Drought outlooks

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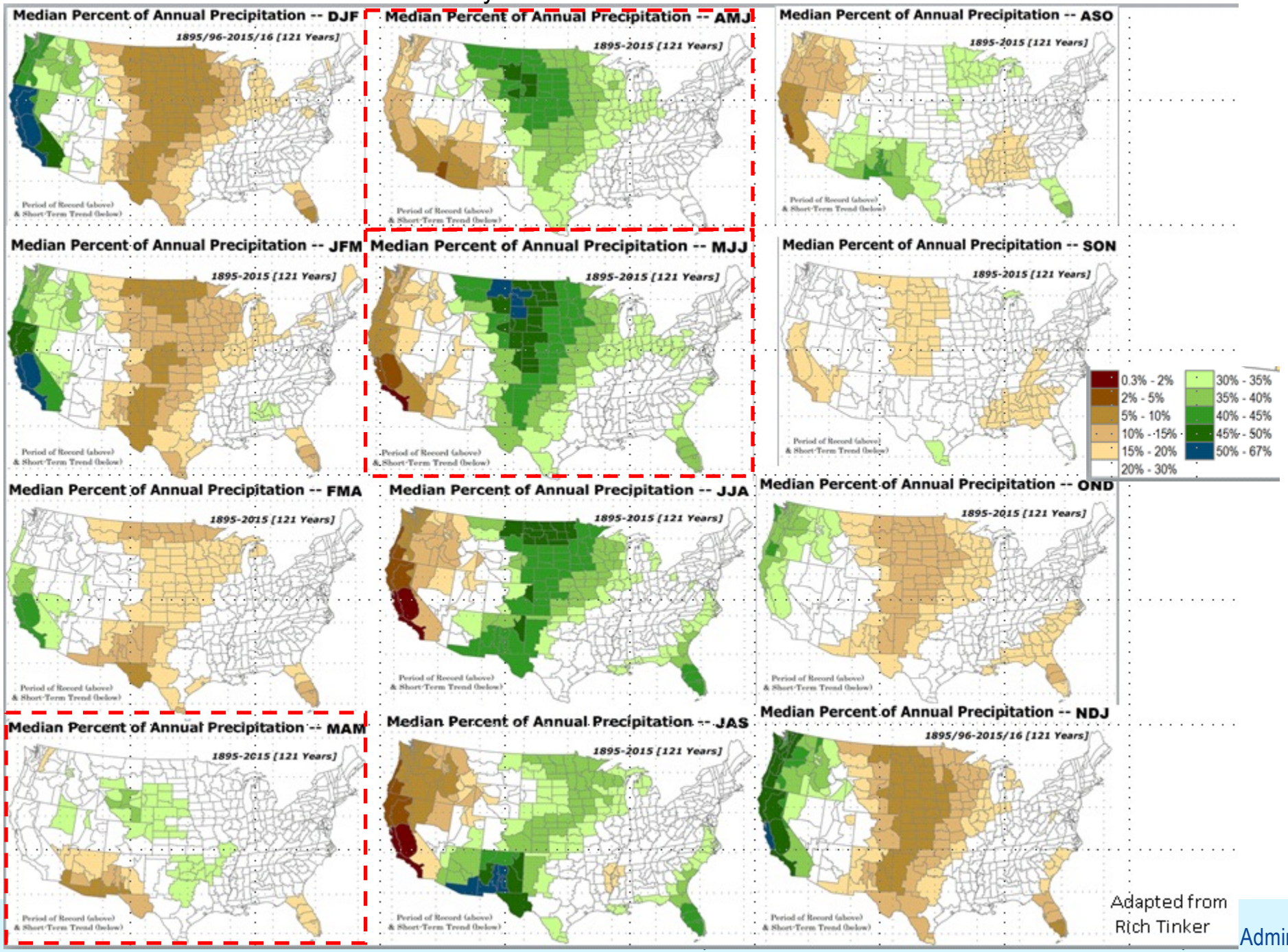
PREPARE Drought and Flood Early Warning for Central Pacific Islands
Nadi, Fiji, 15-20 July 2024

