



**METEOROLOGICAL
SERVICE
SINGAPORE**
Centre for Climate Research Singapore

Southeast Asia Climate Outlook Forum (ASEANCOF)

Raizan Rahmat

Centre for Climate Research Singapore

First WMO Workshop on
Operational Climate Prediction, Pune

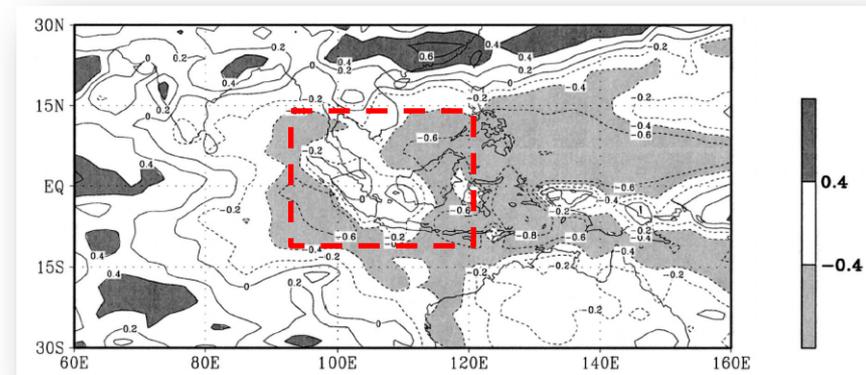
9 – 11 Nov 2015

Southeast Asia & Our Challenges

- Geography consists of:
 - Mainland Southeast Asia & Maritime Continent
 - Complex terrain of islands and mountains, interspersed among the sea causes significant local-scale weather/climate variations
- Complex variations largest during the **DJF season**, where relationship between ENSO and rainfall is weakest:
 - Complicated by wind and monsoon surges, Borneo vortex, & the MJO
 - Red box (right): region of low correlation
- Further study required to understand the causes of **limits to predictability & skill**.



Image credit: Google Map

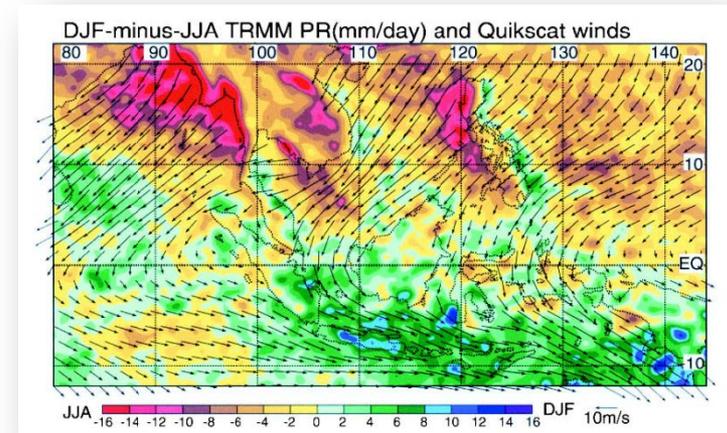


Correlation between Nino3 and CMAP rainfall for DJF
Chang et al. (2004)

Monsoons & prediction potential

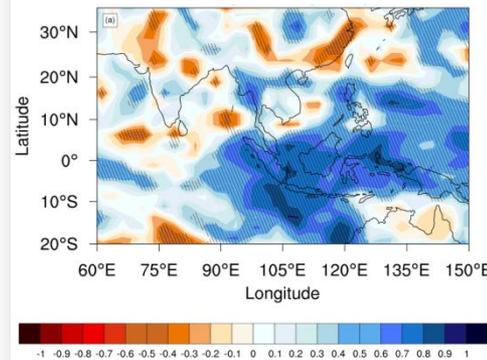
- 2 seasons of interest:
Southwest Monsoon (~JJA)
and Northeast Monsoon (~DJF)
- Significant part of **skill** in seasonal forecasting models is rooted in ENSO
- Larger skill areas are in the **Maritime Continent**, where effects of ENSO through Walker Circulation and ocean-atmosphere feedback are well-known

Monsoonal rainfall (DJF – JJA)

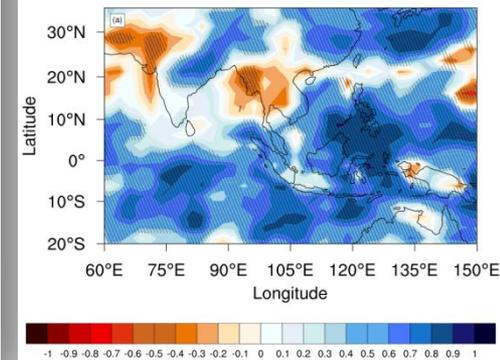


Chang et al. (2005a)

