

TRAVEL REPORT FORM

출장보고서

결 재	사원	부서장	원장직무 대행	
	10/17 김보라	10/17 문상원	10/17 유진호	
협 조				

I. Travel Overview 출장개요

1. Traveler(s) 출장자

Department 소속	Position 직위(직급)	Name 성명	Note 비고
Climate Services and Research	Research Fellow	Yun-Young Lee	
External Affairs	Senior International Project Manager	Bo Ra Kim	

2. Travel Period 출장기간

○ 10월8일(월) ~ 10월14일(일)

3. Occasion and destination 행사 및 출장지

○ Pacific Islands Climate Outlook Forum

○ Nadi, Fiji

II. Major Activities 주요업무 수행내용

1. Main Contents and Activities 주요내용 및 활동

General

○ Attended the 4th Pacific Islands Climate Outlook Forum (PICOF-4) held in Nadi, Fiji, delivered presentations, served as rapporteur, provided technical advice, and held side meetings/discussions

○ Advocated for the usage of the Pacific Island Countries Advanced Seasonal Outlook (PICASO) forecast system developed by APCC, and other APCC forecast tools and information in the Pacific Islands Met Services as well as in the annual PICOF

Presentations and Hands-On Assistance

○ Collected seasonal outlook information from various climate service providers and

combined them to deliver a seasonal outlook presentation to advise the PICOF regional statement

- Delivered a presentation regarding the verification statistics of PICASO to compete with other forecast competitors in the Pacific
- Provided scientific insight when developing the consensus regional outlook for the Pacific Region, as well as the national climate outlooks produced during the agenda



Dr. Yun-Young Lee delivers the "Seasonal forecast guidance for 2018/19" presentation



Dr. Yun-Young Lee delivers the "Consensus forecast in the Pacific" presentation

Discussions

- Held multiple discussions with the New Zealand National Institute of Water and Atmospheric Research (NIWA), the Pacific Island Climate Services (PICS) Panel, Australian Bureau of Meteorology (BoM), and the Secretariat of the Pacific Regional Environment Programme (SPREP) regarding the use of APCC climate services in the Pacific and how it can be increased
- Pacific Met Officers continue to ask for advice regarding how to develop consensus forecasts utilizing multiple models. The providers discussed the pros and cons of providing this information and ultimately decided to provide insight into how the consensus forecast process could work in the Pacific with the right forecast timing as well as capacity
- Gained information regarding the Pacific Met Officer processes when developing seasonal forecasts and which models they are currently utilizing
- There were further discussions regarding the low skills in PICASO for Funafuti, Suva, and Rarotonga stations. APCC provided the met officers with information regarding our future plans to update PICASO and were met with positive response
- NIWA has obtained funding for machine learning downscaled seasonal forecasts for New Zealand and would like to collaborate with APCC in regards to access to data and technical lessons learned, and discuss potential collaborations after this project.

-
- The PICS Panel would like to produce a report regarding consensus forecasts and the pros and cons of generating seasonal outlooks earlier and later in the month and would like APCC to be involved in the writing
 - NIWA would like APCC to write a short insert into their newsletter regarding PICASO and its verification statistics based on the presentation delivered during the PICO4-4

Other Information

- United Kingdom Met Office (UKMO) has obtained funding to conduct a project in the Pacific regarding generating climate projections for the Pacific. The project is slated to be completed in two years and are still trying to decide what the final outputs will be

2. Relevance to APEC Climate Center's Activities 결론 및 소감

- As PICASO is an output of APCC's previous project, it is important to increase awareness of the tool and provide technical expertise so that this tool is widely utilized in the region.

3. Suggestions and Remarks 건의사항

- The PICS Panel chair informally asked APCC to join the PICS Panel. If the official endorsed invitation to join comes to APCC, APCC should consider joining the Panel so that they can formally include APCC forecast tools in the standard operating procedures of producing climate forecasts in the Pacific.

III. References (Presented and Collected Materials) 주요 수집자료

(with attachment of any information or report in case of attendance of conferences, workshops and meetings) 학술대회, 워크숍, 회의 등 참석 시 관련 정보 및 문서 첨부

1. Seasonal forecast guidance for 2018/19 (presentation)
2. Consensus forecast in the Pacific (presentation)

AP 3/15/1

24 August 2018

To: Ms Bo Ra
Senior International Project Manager
External Affairs Department, APEC Climate Center
12 Centum 7-ro, Haeundae-gu, Busan
Republic of Korea

Dear Ms Bo Ra:

Invitation to UKMO Workshop (9th October), the Pacific Islands Climate Outlook Forum (PICOF) Technical Training from 10-12 October 2018 & Social Media Training on 15 - 16 October 2018 to be held at Tanoa International Hotel, Nadi Fiji.

I have the pleasure on behalf of the Secretariat of Pacific Regional Environment Programme (SPREP), World Meteorological Organization (WMO), United Nations Development Partner (UNDP) and our partners to invite you to attend the Pacific Islands Climate Outlook Forum (PICOF) technical training being organized for the region. PICOF technical training is being co-organized and co-supported by SPREP, UNDP, PICS Panel of the PMC and other partners.

The technical training this year will bring together national, regional and international experts relevant to climate services, with a special focus on how we can improve our Regional Climate Centre (RCC) and seasonal forecasting.

The objectives of the training are (a) to bring together national, regional and international experts in climate service provision and applications in climate forecasting; (b) to discuss seasonal climate forecast guidance for the Pacific Islands (PI) region (e.g. SCOPIC, ICU, PEAC, APCC); (c) to discuss ways to improve the RCC website; and (d) to co-explore common approaches and best practices for climate services that can be extended throughout the PI Region.

Also in previous PICOFs with sectors, “communication” was highlighted as a key concern. As a response to country requests, SPREP through the Climate and Oceans Support Programme in the Pacific (COSPPac) project will be supporting hands-on media training for climate officers to improve communicating the science without diffusing its importance in 3 areas. These includes 1) Simplifying ENSO concepts to Media; 2) how to communicate the likely impacts of El Nino in each country and 3) using social media to reach the masses.

You are identified as a resource person to facilitate some of the sessions on the Regional Climate Centre and climate prediction coordination in the region as well as contribute to the PICOF. There will be UKMO workshop prior to PICOF training, and a Social Media Training on the 15-16 October.

Due to funding constraints, we are unable to fund your participation to the meeting. If you are able to attend, we request that you register online:

<https://www.pacificmet.net/rcc/picofs/registration> before the 7th of September 2018. For further information you can liaise with the Pacific Meteorological Desk Partnership (PMDP); E-mail: PacMetDesk@sprep.org or Telephone: +685 21929, Fax: +685 20231.

A detailed provisional agenda and other information on logistics will be circulated at a later date before the workshop.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Filomena', followed by a horizontal line.

Filomena Nelson
Officer-in-charge, Climate Change Resilience Programme

PICOF 2018

Outlook presentation, session 2

2018 OND Outlook

ENSO Outlook

South Pacific (APCC)

North Pacific (NOAA)

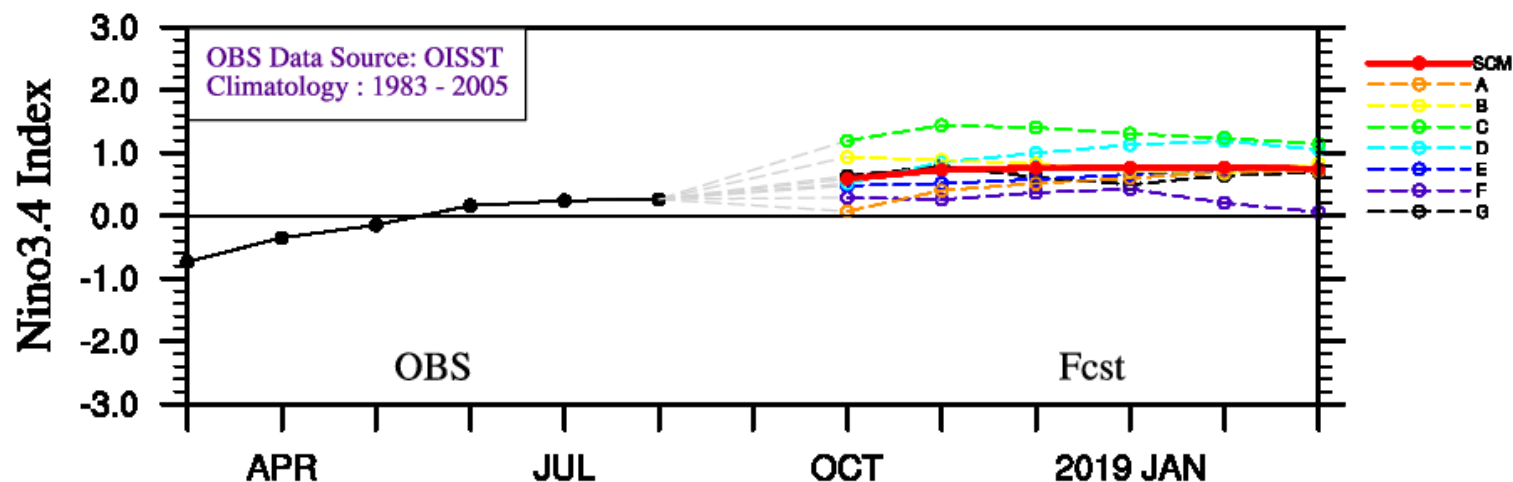
18/19 ENSO Outlook

By APCC

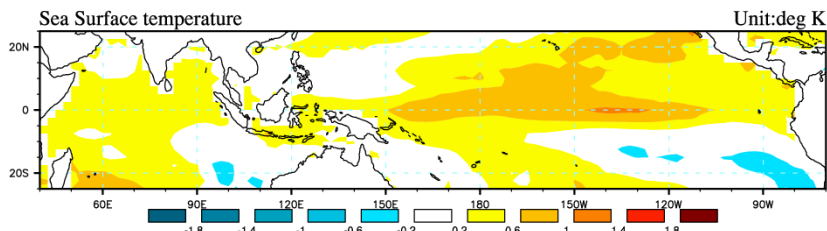
Weak El Niño (CP-type)

Nino3.4 of SCM slightly exceeds 0.8 from October - March.

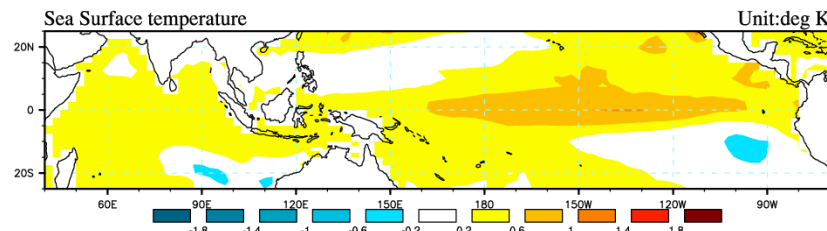
Nino3.4 Index for 2018 ONDJFM



SST Anomaly for OND 2018



SST Anomaly for JFM 2019



18/19 ENSO Outlook

By NOAA (USAPI)

El Niño WATCH

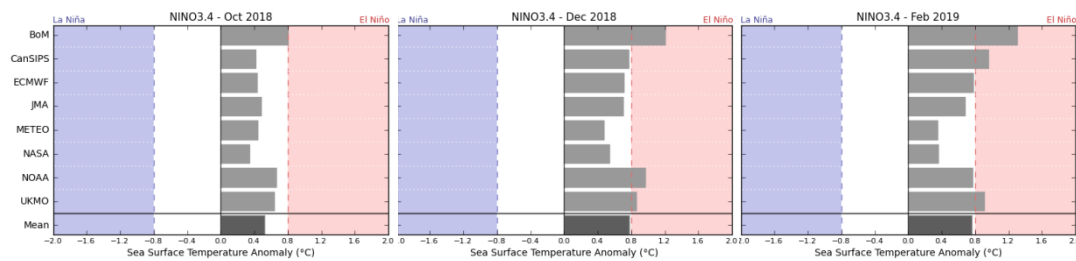
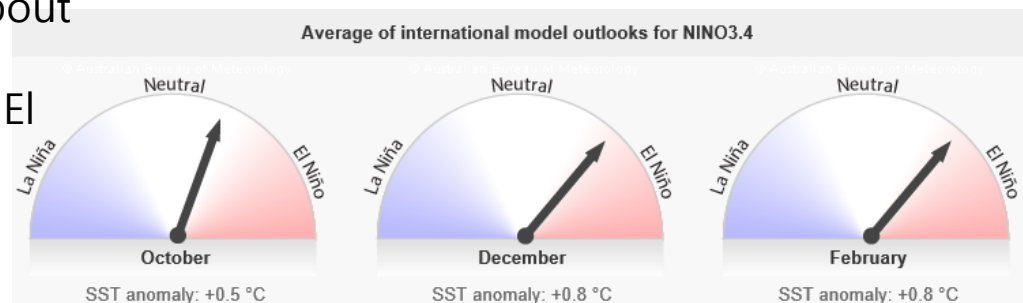
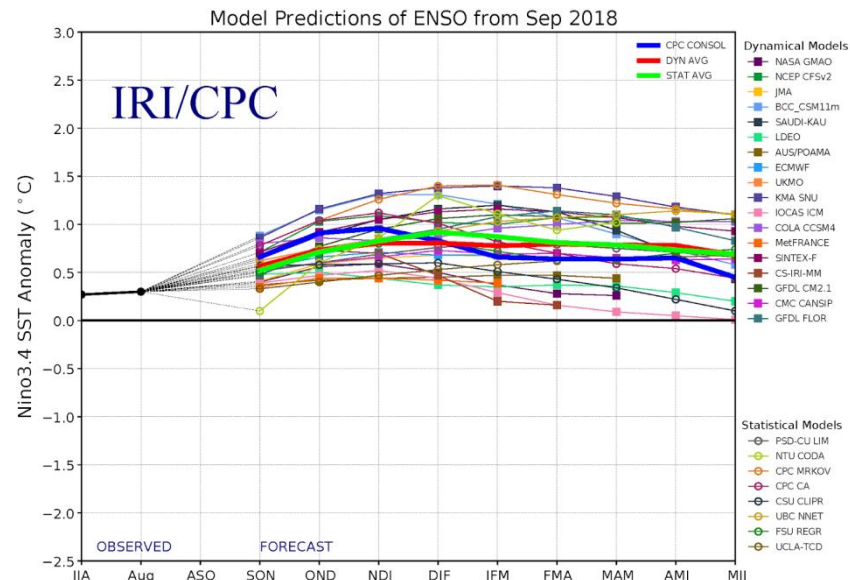
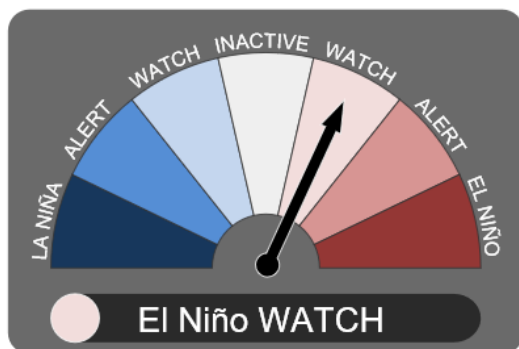
Official consensus probabilities now strongly favor El Niño from November - March.

