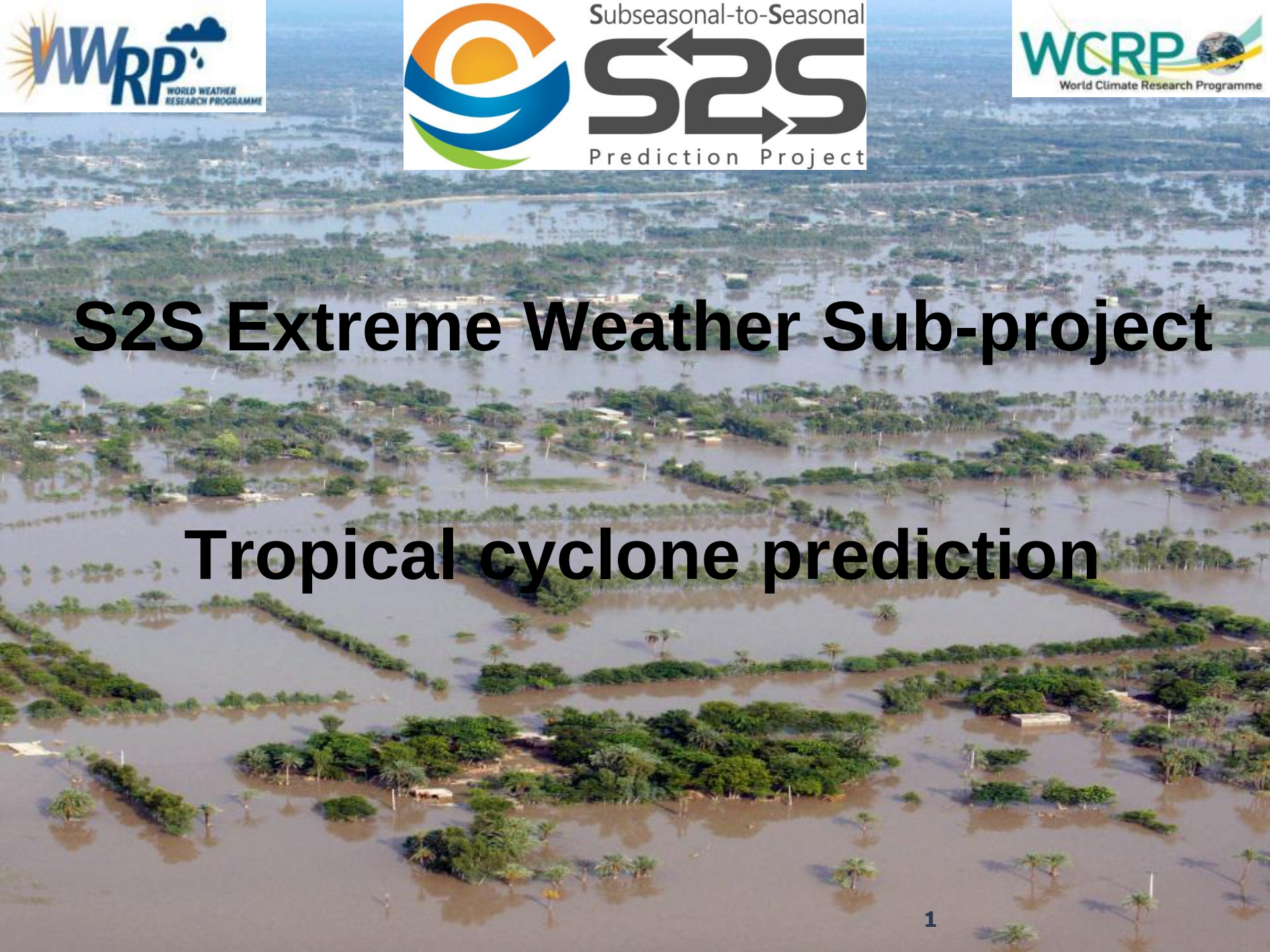


S2S Extreme Weather Sub-project

Tropical cyclone prediction

Tropical Cyclone Tracking (Vitart 1997, 2003)

Step 1: Detection of intense vortices with a warm core for each time step:

- A local maximum of 850 hPa vorticity is located
- The closest minimum of sea level pressure is defined as the centre of the storm
- Detection of a warm core above the centre of the storms