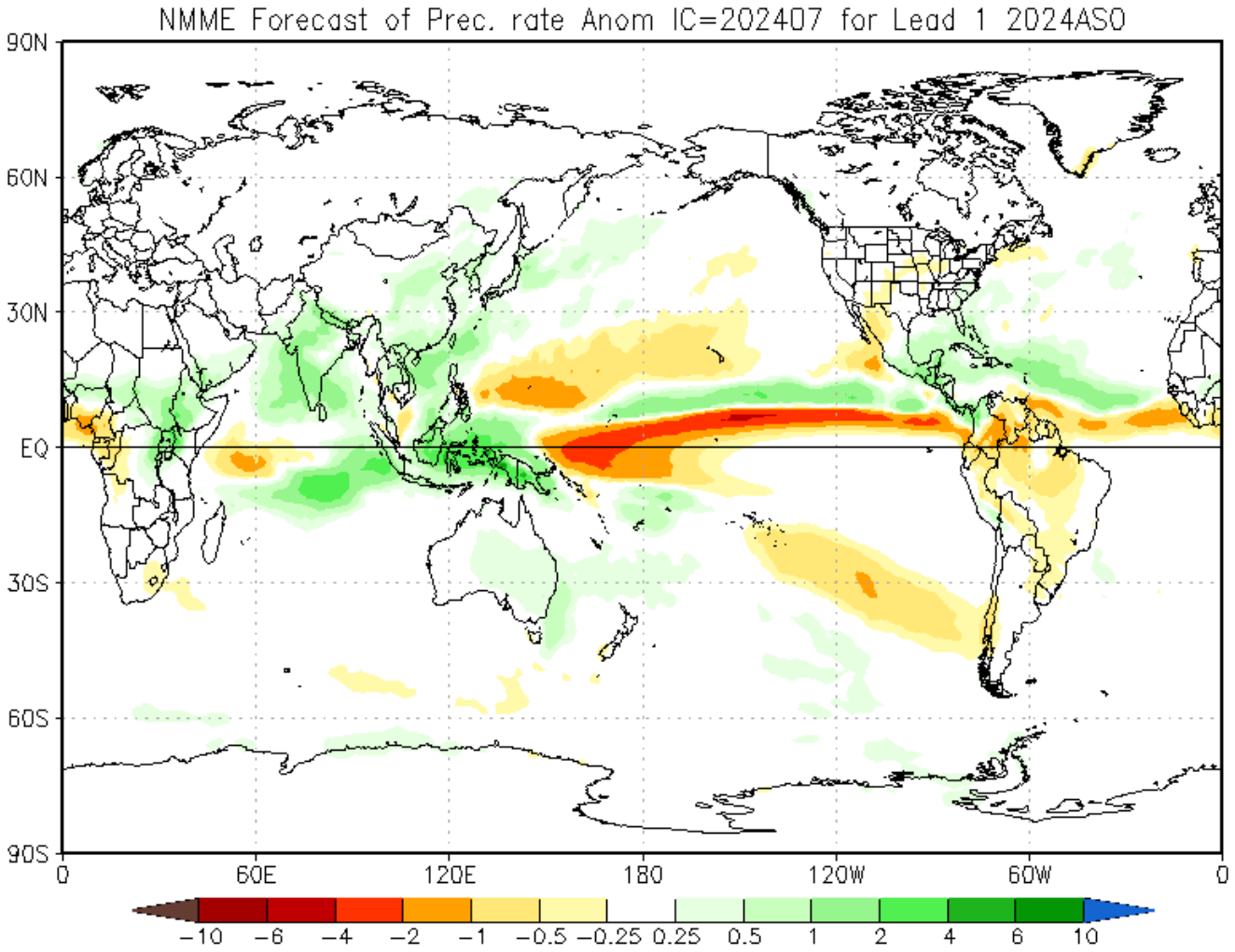
Synthesized drought outlook

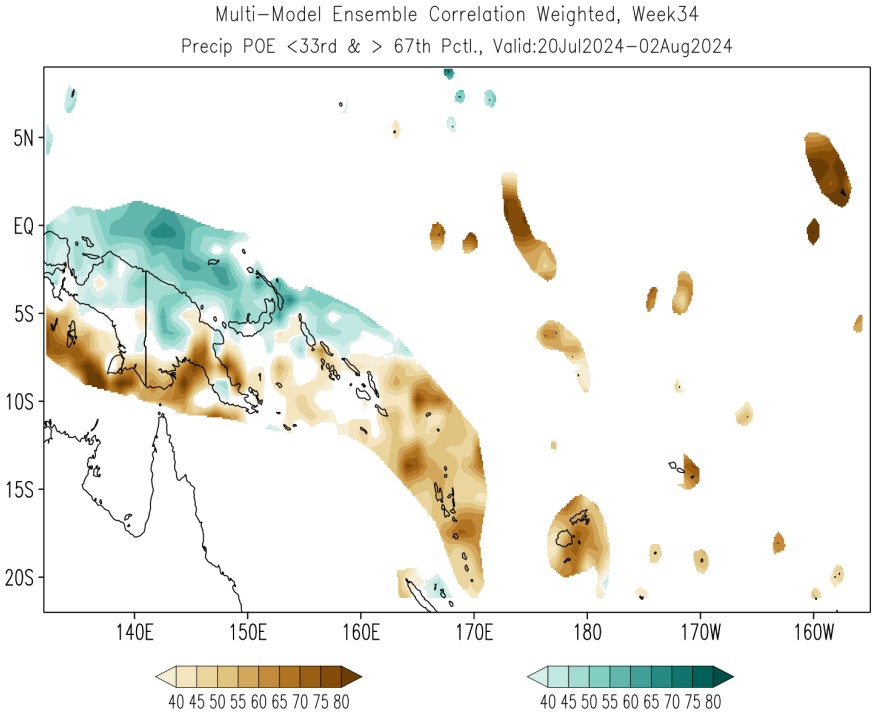
- Climatological cycle:
  - Dry/wet season, optimal persistent forecast
- Prcp forecast:
  - Above/near/below normal, model consolidations
- T2m forecast:
  - Above/near/below normal,
- Objective drought forecasts:
  - SPIs, SPEIs, SMPs, SRIs etc.