Probabilities for El Niño peak from NDJ - MAM (>70%) with about a 65% chance prior (SON).

By BOM

El Niño WATCH: approximately a 50% chance of El Niño developing in 2018 (about twice the normal likelihood)

History: for half of El Niño WATCH years, El Niño has developed!

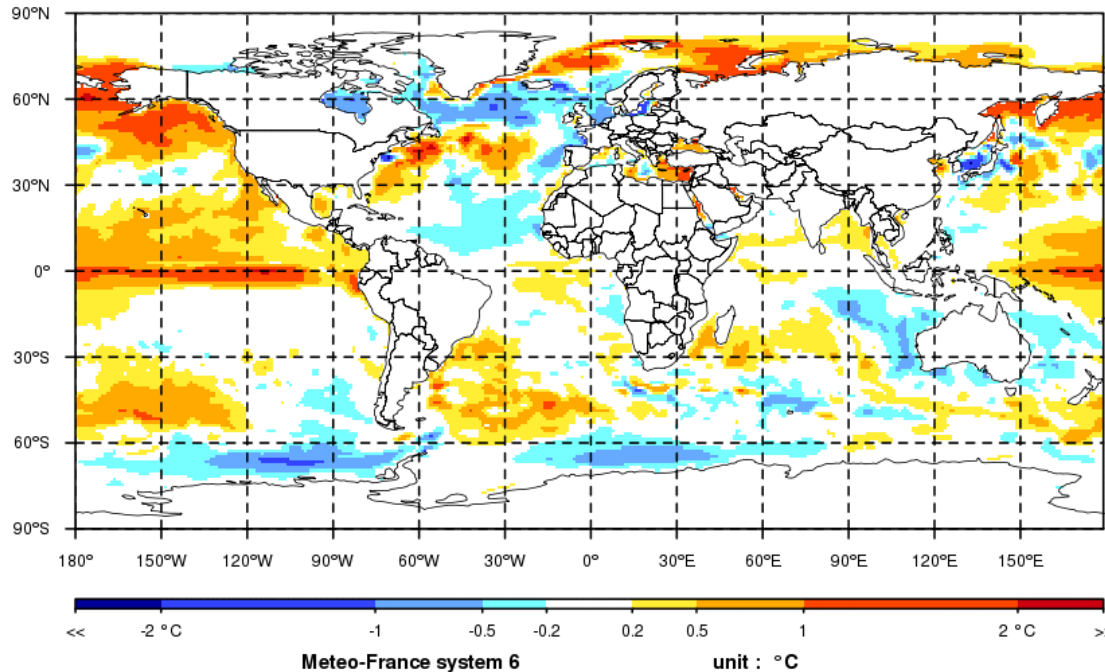


18/19 ENSO Outlook

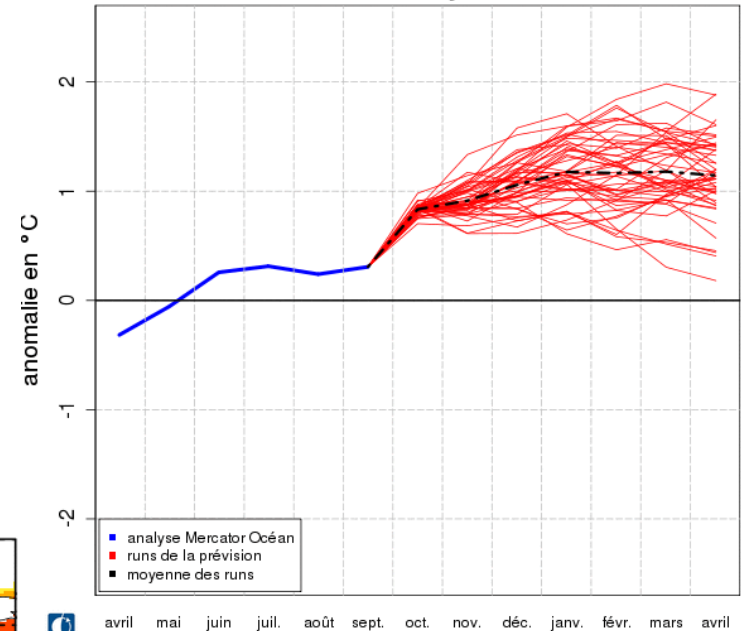
By METEOFRANCE



Prevision d'anomalie trimestrielle de
sea surface temperature
initialisation de octobre 2018 - echeance 0 : OND 2018

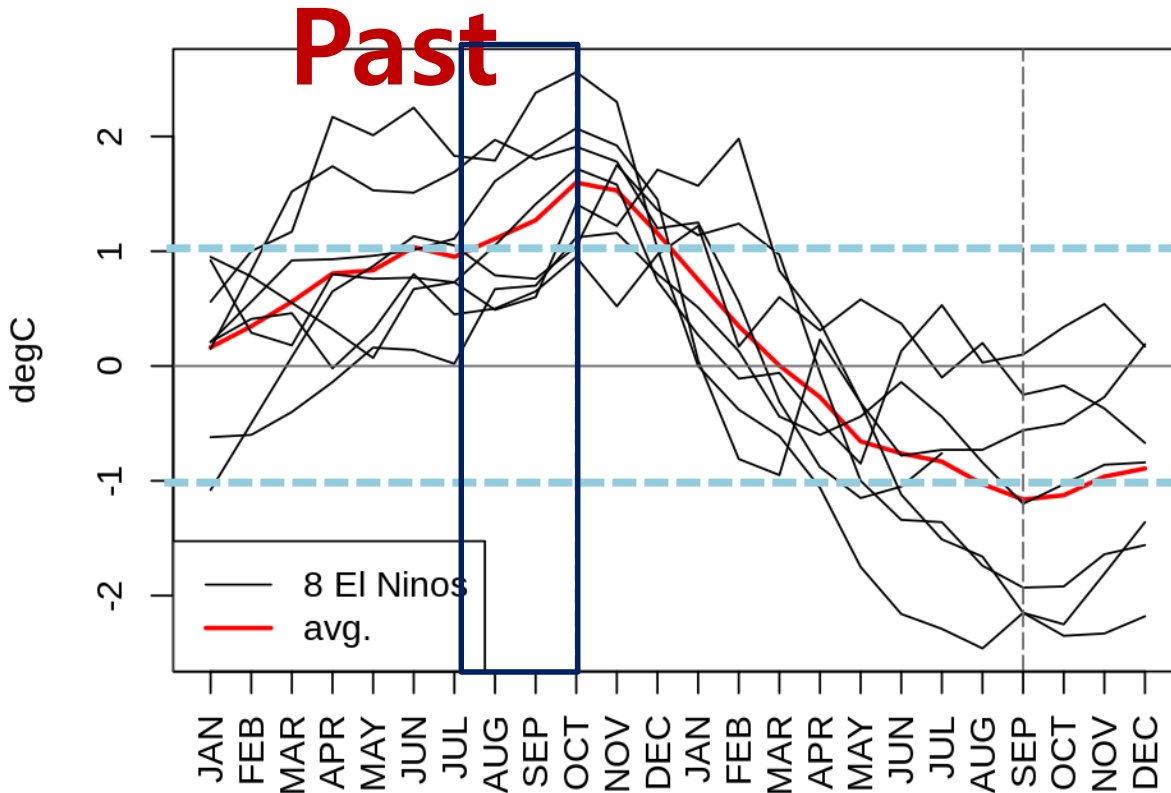


Anomalie moyenne de SST dans la boîte NINO34
Modèle Meteo-France system 6 du 201810

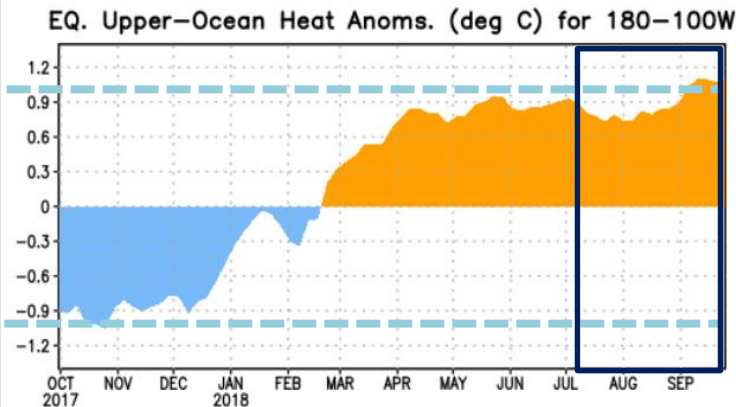


Upper-Ocean Heat Ano. (0-300m)

EQ. Upper-Ocean Heat Anoms. for 180-100W



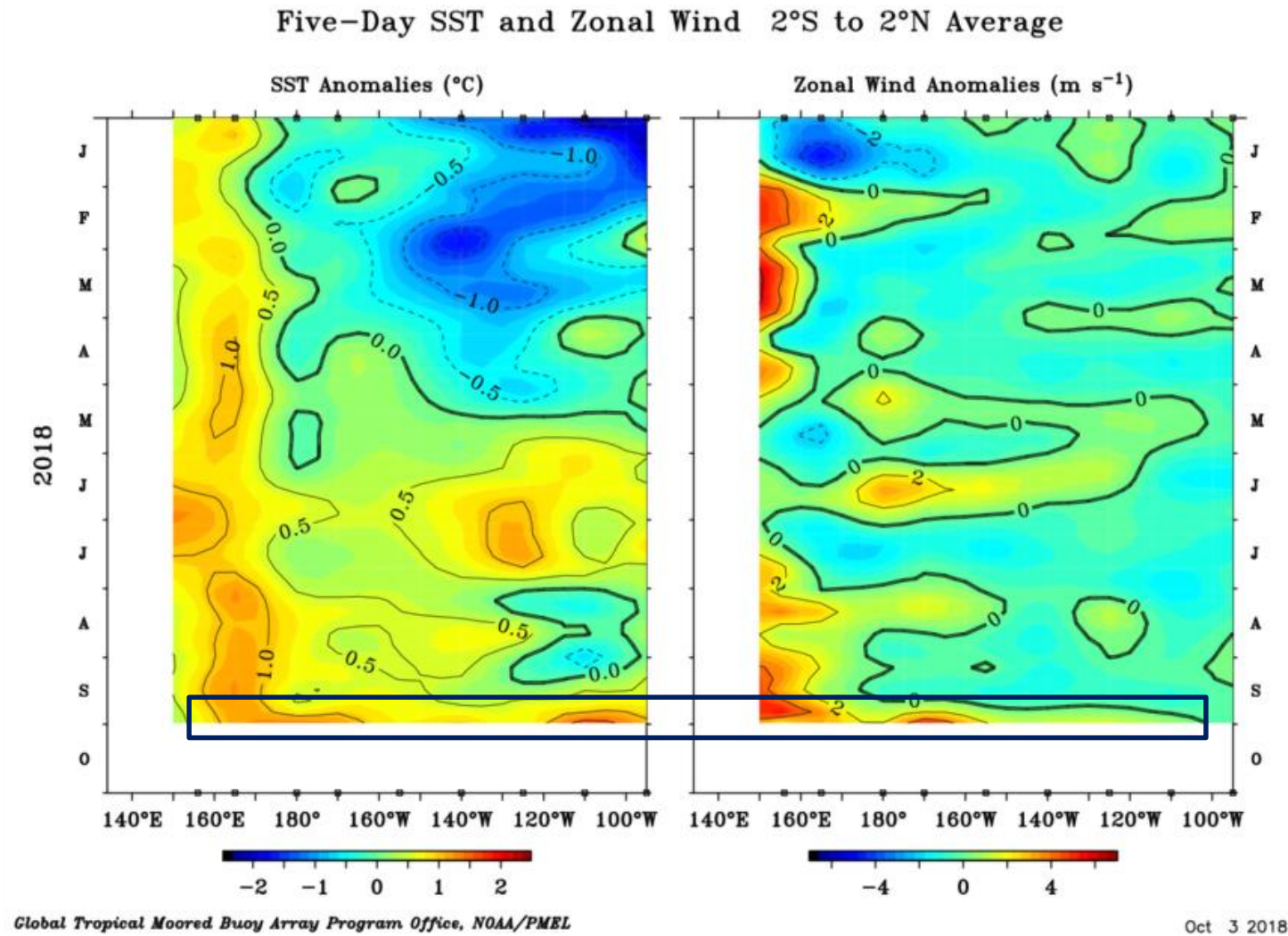
Current



http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf

Weak (CP type) El Nino expected.