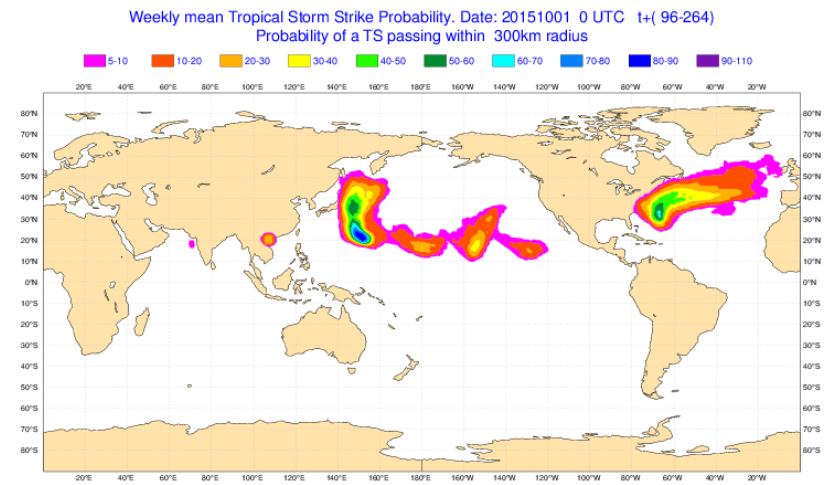
Step 2: Connect the vortices into tracks:

- The steering wind is used to compute a first guess.
- maximum wind velocity at 10m should exceed 17 m/s. Criteria are resolution dependent.

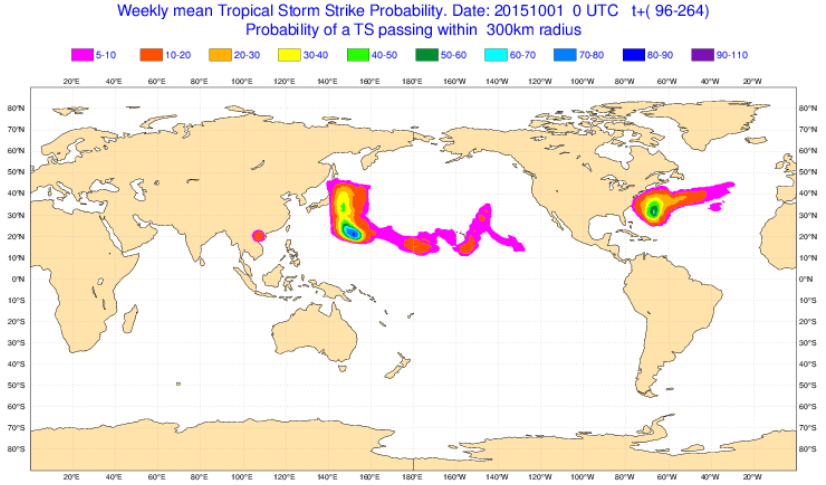
Can we track tropical cyclones in S2S data?

S2S Data is just 24 hourly with a 1.5 degree resolution only

ECMWF Operations
(50 km/6-hourly)

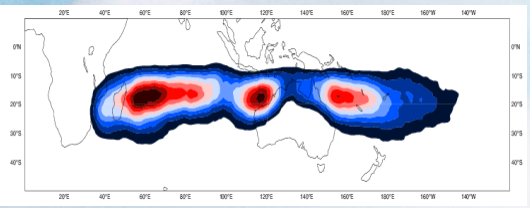


ECMWF S2S
(150 km/24-hourly)

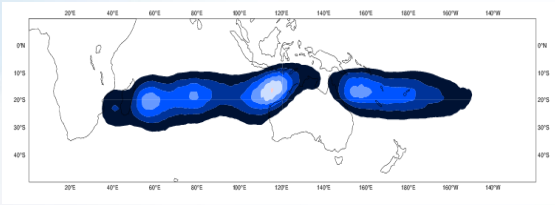


Tropical Cyclone Climatology Density: Jan-May 1999-2010

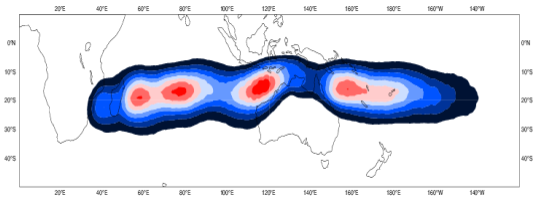
Observations (35 knots)