Pearson corr (Nino3.4 & rainfall)
(JJA, 1996-2008)

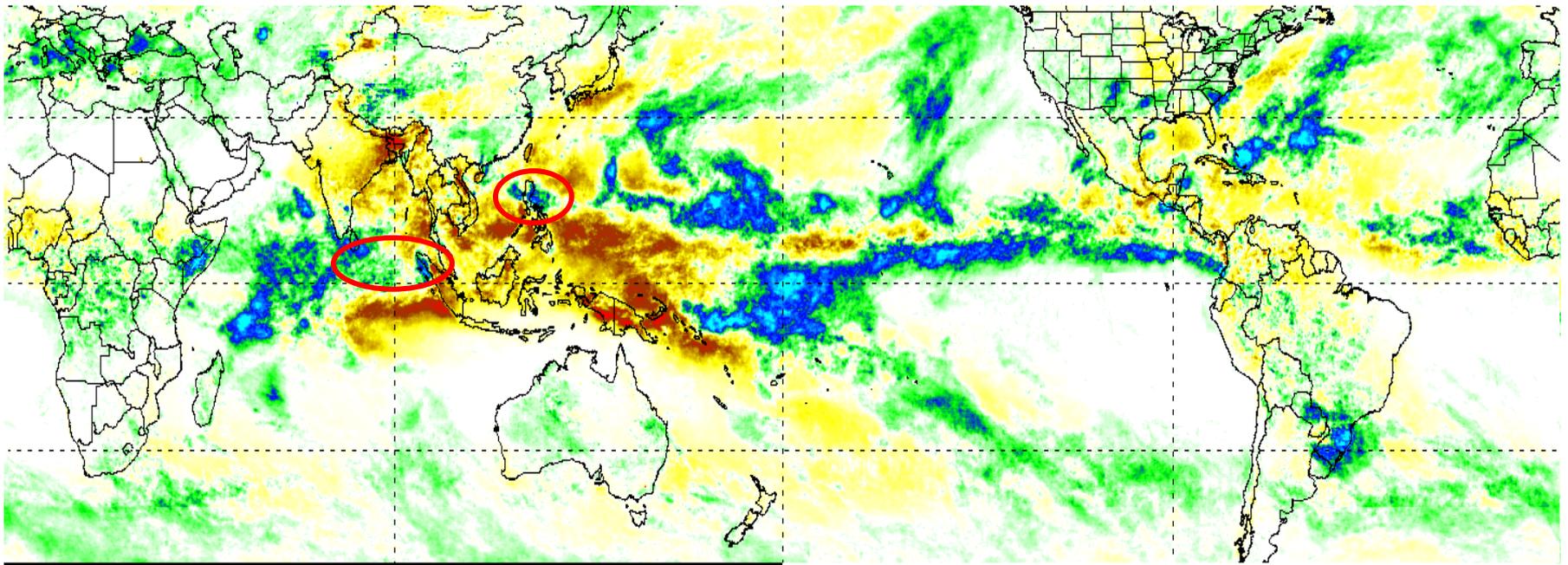


Pearson corr (Nino3.4 & rainfall)
(DJF, 1996-2008)