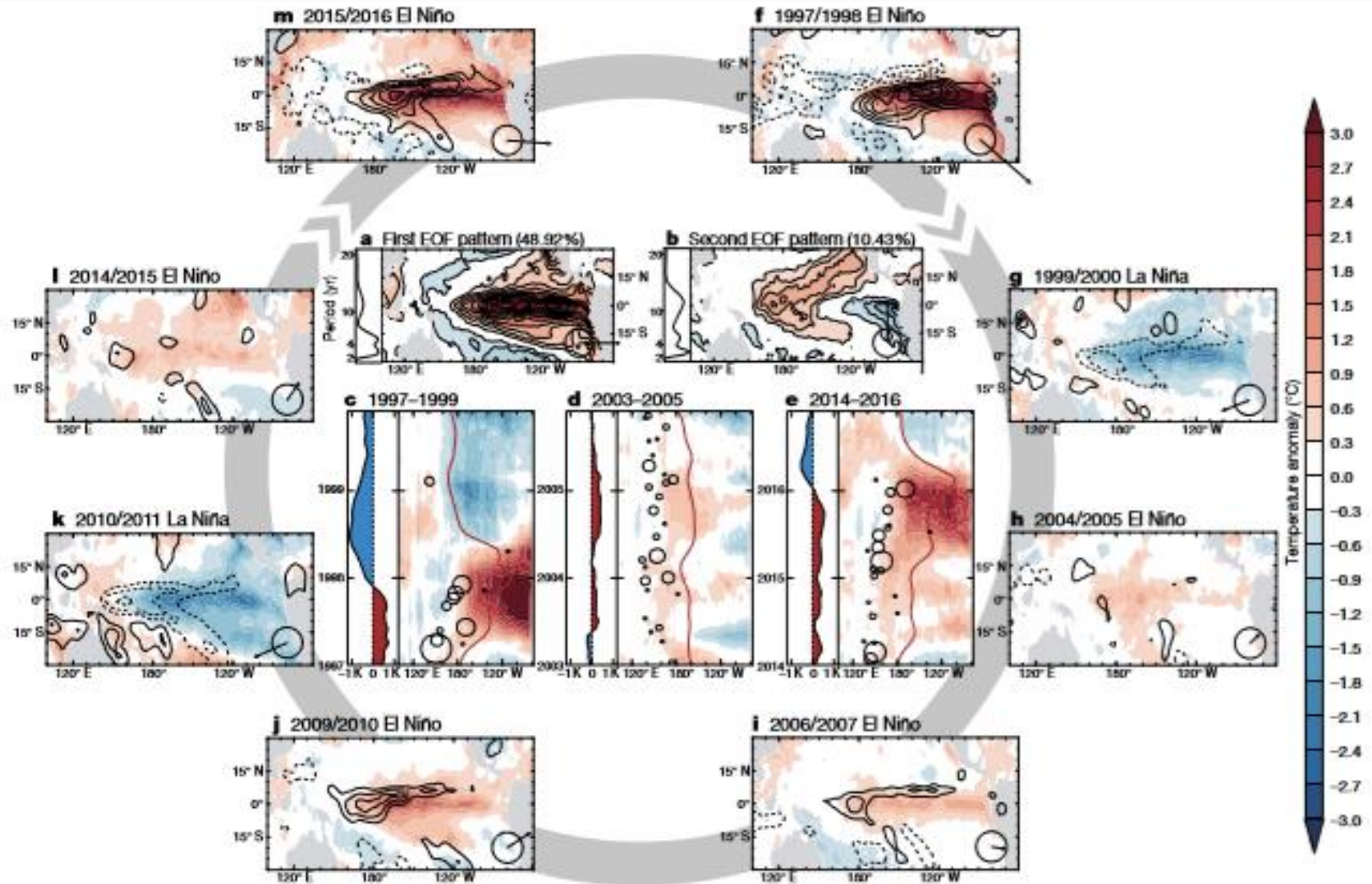
E-Pac. Warming & Westerly burst



Likely to develop to moderate EP/CP El Nino?

ENSO Complexity

In Time & Space



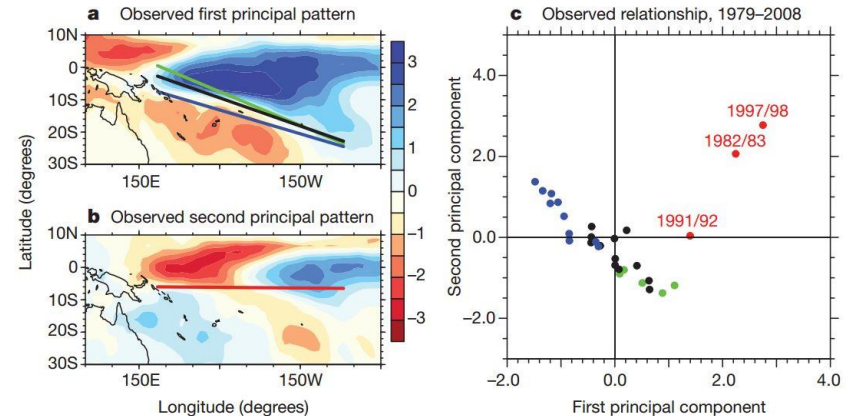
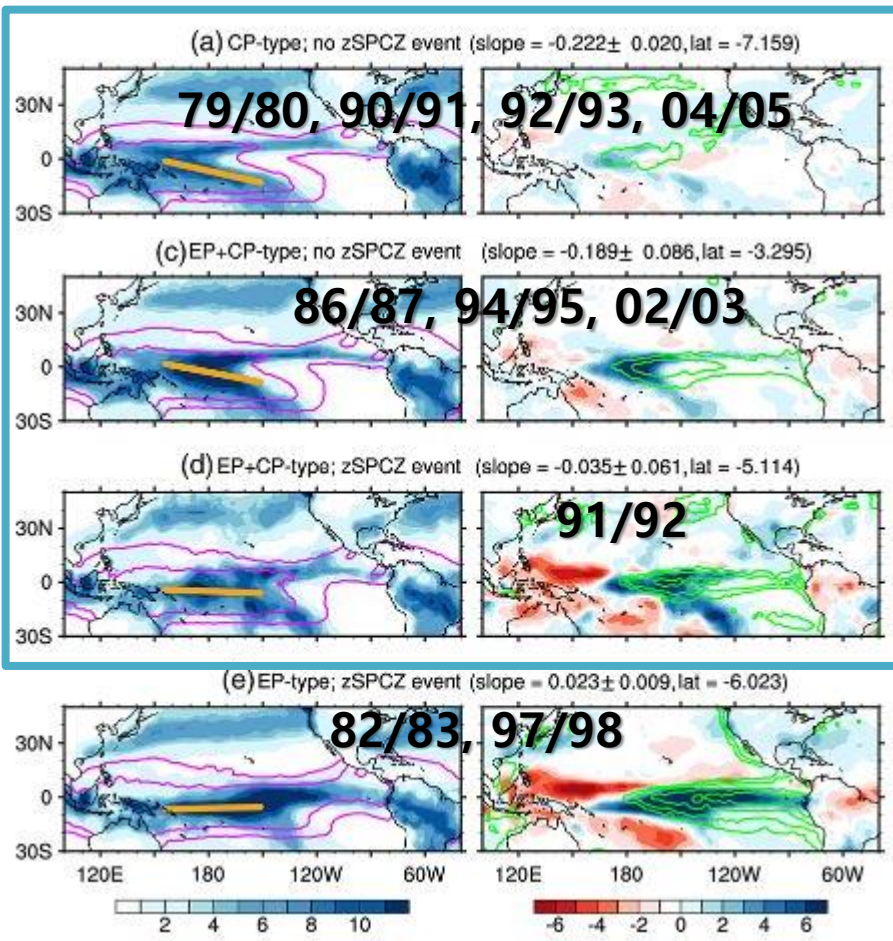
Timmermann, A., An, S. I., Kug, J. S., Jin, F. F., Cai, W., Capotondi, A., ... & Stein, K. (2018). El Niño–Southern Oscillation complexity. *Nature*, 559(7715), 535.

Extreme Swing of SPCZ

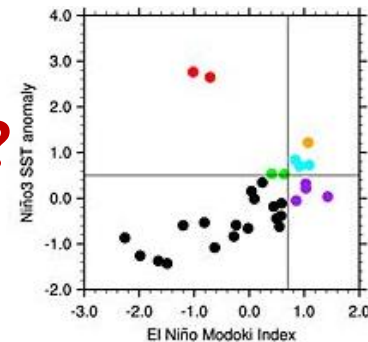
Cai et al (2012) & Borlace et al (2014)

-Strong (Super) EP type El Nino (82/83, 97/98) → **zonal SPCZ**

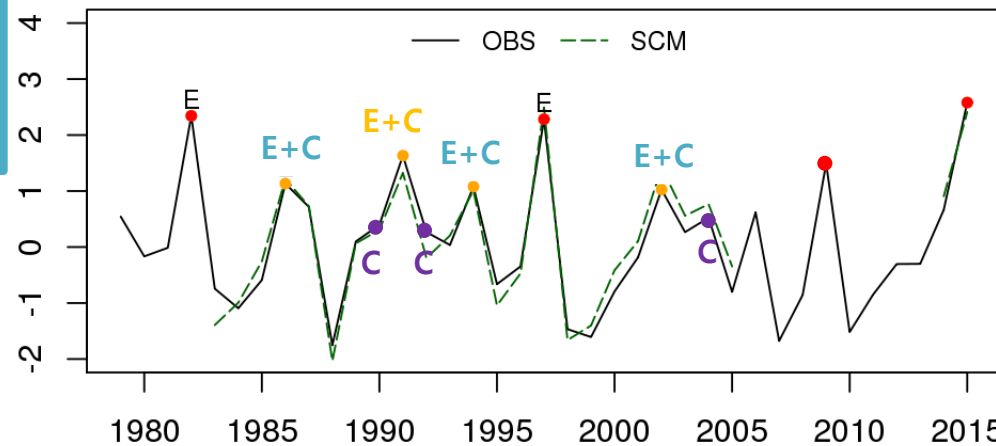
-EP/CP (91/92) El Nino → **Zonal SPCZ**



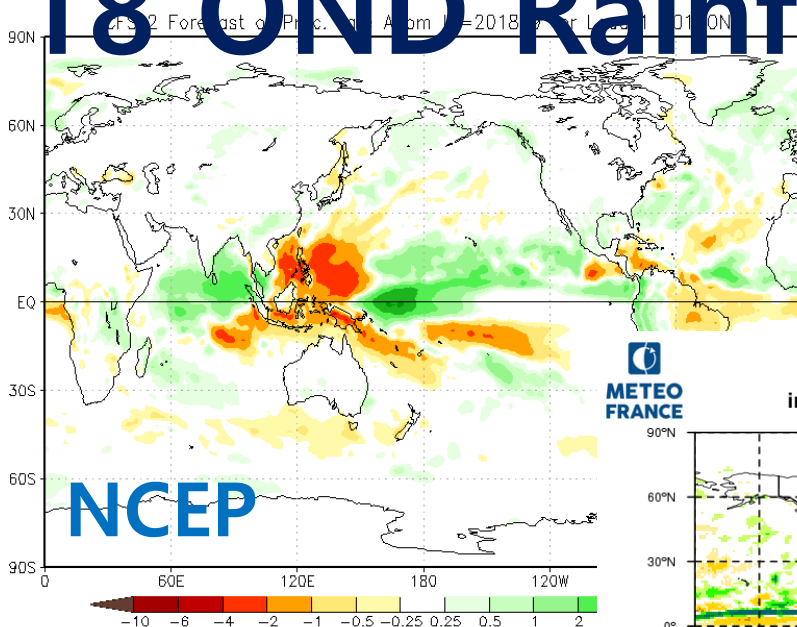
How about 2018/19?



