NOAA CTB Outstanding Operational Forecast Challenges

(http://www.nws.noaa.gov/ost/CTB/openpb.htm)

Geographical separation of seasonal prediction skill between statistical tool and dynamical model

Statistical tool: Constructed Analog (CA) (van den Dool 1992, 2007)

1) Data: HAD SST (45°S-45°N, 1948-1980)
2) Ensemble size: 24 members (1-4 seasons data in ICs, 6 EOF cutoffs (35, 40, 45, 50, 55, 60)

Dynamical model: North American Multi-Model Ensemble (NMME) (Kirtman *et al.* 2014)

Initial condition (IC) season: MAM, JJA, SON, DJF

Forecast lead-time: 1 and 5 months

Skill metrics: Anomaly Correlation (AC)

Assessment time period: CA ~ 1981-2015; NMME ~ 1981-2010

Verification data: NOAA-OI-v2 SST

Puzzle: It was found distinct geographical separation of seasonal prediction skill with decent skill shown over the tropical western Pacific and Indian Ocean by CA and that over the tropical central-eastern Pacific by NMME (*e.g.* Fig. 1). A summary of all cases (varied initial seasons and lead times) is given by Table 1.

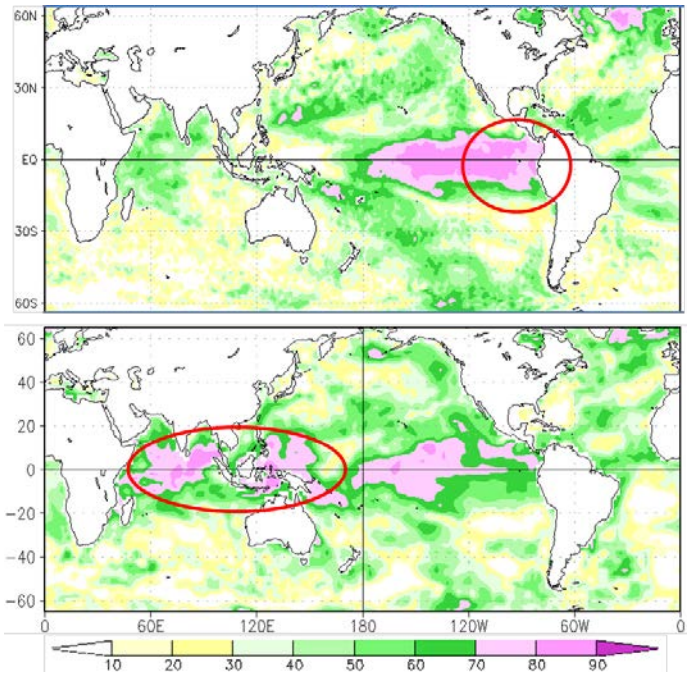

Fig.1 Anomaly correlation skill (%) of 5-month lead NDJ SST forecast (ICs through MAM) by NMME (top) and CA (bottom).

Challenges: The Constructed Analog (CA), a statistical tool, clearly revealed appreciable predictability over the tropical western Pacific and Indian Ocean, where dynamical models had little skill; pointing to possibly missing of important process(es) common to dynamical models, whose development efforts more focused on improving ENSO forecast historically.

IC season & Lead	Indian Ocean	Western Pacific	Central Pacific	Eastern Pacific	Atlantic
MAM, L1	CA	CA		NMME	CA
MAM, L5	CA	CA		NMME	
JJA, L1	CA	CA		NMME	
JJA, L5	CA	CA			CA
SON, L1	CA	CA			
SON, L5	CA	CA	NMME		NMME
DJF, L1	CA	CA		NMME	NMME
DJF, L5	CA	CA	NMME	NMME	CA

Table 1 Geographical skill comparison between CA and NMME in predicting tropical ocean basin SSTs with varied IC seasons and lead-times.

References

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