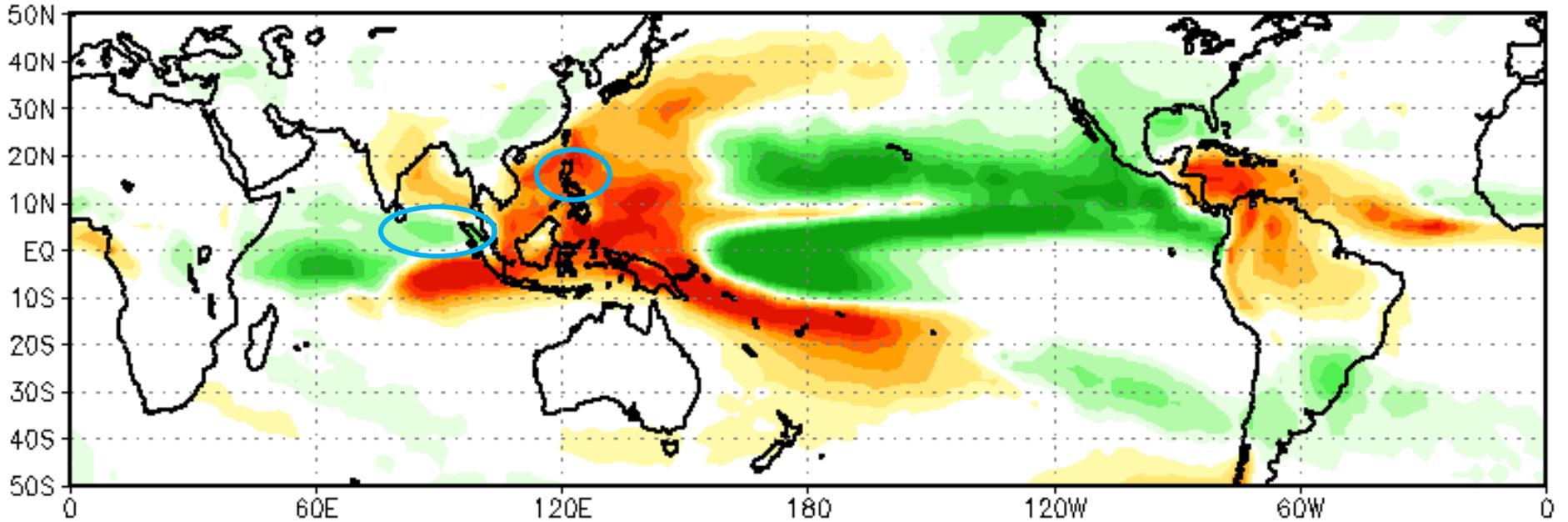
Lee, Shao Yi

(also refer to Wang et al., 2009 for similar assessments)



28 OCT 2015 Rainfall Anomalies For last 30 Days (mm/d)

15	10	5	0	5	10	15
----	----	---	---	---	----	----

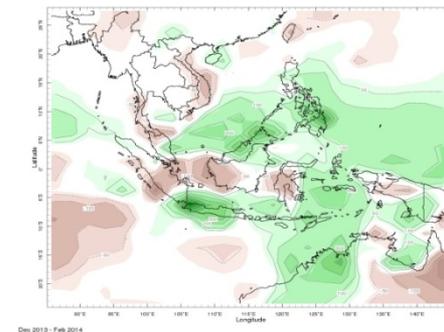
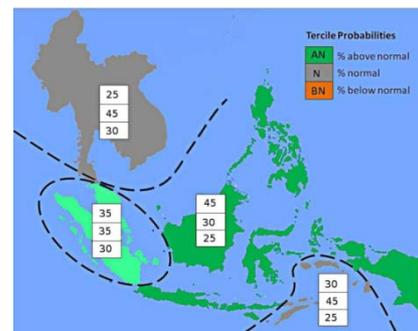


Inaugural ASEANCOF session

- **3-5 Dec 2013**, Singapore
- WMO- and USAID-funded, and supported by ASEAN
- Participants: regional Nat'l Met and Hydro Agencies (NMHSs), WMO reps, GPCs reps, APCC.
- To be held ahead of the:
 - NE Monsoon (~Nov)
 - SW Monsoon (~May)
- Aim: “... **collaboratively developed and consensus-based** seasonal climate outlooks and related information on a **regional scale**.”



e.g. DJF 2013-2014 precipitation outlook & anomaly



Dec 2013 - Feb 2014

ASEANCOF Meeting Format

Session	E.g. Nov 2015
Opening science/capability presentation	Sub- Seasonal and Seasonal Forecasts for drought applications (Andrew Robertson, IRI)
Presentations from GPCs - setting the scene by global centres	ECMWF, NCEP, JMA, KMA, CMA, IRI, BoM, WMO-LC LRFMME, APCC
Update and forecast from each ASEAN NMS	All ASEAN countries
First draft forecast produced from all inputs	
The FORECAST FORUM (review last ASEANCOF consensus) Coming to a consensus forecast Bring together the GPC forecasts with the local forecast	
End-user presentations	Regional drought and disaster management community
Discussion	

The ASEANCOF Journey (so far...)

- ASEANCOF-1: Science, GPC and NMS representation. **No users, no training.**
- ASEANCOF-2: Skype **videoconference** ahead of 2014 SW Monsoon.
- ASEANCOF-3: Held in MSS, Singapore, November 2014 and included **user participation** (water management sector). **One day training session** led by international expert (Richard Graham, UKMO).
- ASEANCOF-4: Held in **BMKG, Indonesia**, May 2015. Ahead of SW monsoon season. Combined with **NOAA-USAID, 7ITWCVP** training session.
- ASEANCOF-5: Will be held at MSS, Singapore in November 2015. **Strong user participation, drought and disaster management.** Training session will focus on *sub-seasonal and seasonal applications to drought* (Andrew Robertson, IRI: co-chair of WMO S2S Steering Group)



ASEANCOF-3



Training Session

Forum Learning Points

- Valuable to **bring together** GPCs with regional seasonal forecasters – the information producers, forecasters and end users.
 - Can help to develop **best practice**.
 - There is a lot of good information available from the GPCs. The WMO-LC is a very **good resource**.
 - Forecast **skill** matters – provision of skill maps on WMOLC useful
- “Help! What to do with all this information?” → Training.
- Forum process can give **greater confidence** to forecasts at national level.
- If possible, needs a **consistency of people** to build a community.