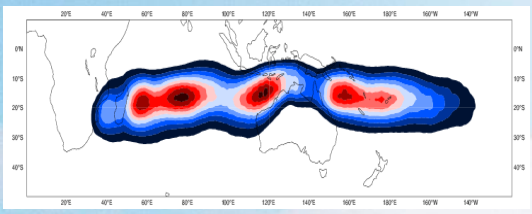
NCEP (35 knots)



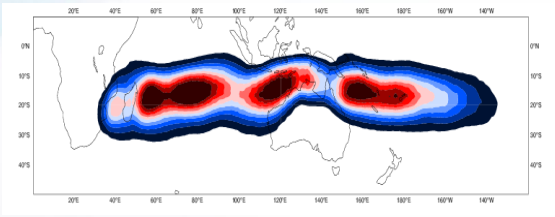
NCEP (30 knots)



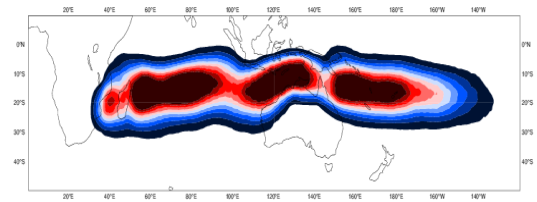
NCEP (28 knots)



NCEP (25 knots)



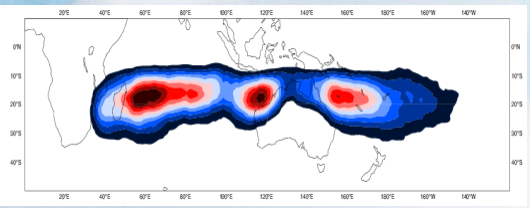
NCEP (20 knots)



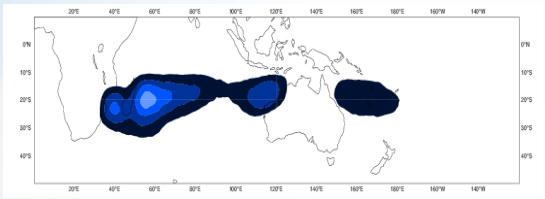
< 10 | 10.. 15 | 15.. 20 | 20.. 25 | 25.. 30 | 30.. 35 | 35.. 40 | 40.. 45 | 45.. 50 | > 50

Tropical Cyclone Climatology Density: Jan-May

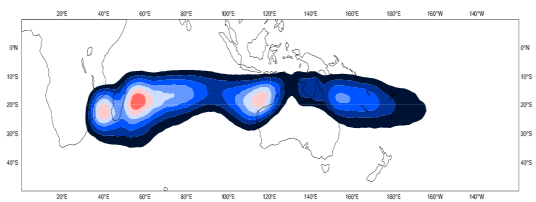
Observations (35 knots)



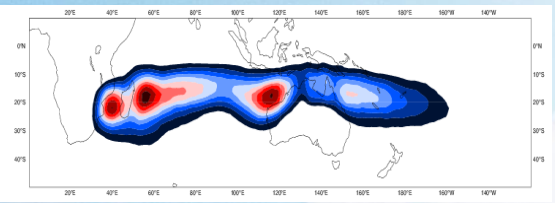
ECMWF (35 knots)



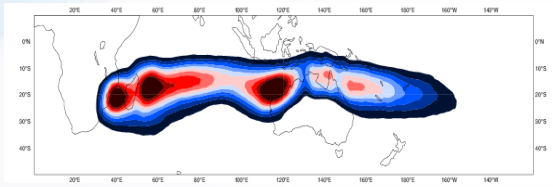
ECMWF (30 knots)



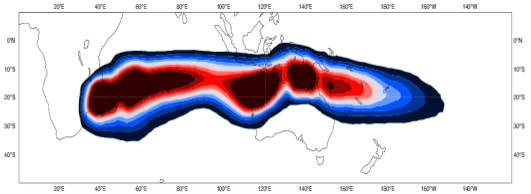
ECMWF (27 knots)



ECMWF (25 knots)



