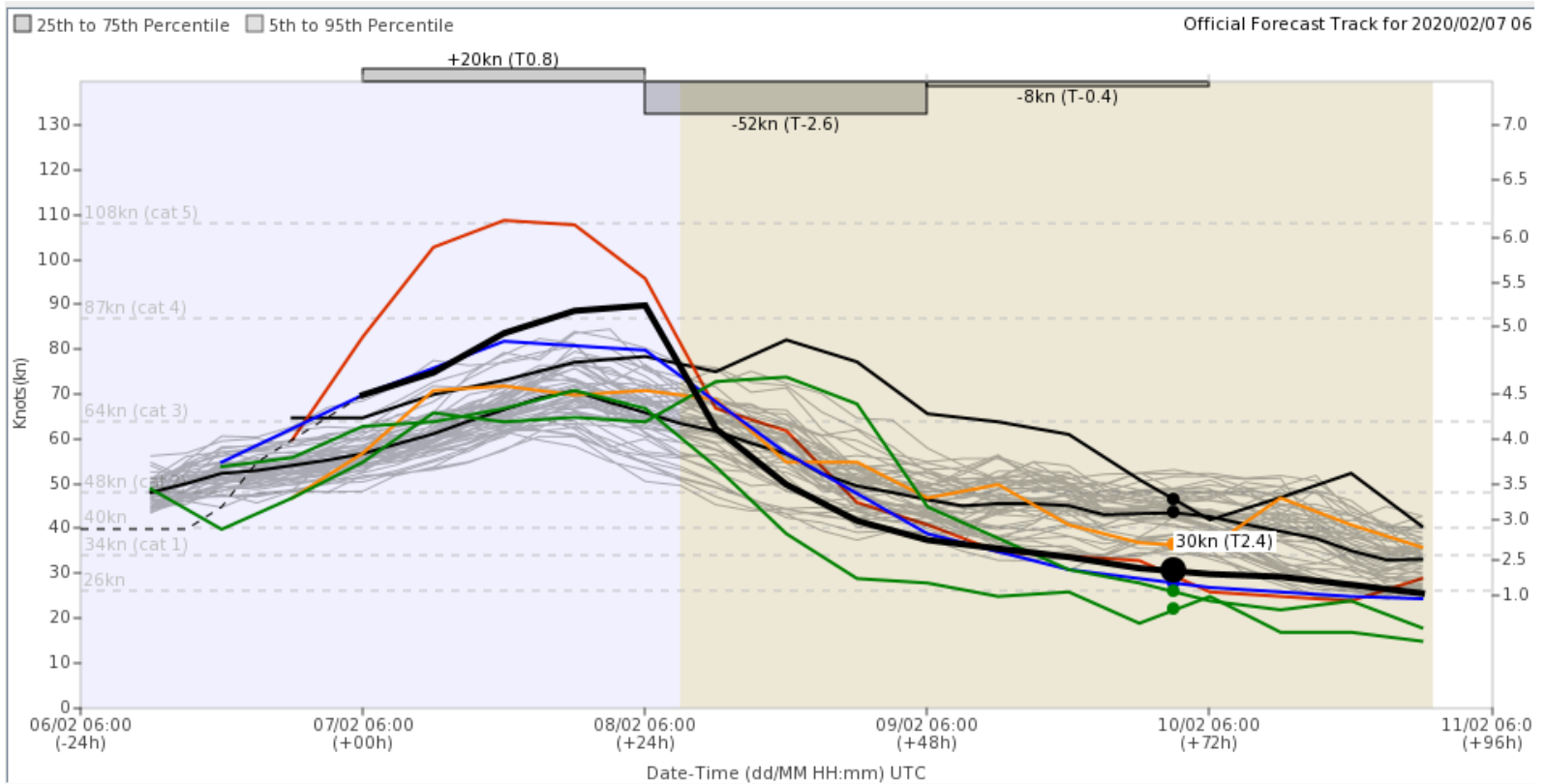# Traditional difficult and model underperformance

Objective methods: ICNW/SHIPS and RI guidance - blend of some NWP diagnostic/stats.

Bias correction of EC.

Some next steps

Australian Government
Bureau of Meteorology

- Forecast track: from consensus of deterministic tracks to peak multi-model ensemble consistent with current uncertainty area.

- Extension of bias corrected super-ensemble to gale/storm/hurricane force onset/duration.