ASEAN Region Questionnaire

- Acknowledgements to Dr Richard Graham (UKMO) and the UK's Department for International Development (DFID) for permission to use this.
- Title: “Priority needs for dynamical-model climate prediction: questionnaire for suppliers of climate forecast services”
- Sent to all ASEAN National Met Services.

Results

- **Statistical and dynamical** methods are widely used for LRF.
- Boreal **winter (NE) and summer (SW)** monsoon seasons are of greatest interest, although **season length of interest** varies.
- About half use **GPC outputs as basis** for their forecast.
- For tropical cyclones, statistical and dynamical models widely used. If skilful, better products on tracks would be useful.
- Definite requirement for additional information on:
 - ✓ Monsoon onset and cessation timing
 - ✓ Rainy season duration
 - ✓ Frequency of dry spells
 - ✓ Frequency of extremes (e.g. daily rainfall)

Recommendations – discussed at ASEANCOF

Making more of what already exists

Review methodologies and share experience:

- Downscaling and producing greater spatial detail in the forecast
- Skill information available on the WMO-LC and guidance on how to use it
- Availability of one-month means and advice on use
- Access to monthly forecast products (relates to S2S)
- Review products currently available for tropical storm numbers, density and energy and suggest enhancements.

Recommendations cont.

Developing new products

1. Investigate the capability of the GPC modelling systems to produce skillful forecasts of **monsoon onset, rainy season length, risk of extended dry spells and daily extremes**. Some of this has been done in other areas of the world.
2. Relate the GCM based onset (and other) definitions to the variety of in-country definitions, and investigate more precise indication of **onset timing 2-3 weeks ahead** of onset on an experimental basis.
3. Investigate skill of diagnostics from GPC **tropical wind forecasts** in the Southeast Asia region.

Sub-seasonal to Seasonal (S2S)

The screenshot displays the S2S Prediction Project website. At the top, the logo features a stylized 'S2S' with a circular arrow and the text 'Sub-seasonal to Seasonal Prediction Project'. A navigation menu includes 'About S2S', 'News', 'Documents', 'Sub-projects', 'Database', 'Meetings', 'People', and 'Links'. The main content area is dominated by a large banner with a background image of a flooded landscape. The banner text reads: 'Reforecast data are now available at the ECMWF S2S Data Portal' followed by the URL 'http://apps.ecmwf.int/datasets/data/s2s/'. To the right of the banner, there is a 'News' section with two items: 'Advanced School and Workshop on S2S Prediction and Application to Drought Prediction, 23 November to 4 December 2015, ICTP, Trieste, Italy' and 'ECMWF Workshop on Sub-seasonal Predictability, 2-5 November 2015, ECMWF'. Below this is the 'S2S Database' section, which includes buttons for 'ECMWF' and 'CMA'. It contains two news items: 'S2S re-forecast data portal at ECMWF is now available!' (updated 2015-10-21 08:40) and 'Now 7 Centres data available at ECMWF Data Portal' (with the URL 'http://apps.ecmwf.int/datasets/data/s2' and updated 2015-07-09 08:04). At the bottom of the website, there are buttons for 'S2S News', 'News Letter', and 'FAQs', and a 'Tweets' section with a 'Follow' button. The bottom of the image shows a Windows taskbar with icons for Internet Explorer, File Explorer, VLC, Skype, and PowerPoint, and a system tray showing the time as 2:51 on 10/21/15.

In the region:

- 1) Evaluation of skill and usefulness of forecasts.
- 2) Real-time forecasts.

Recurring questions

- **Can the ASEANCOF group adopt towards using more similar approaches/techniques (e.g. same set of ‘best’ models for the region, similar statistical technique) in coming up with preliminary forecast?**
 - For the same season, different parts of the region have different considerations (monsoons vs TCs vs local circulations) → different techniques.
- **Can we be more objective in our forecast?**
 - Currently, gaps in our understanding allows for elements of subjectivity/interpretation to creep in



**METEOROLOGICAL
SERVICE
SINGAPORE**

Centre for Climate Research Singapore