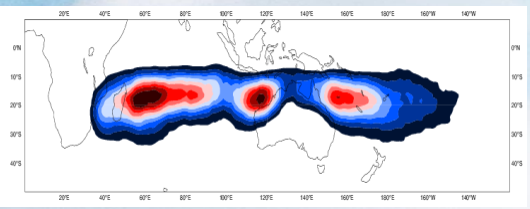
ECMWF (20 knots)



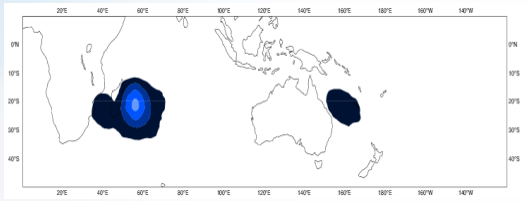
< 10 | 10.. 15 | 15.. 20 | 20.. 25 | 25.. 30 | 30.. 35 | 35.. 40 | 40.. 45 | 45.. 50 | > 50

Tropical Cyclone Climatology Density: Jan-May

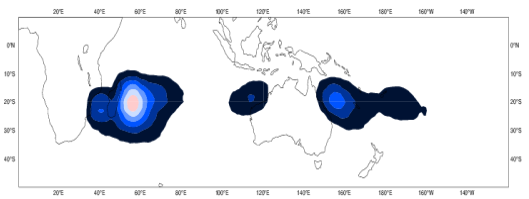
Observations (35 knots)



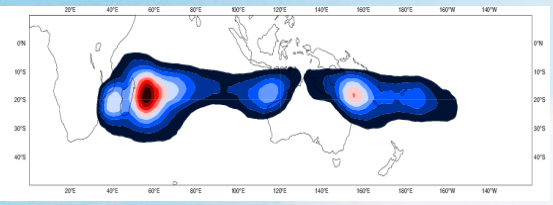
JMA (35 knots)



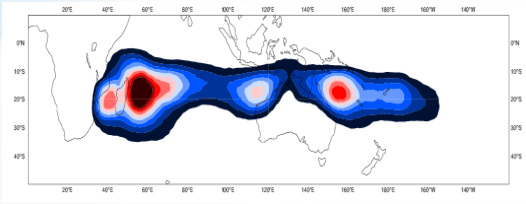
JMA (30 knots)



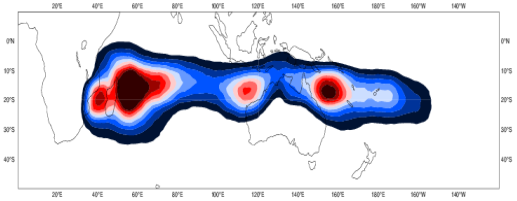
JMA (25 knots)



JMA (23 knots)



JMA (21 knots)



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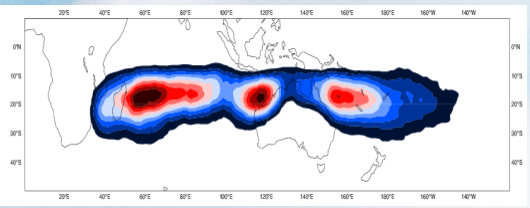
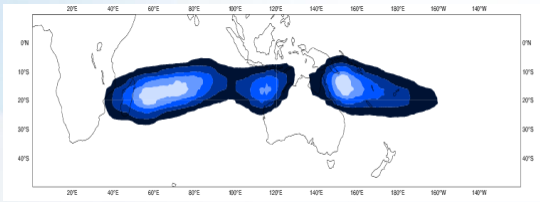
Tropical Cyclone Climatology Density: Jan-May

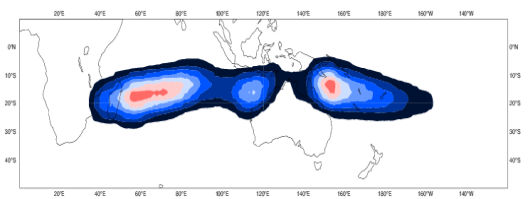
Observations (35 knots)