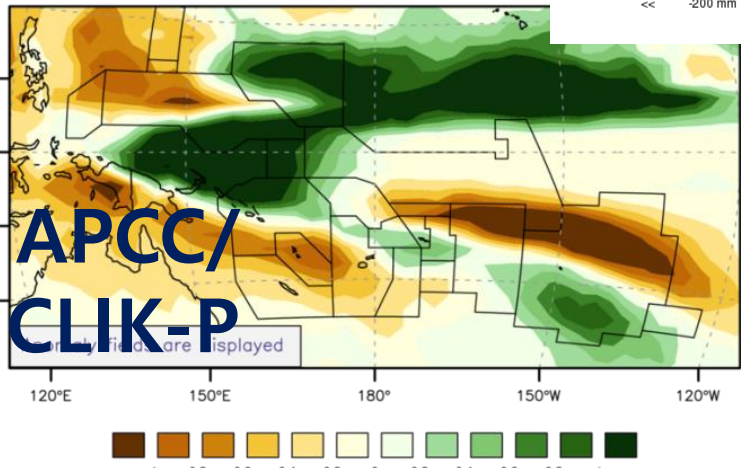
ONI (nino34, DJF mean)



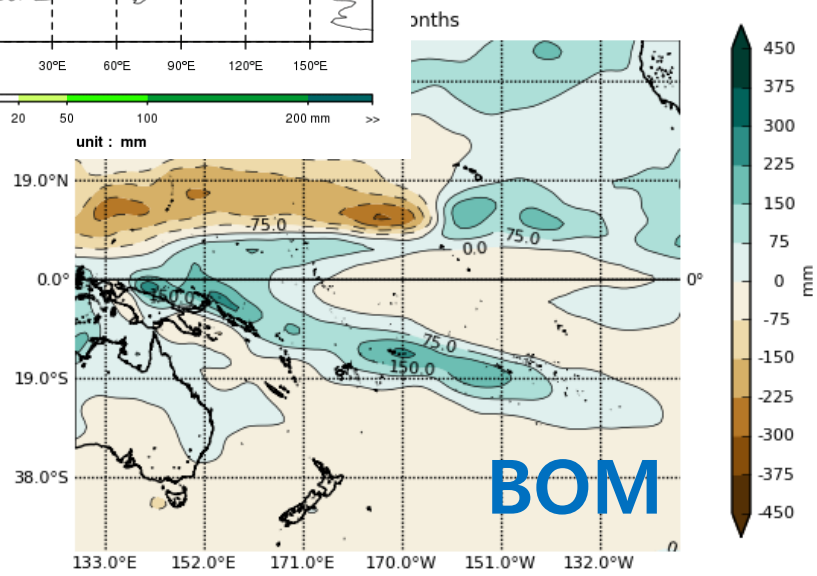
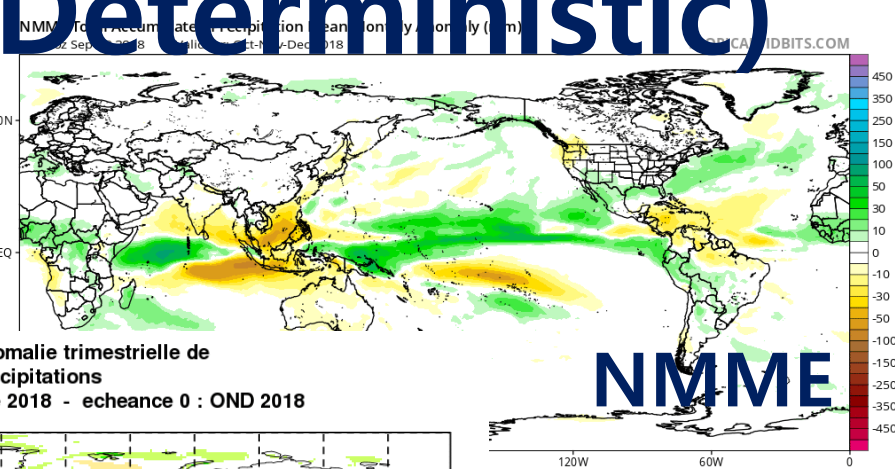
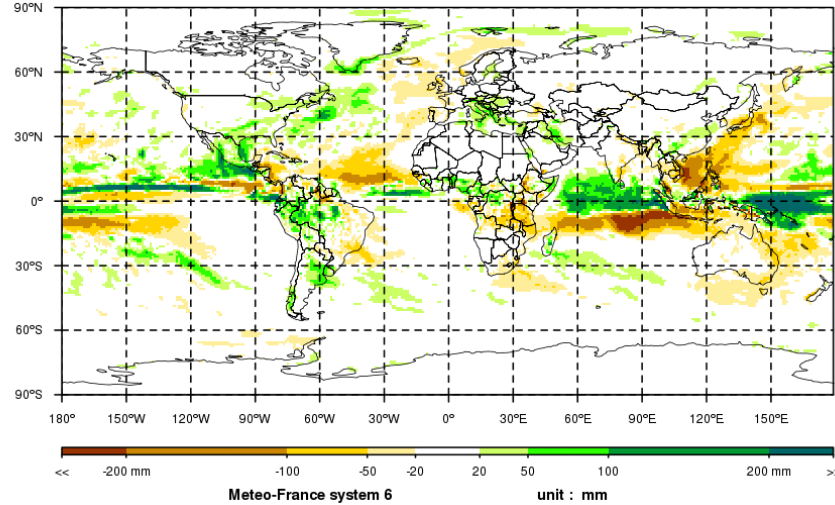
18 OND Rainfall (Deterministic)



Precipitation for October-December



Prevision d'anomalie trimestrielle de precipitations
initialisation de octobre 2018 - echeance 0 : OND 2018

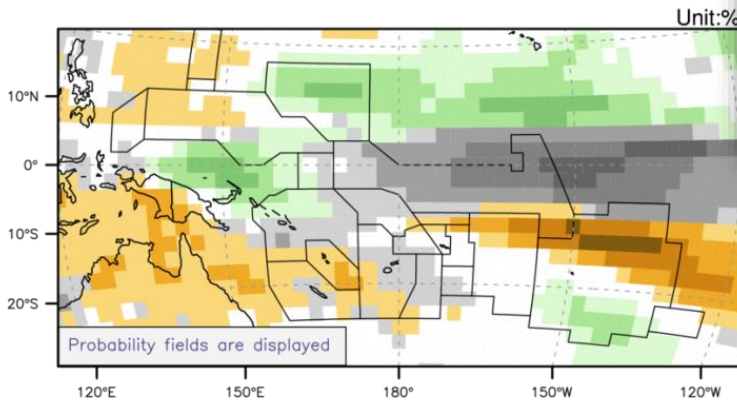


ks for the Pacific.
sted for historical skill.
n and research only.

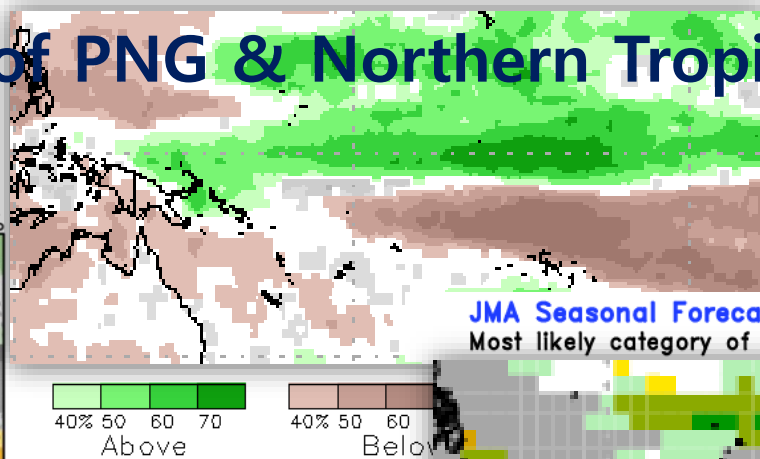
18 OND Rainfall Prob.

Consistent:
rain band (Northeast of PNG & Northern Tropics)
dry band (SE Pacific)

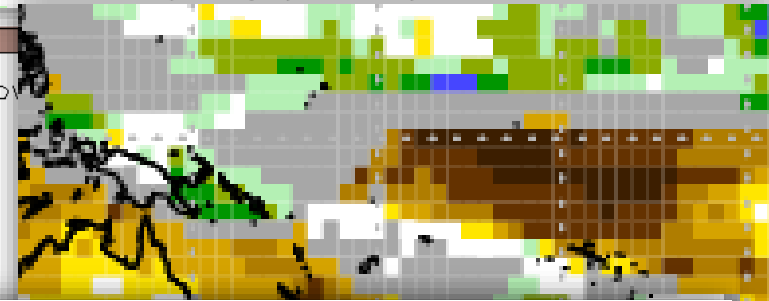
Precipitation for October-December 2018



NMME prob fcst Prate IC=201809 for lead 1 2018 OND



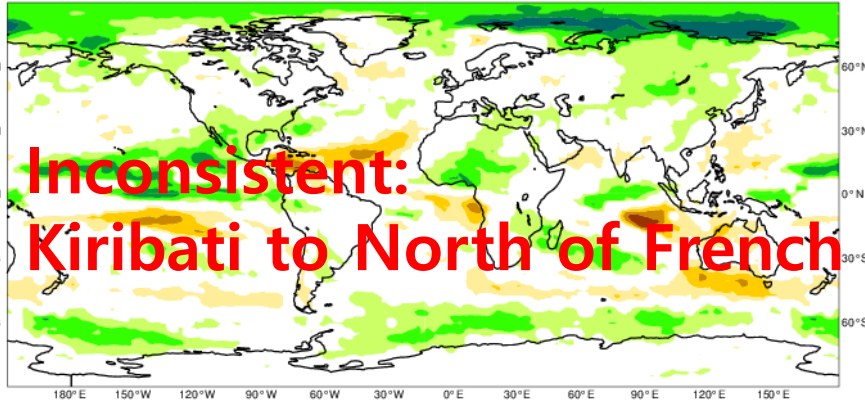
JMA Seasonal Forecast (Forecast initial month is 09 2018)
Most likely category of Precipitation for OND 2018



EUROSIP multi-model seasonal forecast
Prob(most likely category of precipitation)
Forecast start reference is 01/09/18
Unweighted mean

ECMWF/Met Office/Meteo-France/NCEP/JMA
OND 2018

70..100% 60..70% 50..60% 40..50% other 40..50% 50..60% 60..70% 70..100%

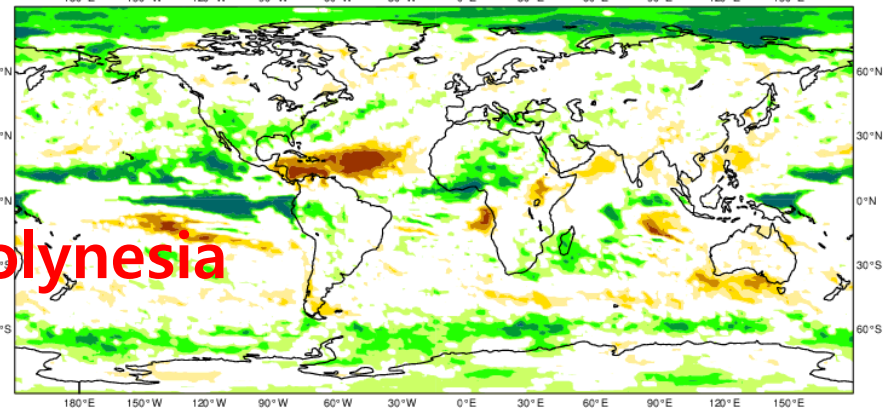


ECMWF Seasonal Forecast
Prob(most likely category of precipitation)
Forecast start is 01/09/18, climate period is 1993-2016
Ensemble size = 51, climate size = 600

System 5
OND 2018

----- Prob(below lower tercile) Prob(above upper tercile) -----

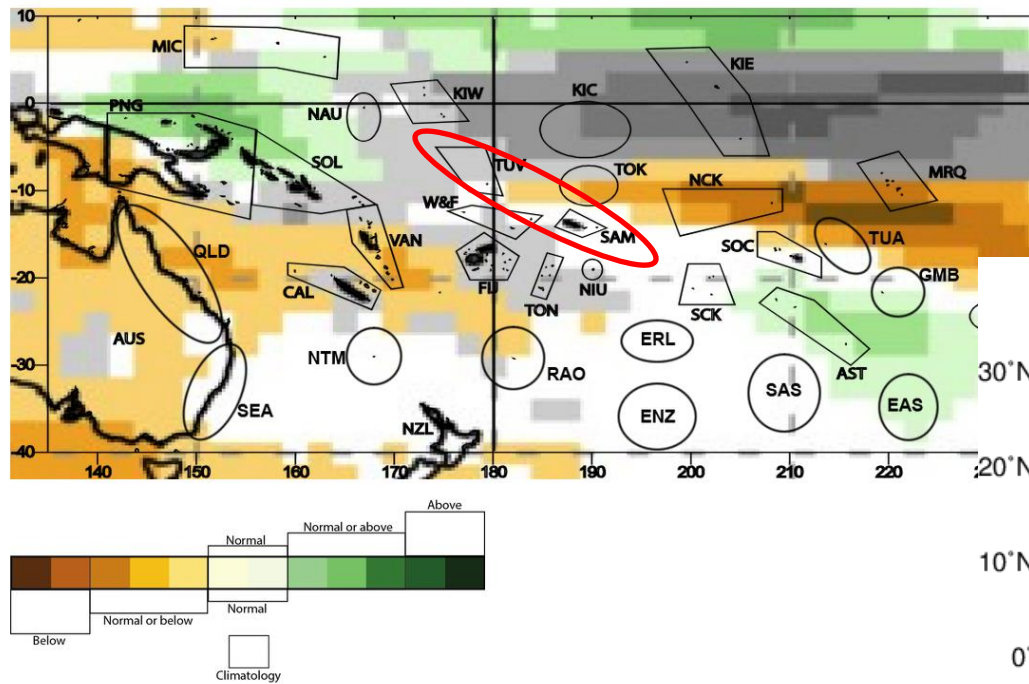
70..100% 60..70% 50..60% 40..50% other 40..50% 50..60% 60..70% 70..100%



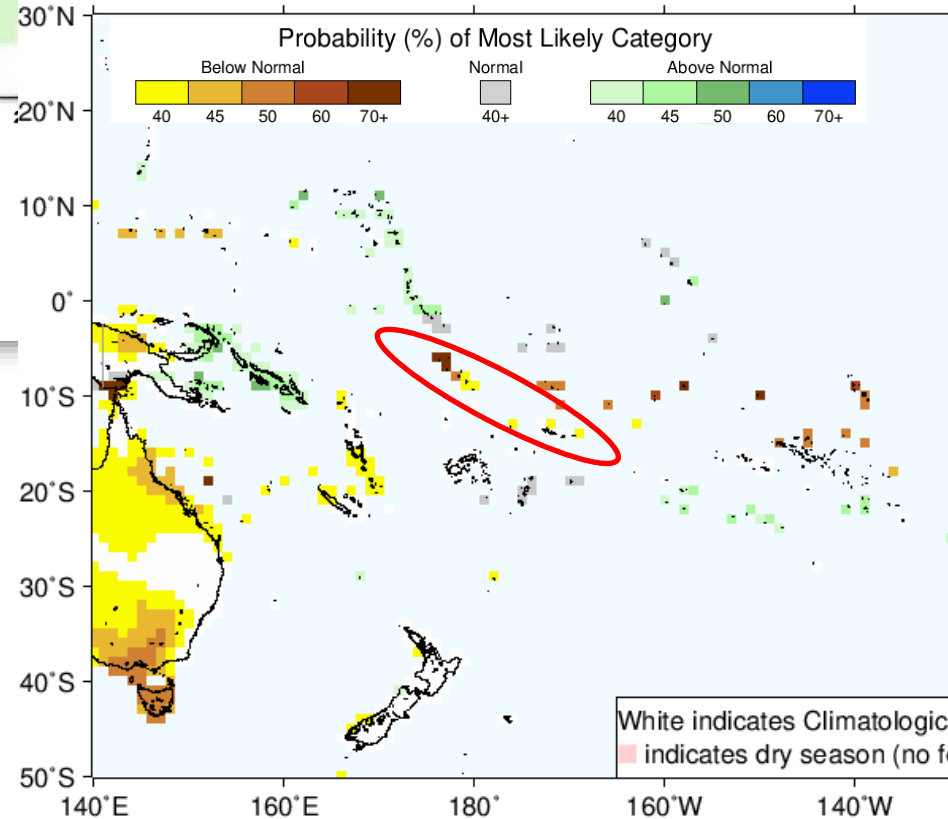
Inconsistent:
Kiribati to North of French Polynesia