- Improved products (eg storm tide, TC outlook) and improved forecaster skills for interpreting objective output for customer decisions.

- Improved assimilation of observing/satellite platforms to NWP analysis (global modellers).
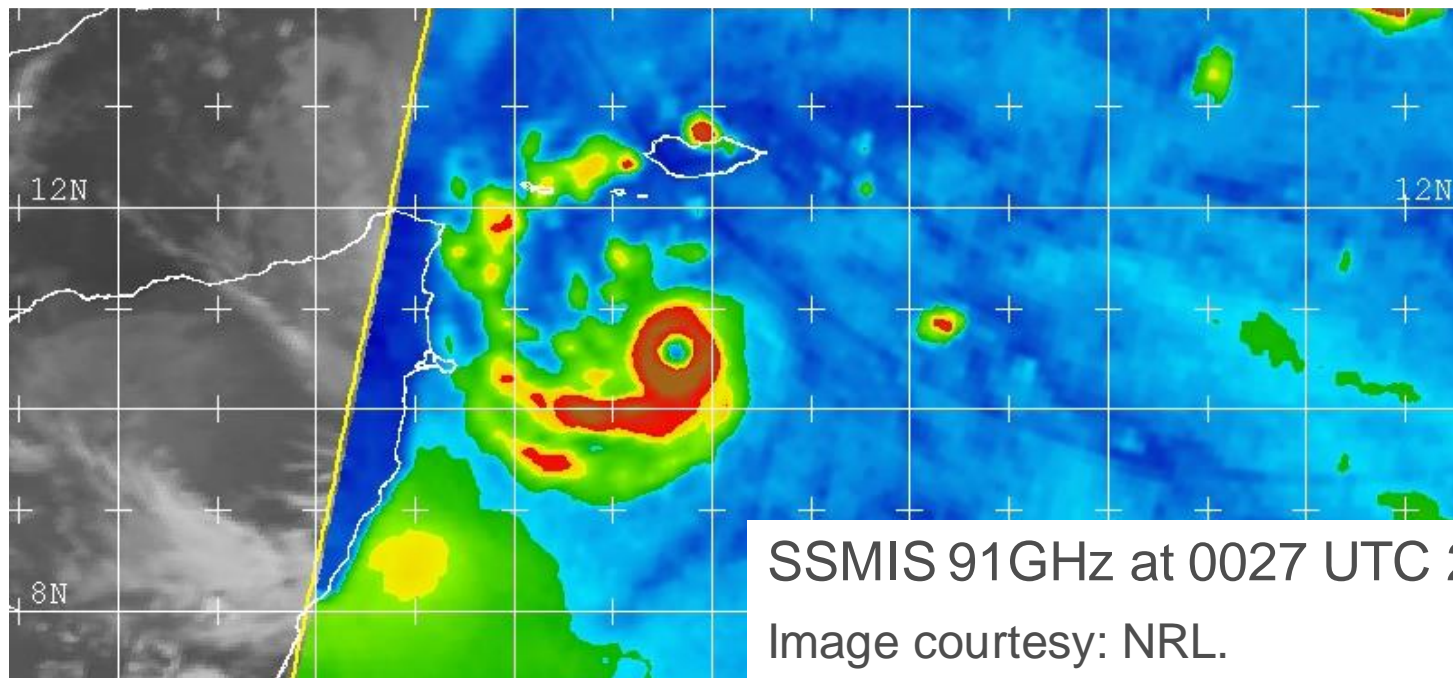
Reality Check:
03A 22 November (Gati)

Australian Government
Bureau of Meteorology

Microwave image when classified as a tropical low (00UTC)

ADT was ~2.8 35-40kn SATCON 50kn but this image >65kn

Note at 06UTC JTWC increased to 80kn* (subjective) Vs SATCON 60kn* (1min)

*converted to 10min

SSMIS 91GHz at 0027 UTC 22 Nov

Image courtesy: NRL.

Summary:

Progress made using objective output for probabilistic output but
otherwise TC process still requires heavy intervention;
Objective methods need to blend information from many different
sources e.g. super-ensemble and bias correction;
don't provide single model methods!
When & where to intervene often depends on key decisions being
made to focus attention in the process;
Increasingly forecaster time spent on interpretation rather than
'creation' 'forecaster as story-teller'.

Other questions
joe.courtney@bom.gov.au