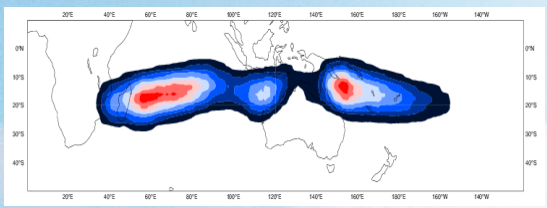
BoM (35 knots)



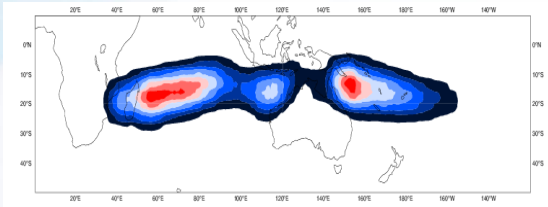
BoM (30 knots)



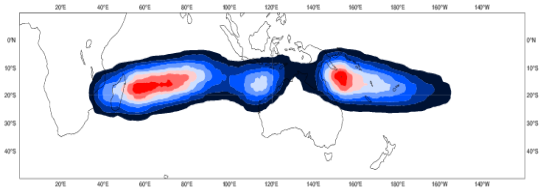
BoM (25 knots)



BoM (23 knots)



BoM (20 knots)



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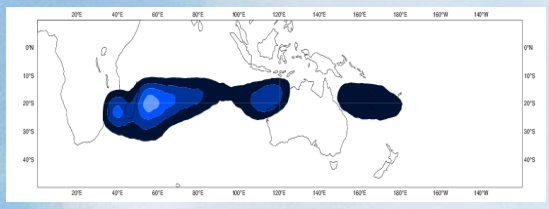
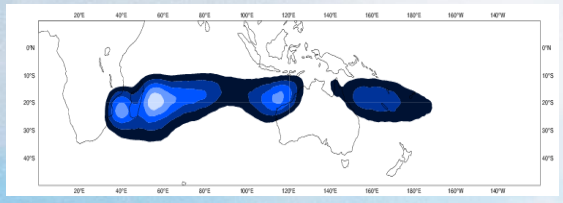
Impact of the model's output resolution - ECMWF

S2S GRID
(1.5 degree resolution)

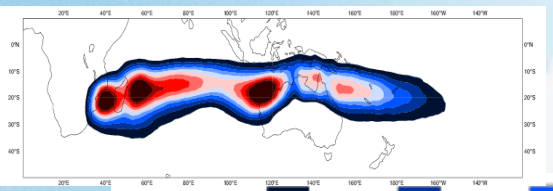
S2S (35 knots)



S2S (33 knots)

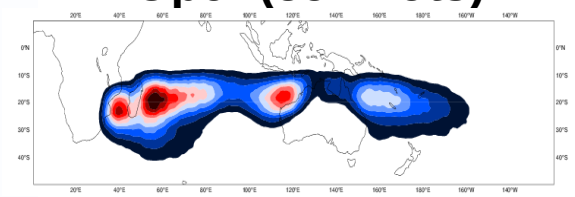


S2S (25 knots)

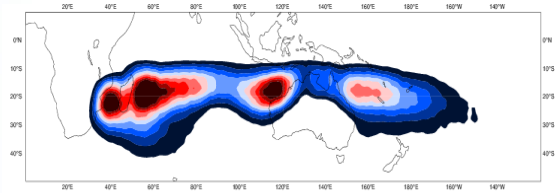


Original GRID
(about 0.5 degree)

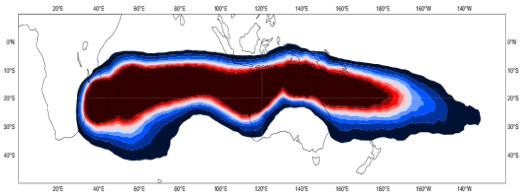
Oper (35 knots)



Oper (33 knots)

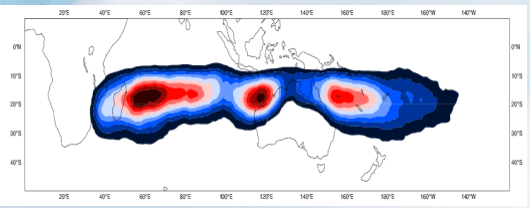


Oper (25 knots)