18 OND Rainfall Prob.

APEC Climate Center - Outlook

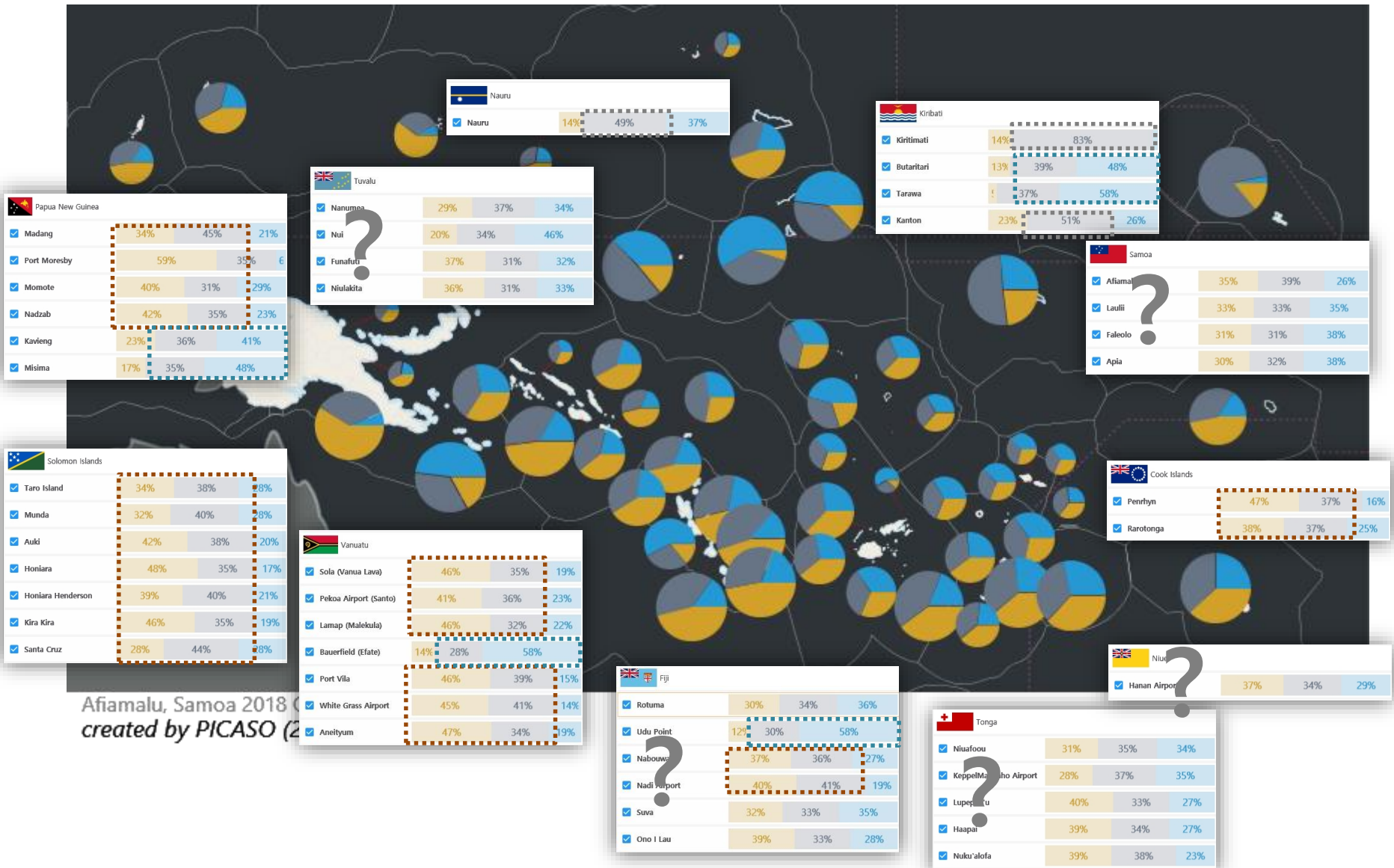


IRI Multi-Model Probability Forecast
October–November–December 2018,

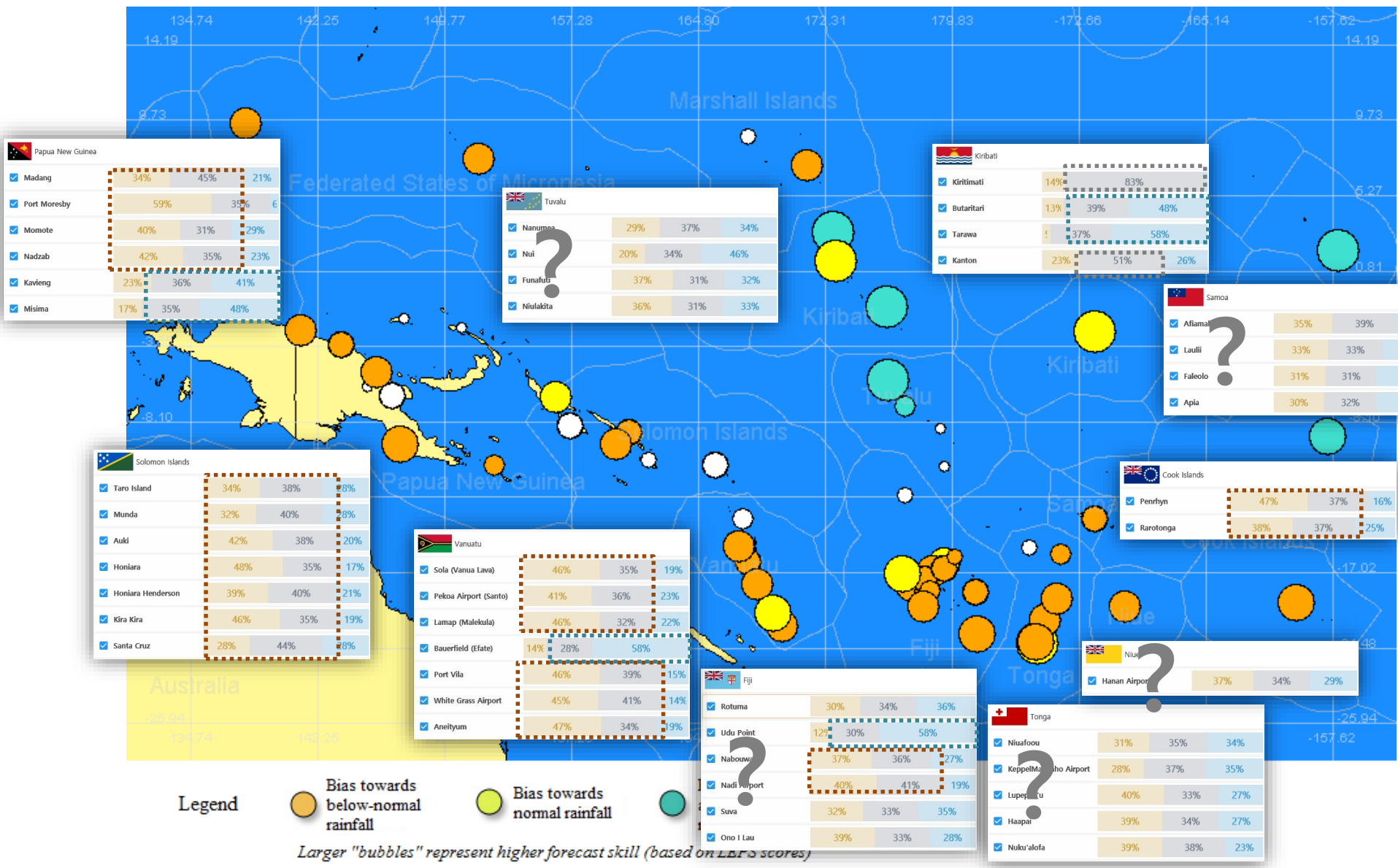


Btw MMEs:
Mostly consistent except
Tuvalu & Samoa

18 OND Rainfall (PICASO)

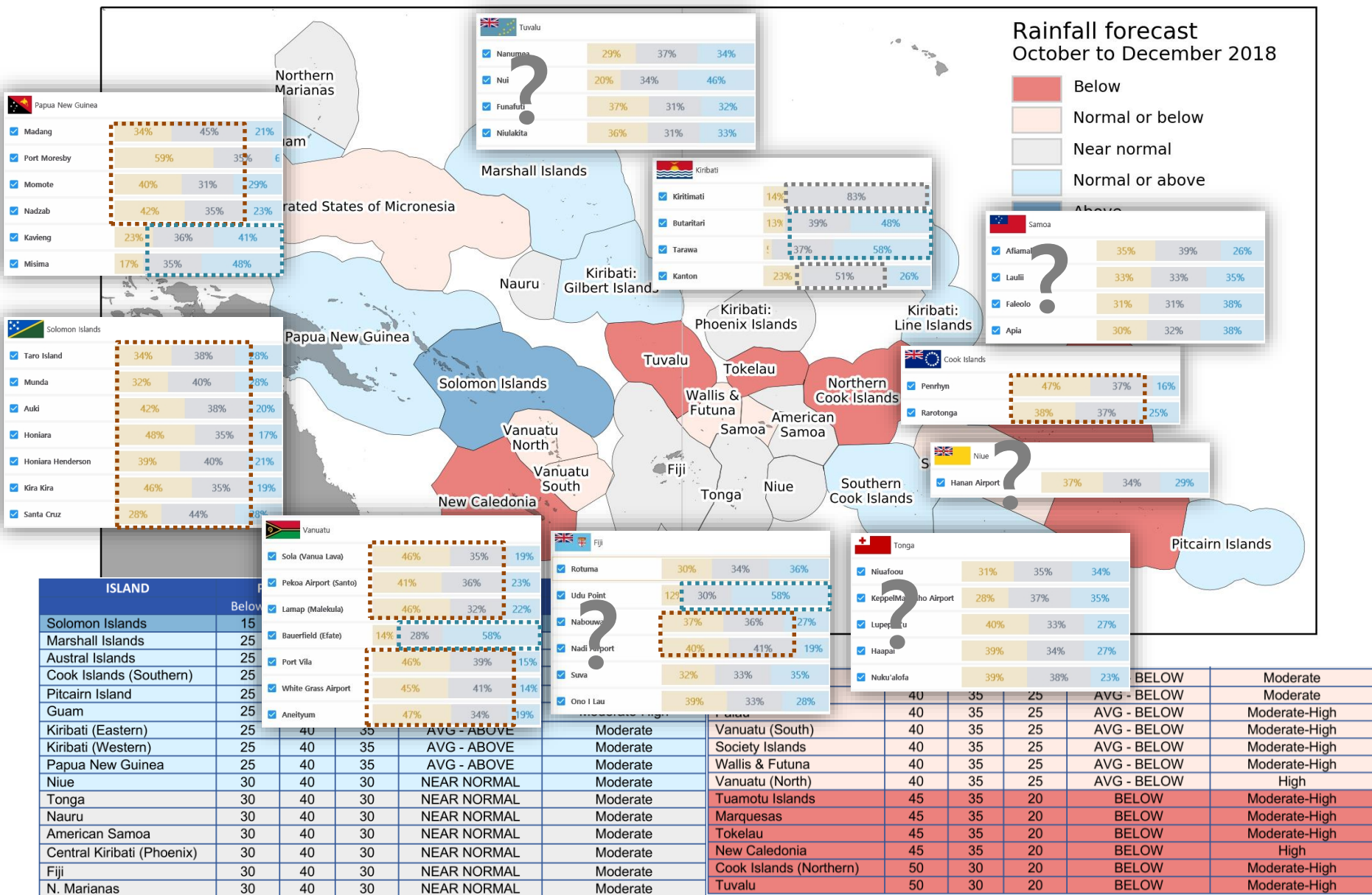


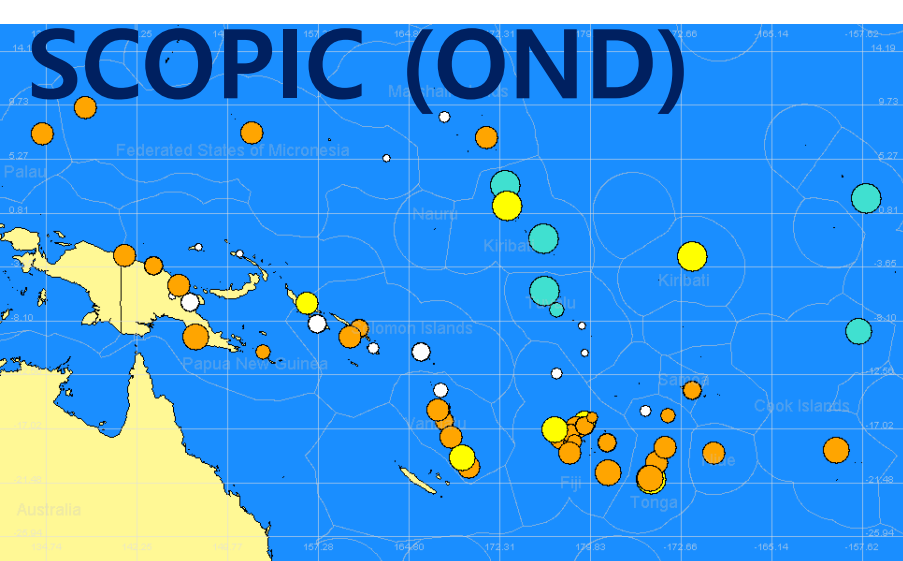
18 OND Rainfall (SCOPIC)