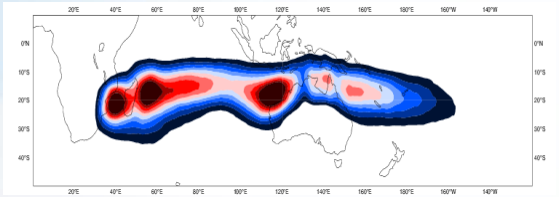


Tropical Cyclone Climatology Density: Jan-May

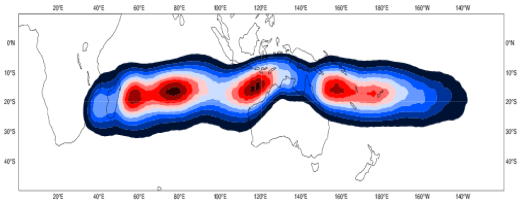
Observations (35 knots)



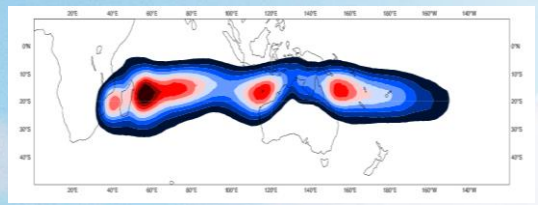
ECMWF (25 knots)



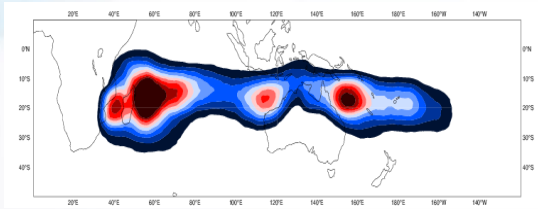
NCEP (28 knots)



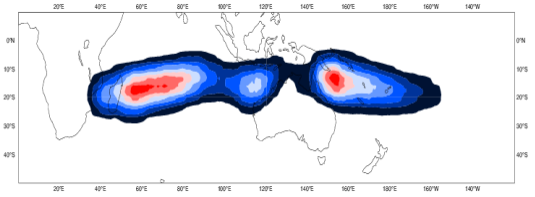
Multi



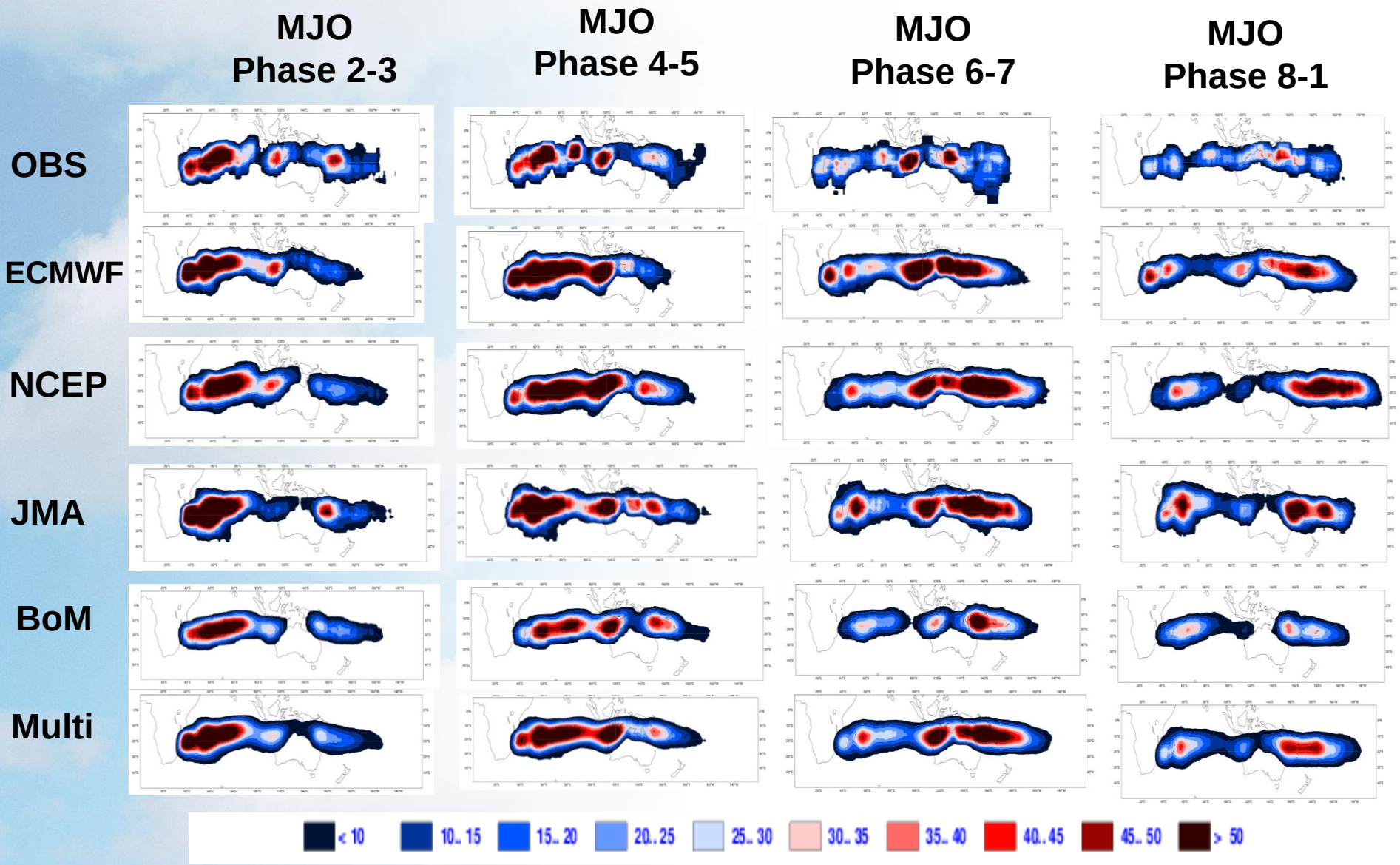
JMA (21 knots)