18 OND Rainfall (METPI)

From APCC, CFSv2, NMME, IRI, JMA, ECMWF, EUROSIP

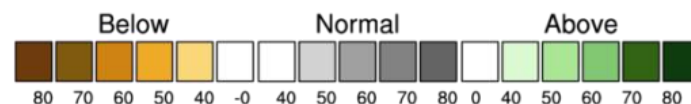
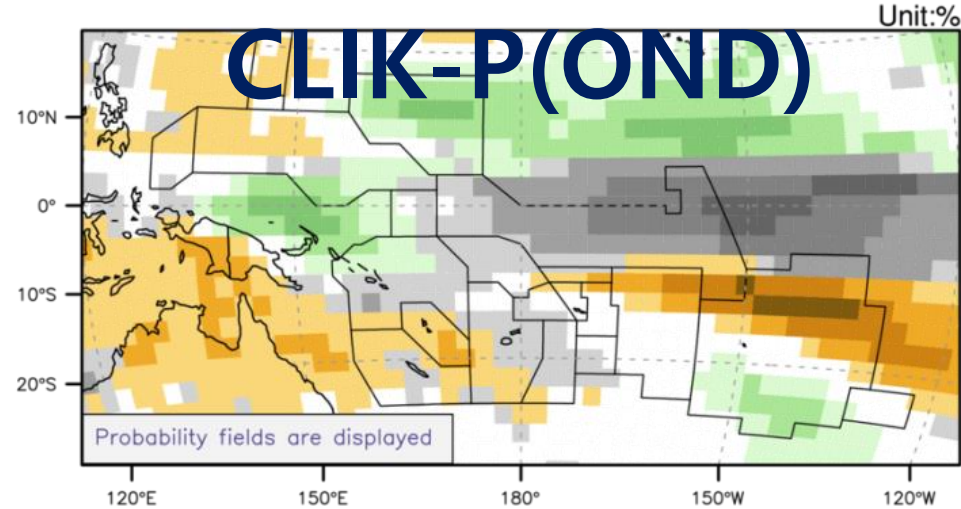




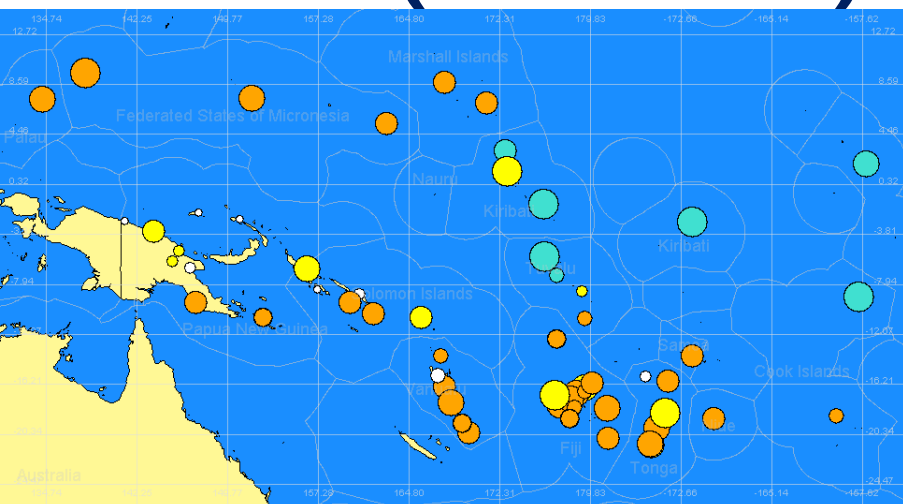
Legend

- Bias towards below-normal rainfall
- Bias towards normal rainfall
- Bias towards above-normal rainfall
- No bias in forecast (Climatology)

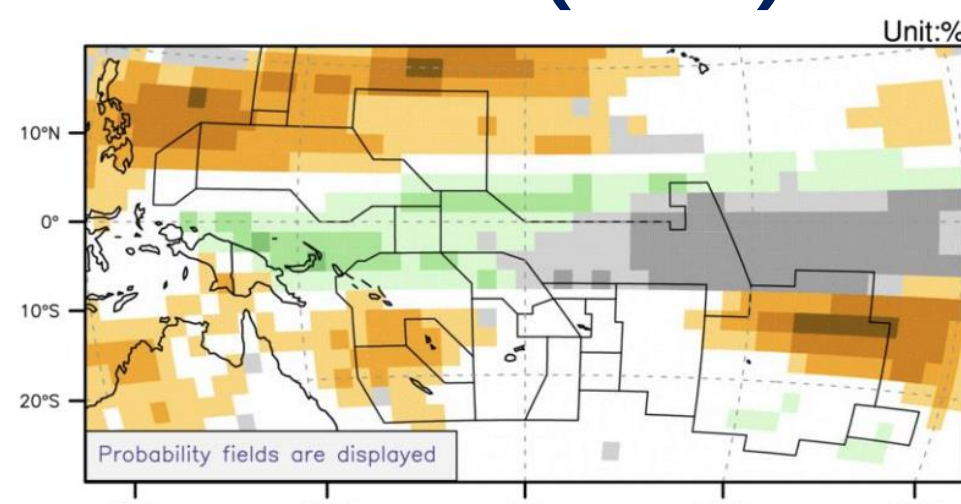
Larger "bubbles" represent higher forecast skill (based on LEPS scores)



SCOPIC (ONDJFM)



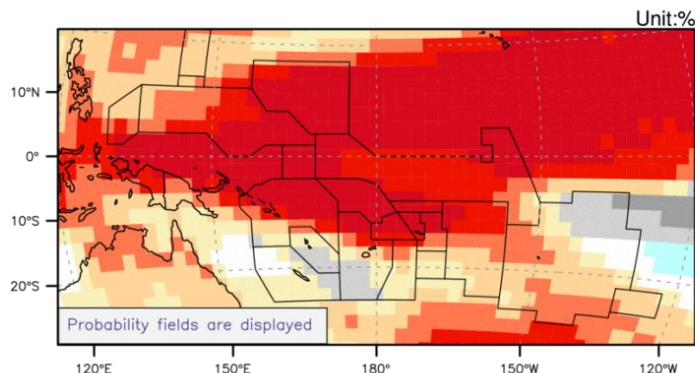
CLIK-P(JFM)



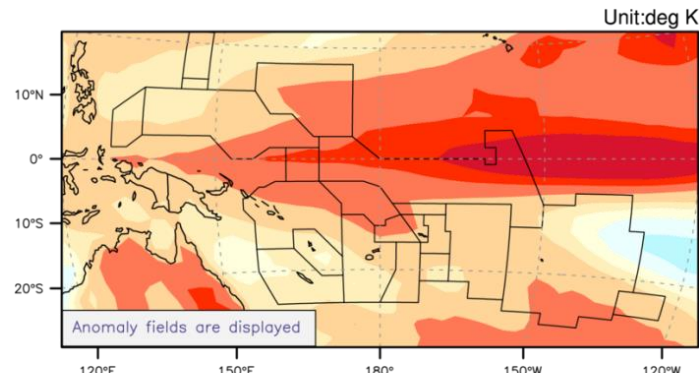
18 OND Temperature

APCC/
CLIK-p

Temperature at 2m for October-December 2018



Temperature at 2m for October-December 2018

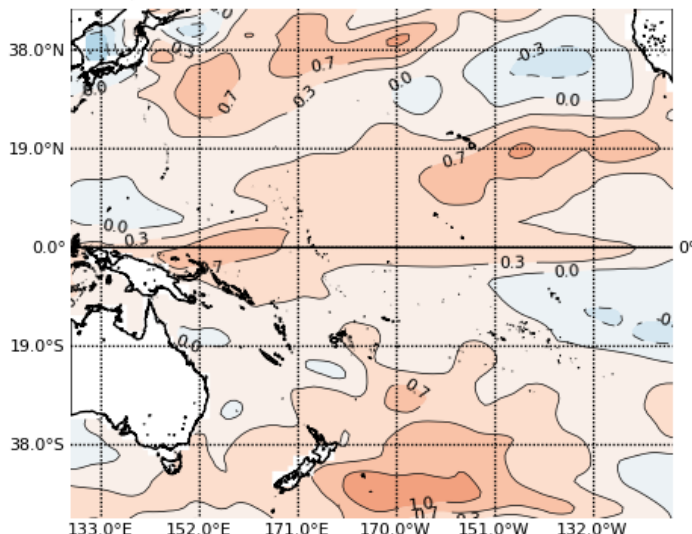


Most area: AN expected

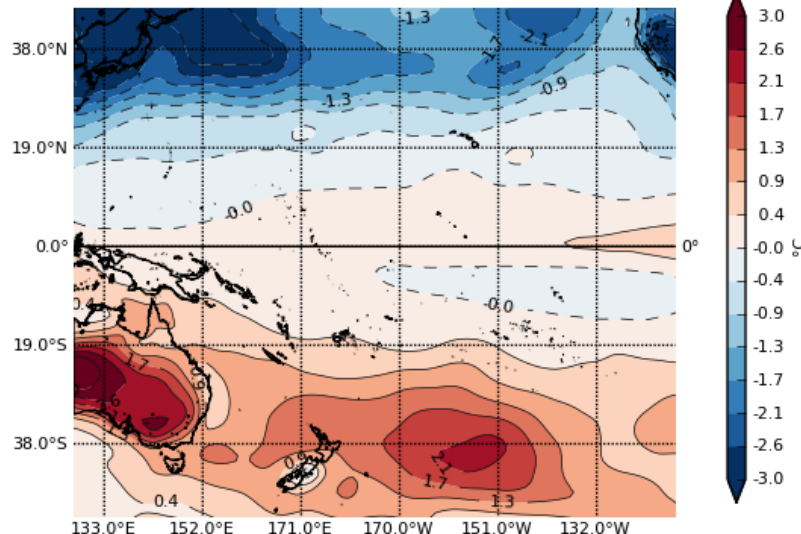
Unsure: Vanuatu, Tokelau, northern Cook Islands

BOM/
POAMA

variable: SSTAr(deg C)
Model initialised: 20181001
Forecast period: OND, Lead time: 0 months



variable: tsaira(deg C)
Model initialised: 20181001
Forecast period: OND, Lead time: 0 months



Conclusions (S. Pacific)

- 18/19: weak CP type El Nino expected (chance of development to a moderate CP/EP type)!
- 18 OND Rainfall outlooks are mostly consistent in W. Pacific, equatorial C. Pacific and E. Pacific (Cook Islands), while they are not consistent in subtropical C. Pacific.

	PICASO	SCOPIC	METPI	Consensus
W. Pacific	BN(NN)	BN or No BIAS	AN to BN	BN
Equatorial C. Pacific	AN or NN	AN or NN	AN or NN	AN or NN
Subtropical C. Pacific	UNSURE	Mostly BN	Mostly NN	?
Cook Islands	BN(NN)	AN or BN	AN or BN	AN or BN

- 18 OND rainfall condition is likely to persist for next three months.
- AN temperature is expected in most S. Pacific in 18 OND.

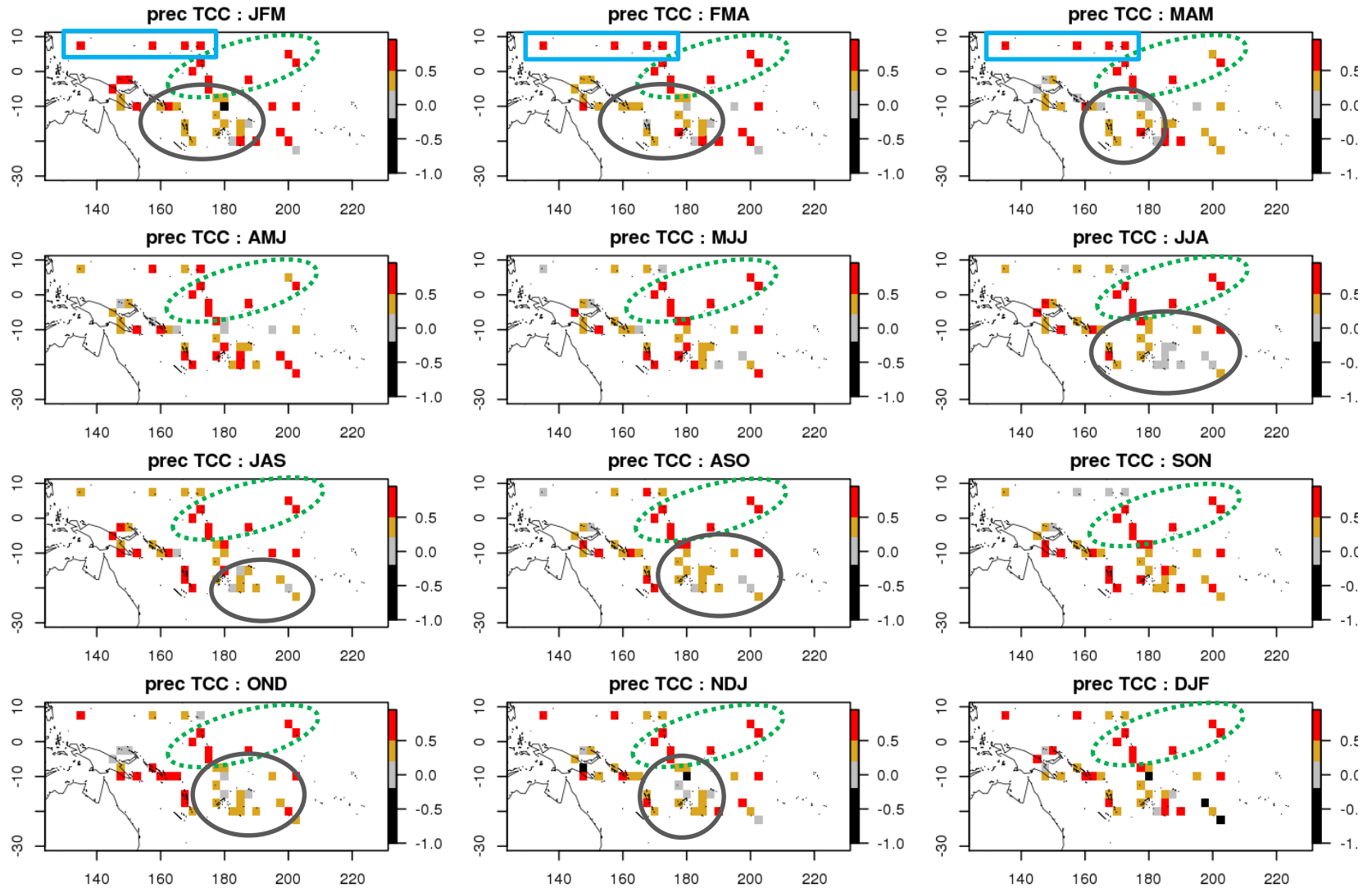
THANK YOU FOR ATTENTION

For the Consensus Forecast in the Pacific...

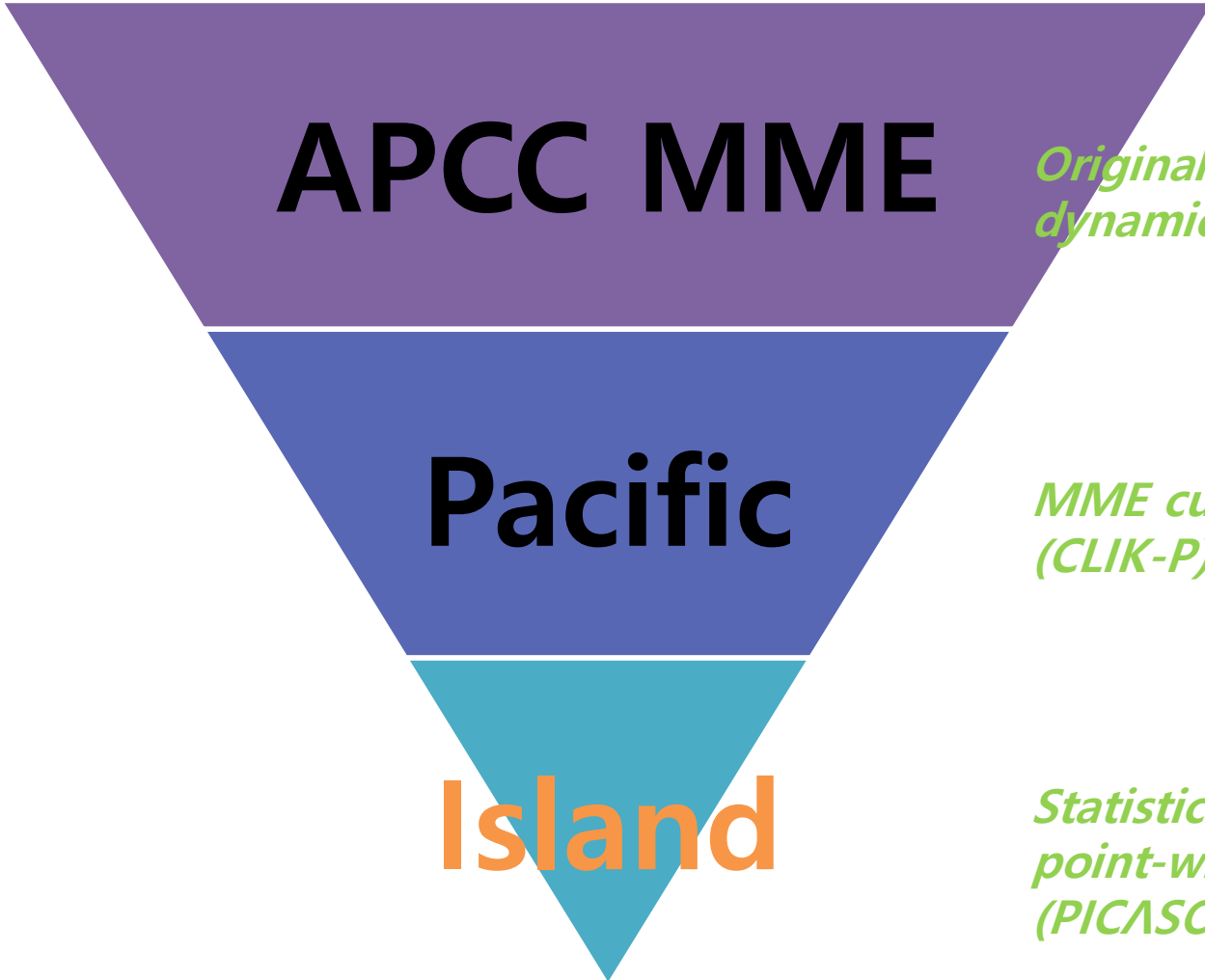
PICASO performance evaluation

YUN-YOUNG LEE & BO RA KIM, APEC CLIMATE CENTER

Gray zone...



ROK-PI CliPS



APCC MME

*Original grid-based
dynamic model output*

Pacific

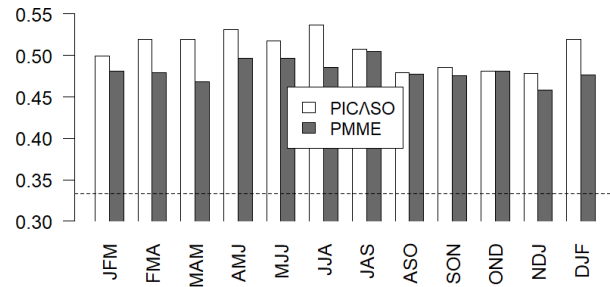
*MME customized to the Pacific
(CLIK-P)*

Island

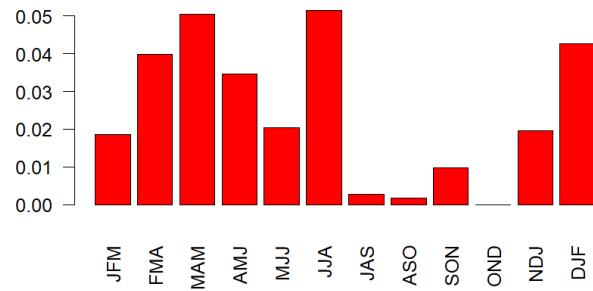
*Statistically downscaled
point-wise forecast
(PICASO)*

Skill improvement compared to APCC PMME

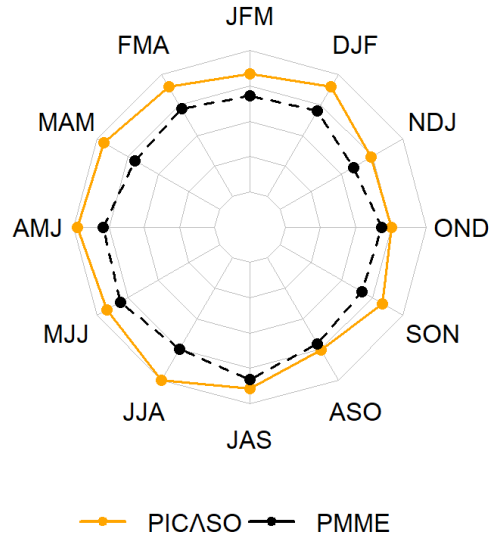
Success Rate



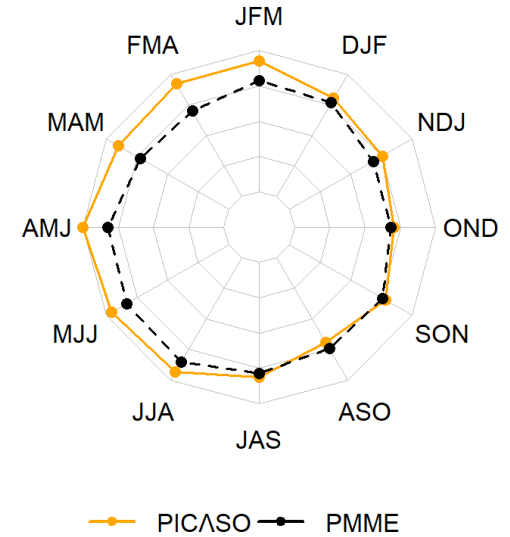
Improvement [PICASO-PMME]



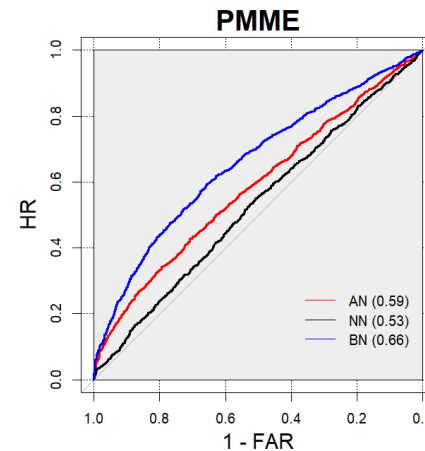
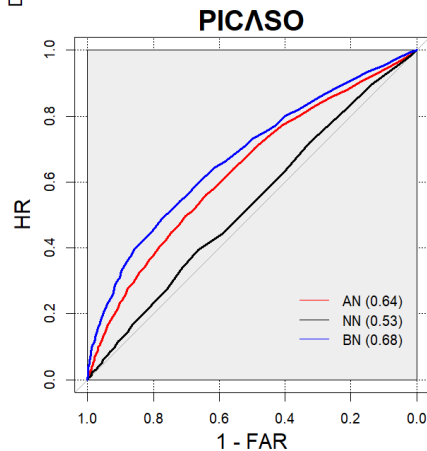
HSS