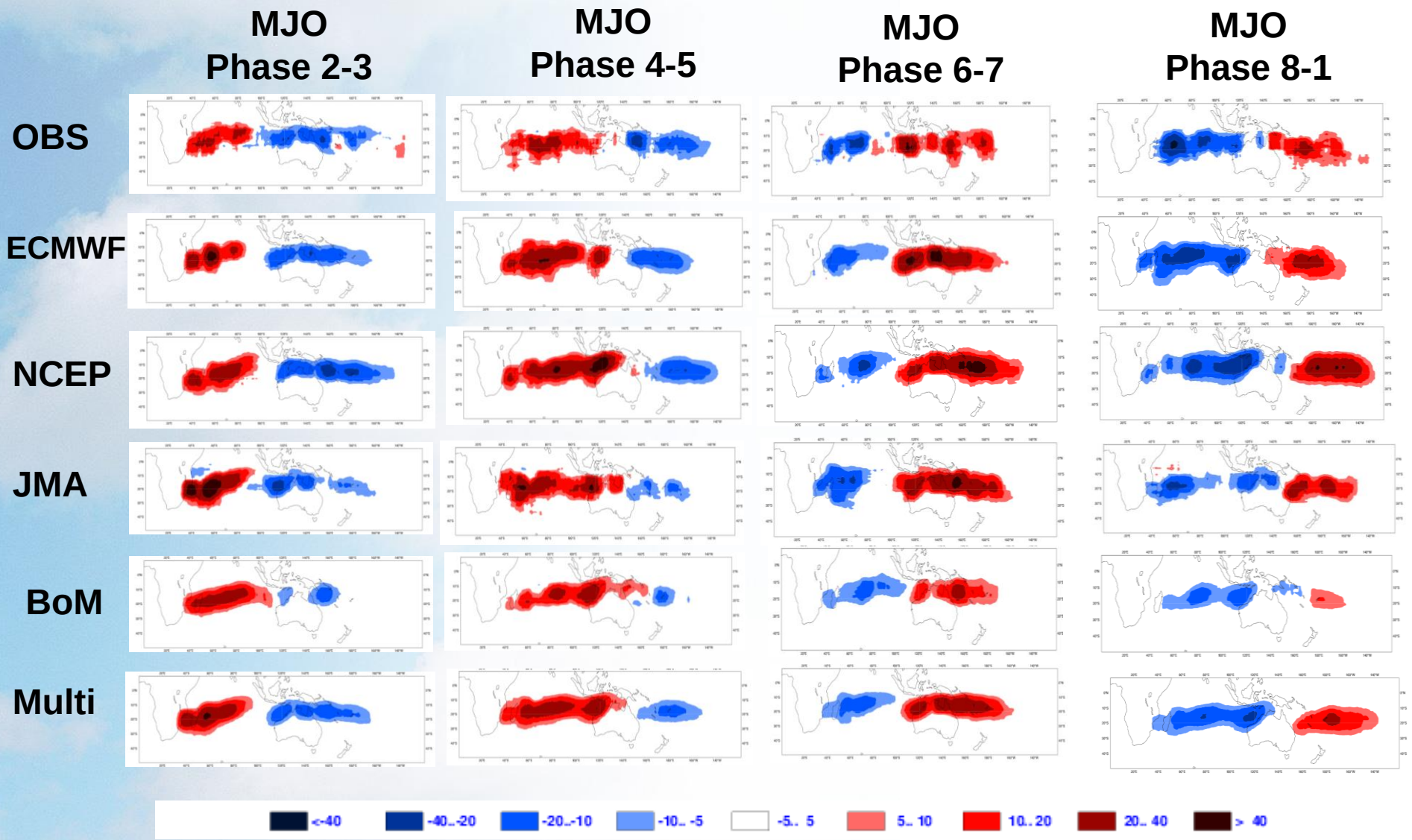
BoM (25 knots)