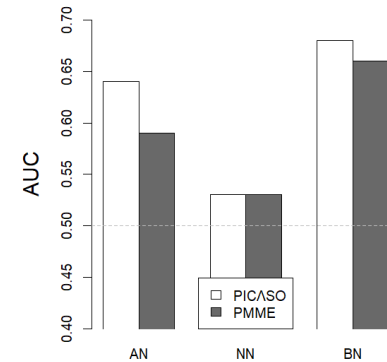
LEPS



ROC



SCORE



APCC

MME

Pacific

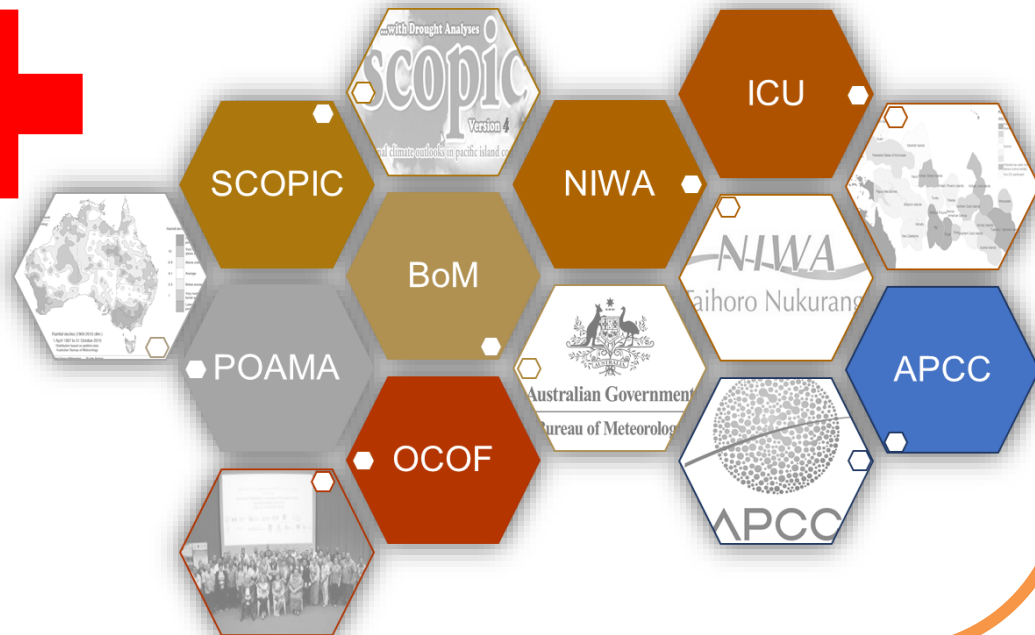
Island
PICASO



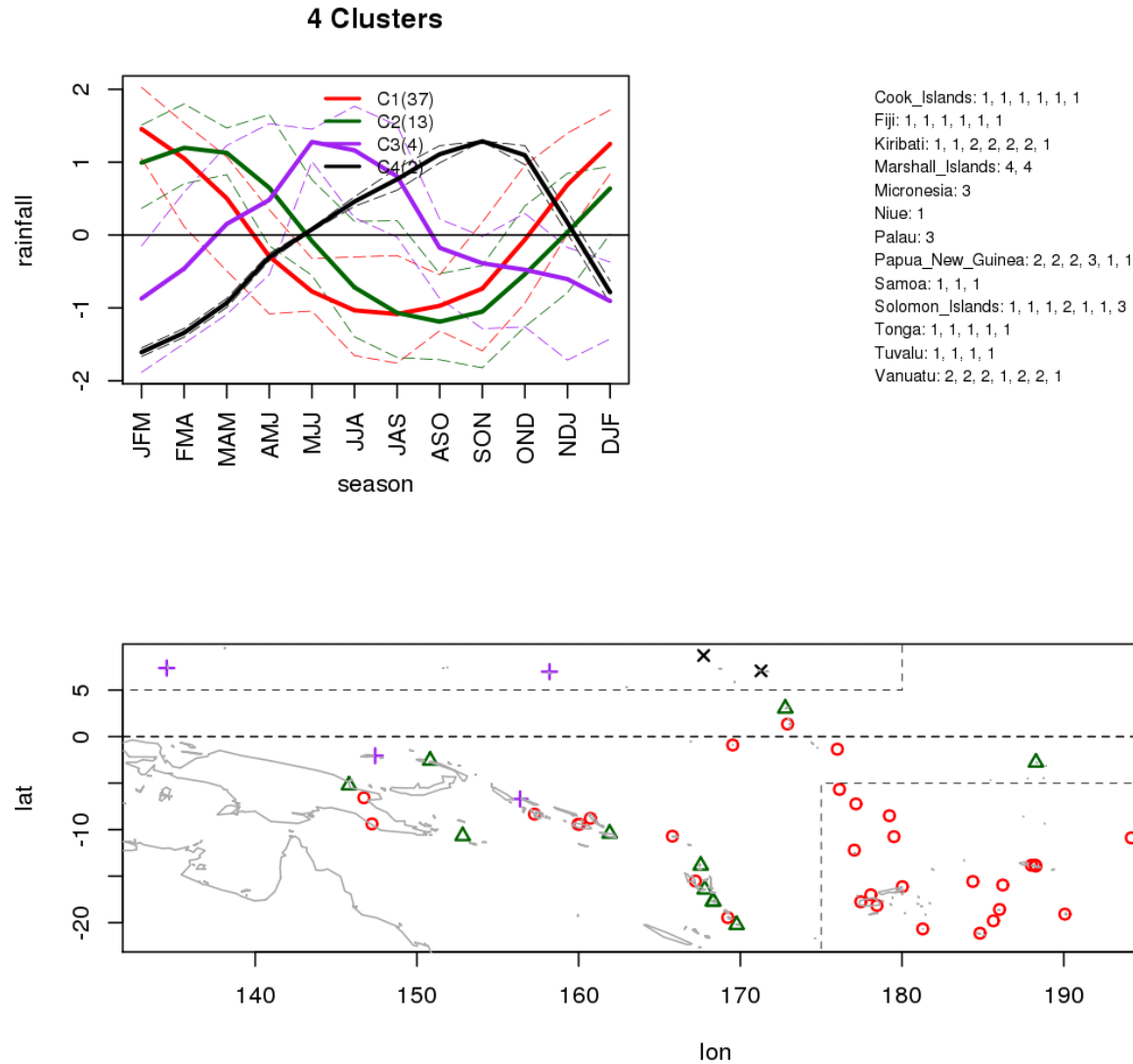
Pacific Market

item: seasonal forecast

Not a Fortune-teller!

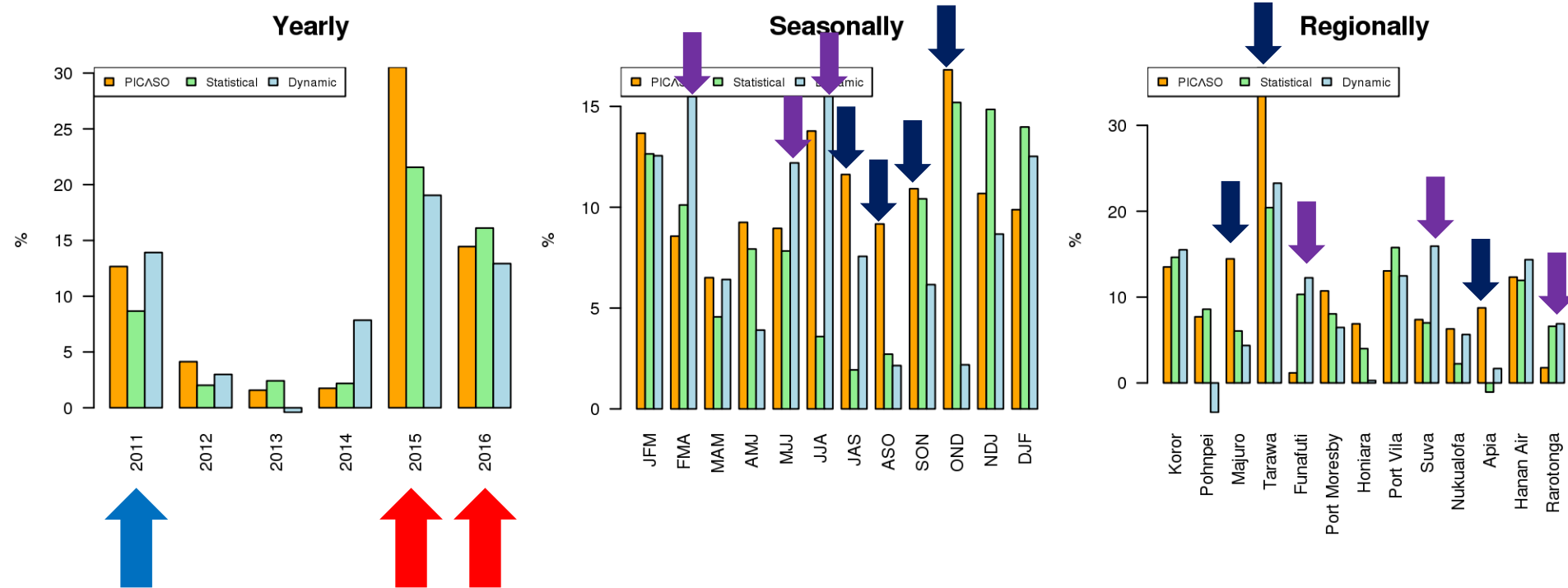


Distinct Climate :regionally varying seasonal cycle



Skill Dependency :to year, season and region

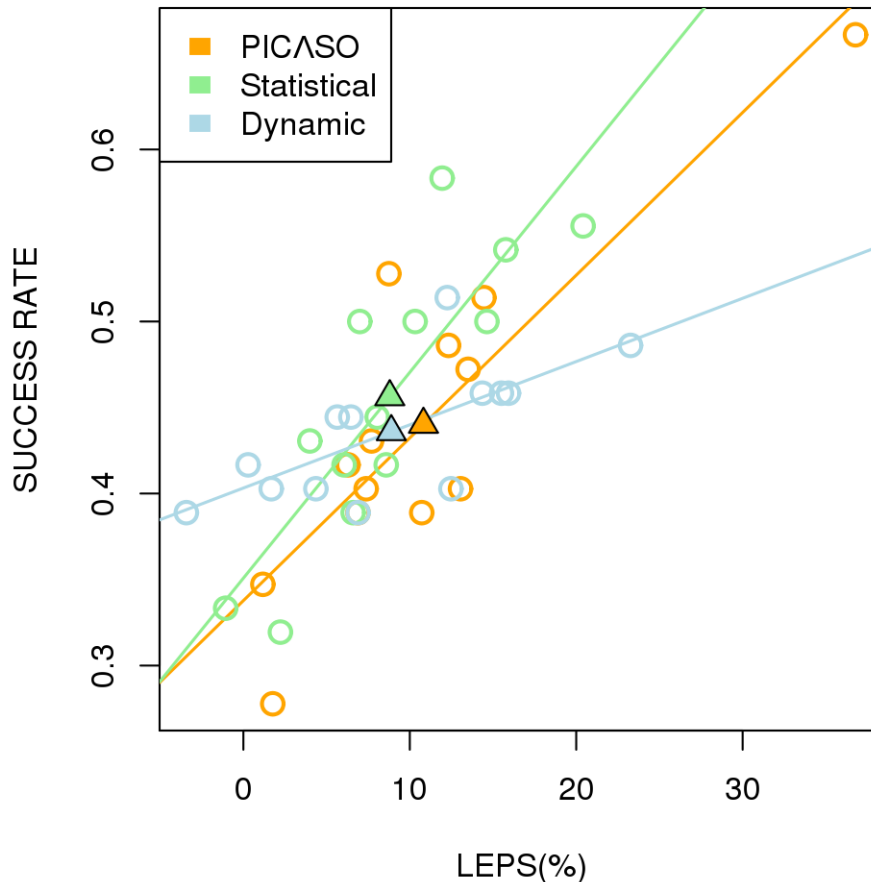
**** based on 2011-2016 forecasts (from SPREP)**
**** only tercile probability & observation category provided!**



Sensitive to what is verified

:Category vs Probability

LEPS vs SR



Category, that is tercile

- subjective to sample/period
- should be consistent between models and observations

1. Different reference period?

- PICASO: 1983-2005
- Others: 1981-2010 (WMO recommendation) or observation period?

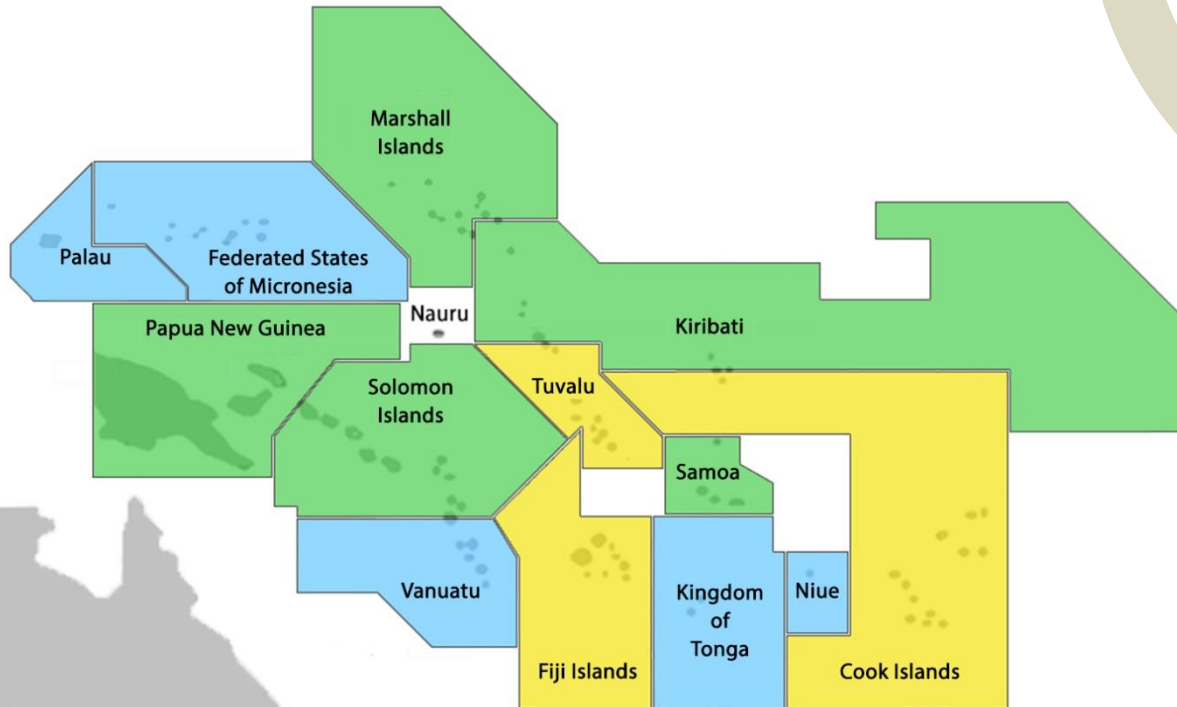
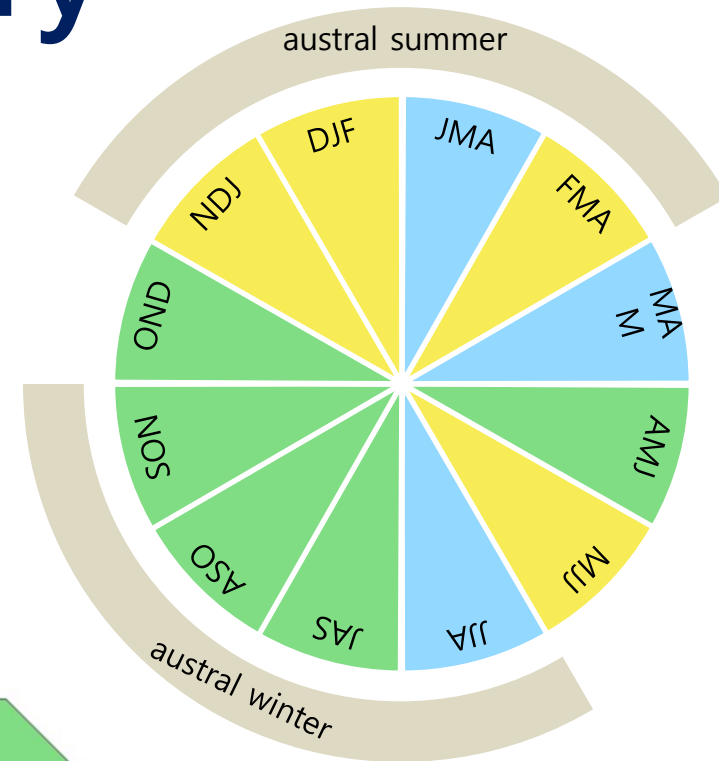
2. Observation data access

For the more objective verification and further system improvement...

Category Verification

Probability Verification

PICASO Skill Summary



- During strong ENSO
- Transition periods (Austral Winter → Austral Summer)
- Improvement in Western Pacific (Port Moresby, Honiara, Majuro, Tarawa, and Apia)



- User-friendly
- Offline system (only connects once a month)



- Multi-Model Ensemble → more operationally reliable (less uncertainties)
- Tailored → specifically for the Pacific



- Operation schedule (MME model output is later due to gathering of multiple models)
- Newly launched → less stable



THANK YOU FOR ATTENTION