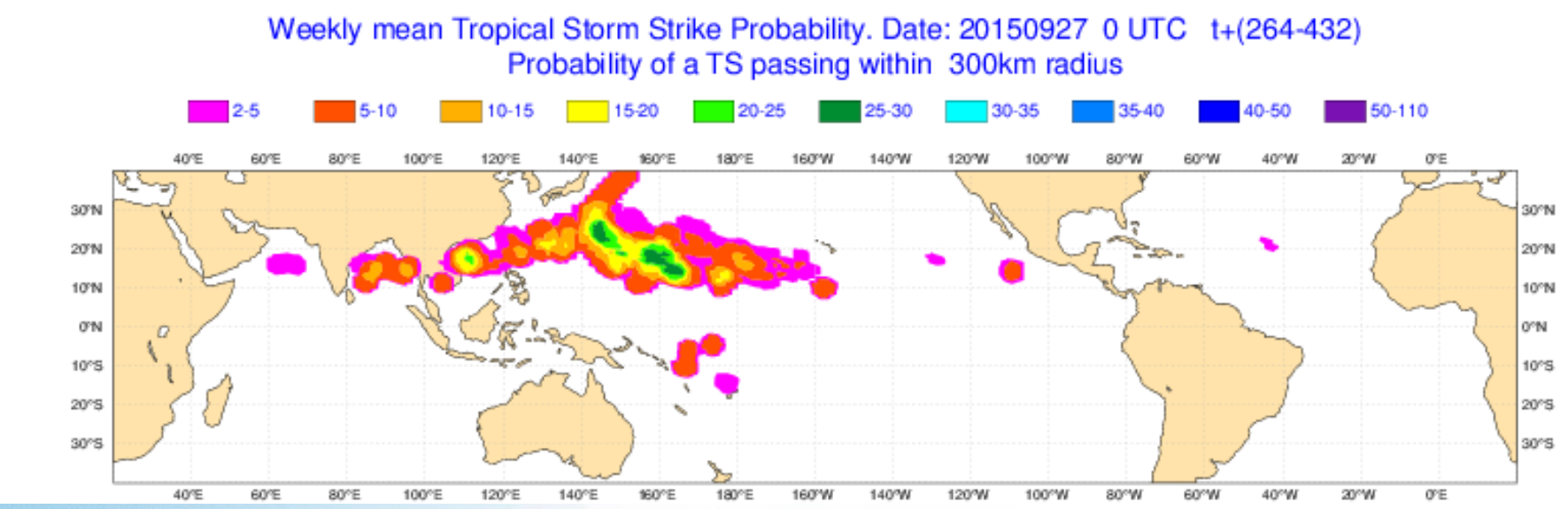
Tropical Cyclone Density



Tropical Cyclone Density Anomaly



Tropical cyclone forecasts are produced routinely using S2S data



Next stages

- **Modulation of TC activity by MJO over the NH**
- **Modulation of TC activity by ENSO**
- **TS skill verification**