- High impact weather/climate events:
  - ENSO, Hurricane, heat wave etc
- Geographic features
  - Land covers, current VHI, terrain, lee side etc.

Rainy Season across the US

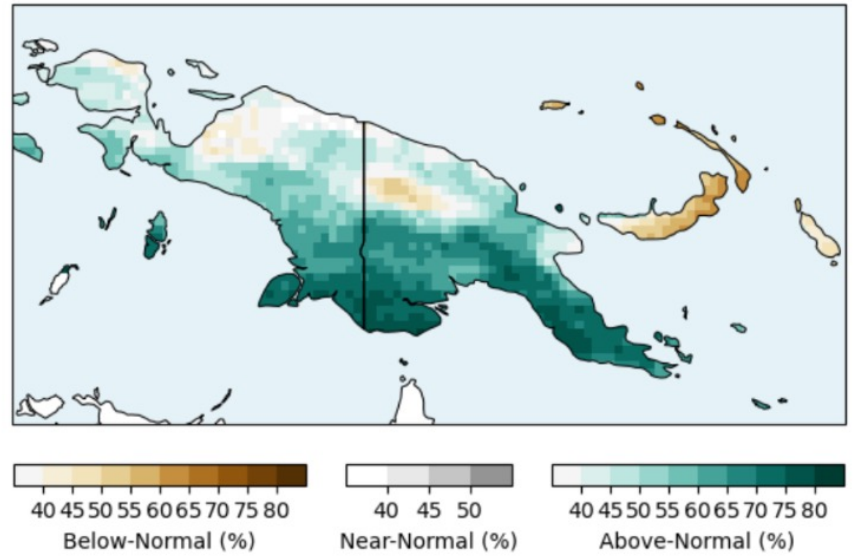


Adapted from Rich Tinker





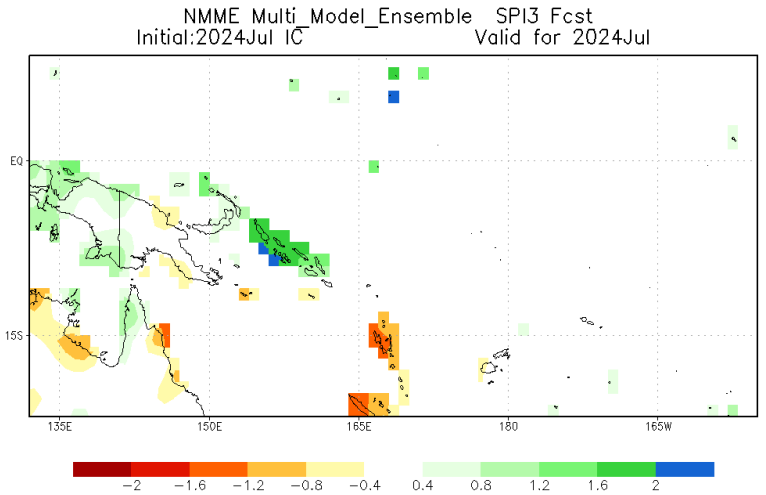
Papua New Guinea Initialized Jun; Aug-Oct Forecast (CCA on Rainfall)



Objective Drought outlook

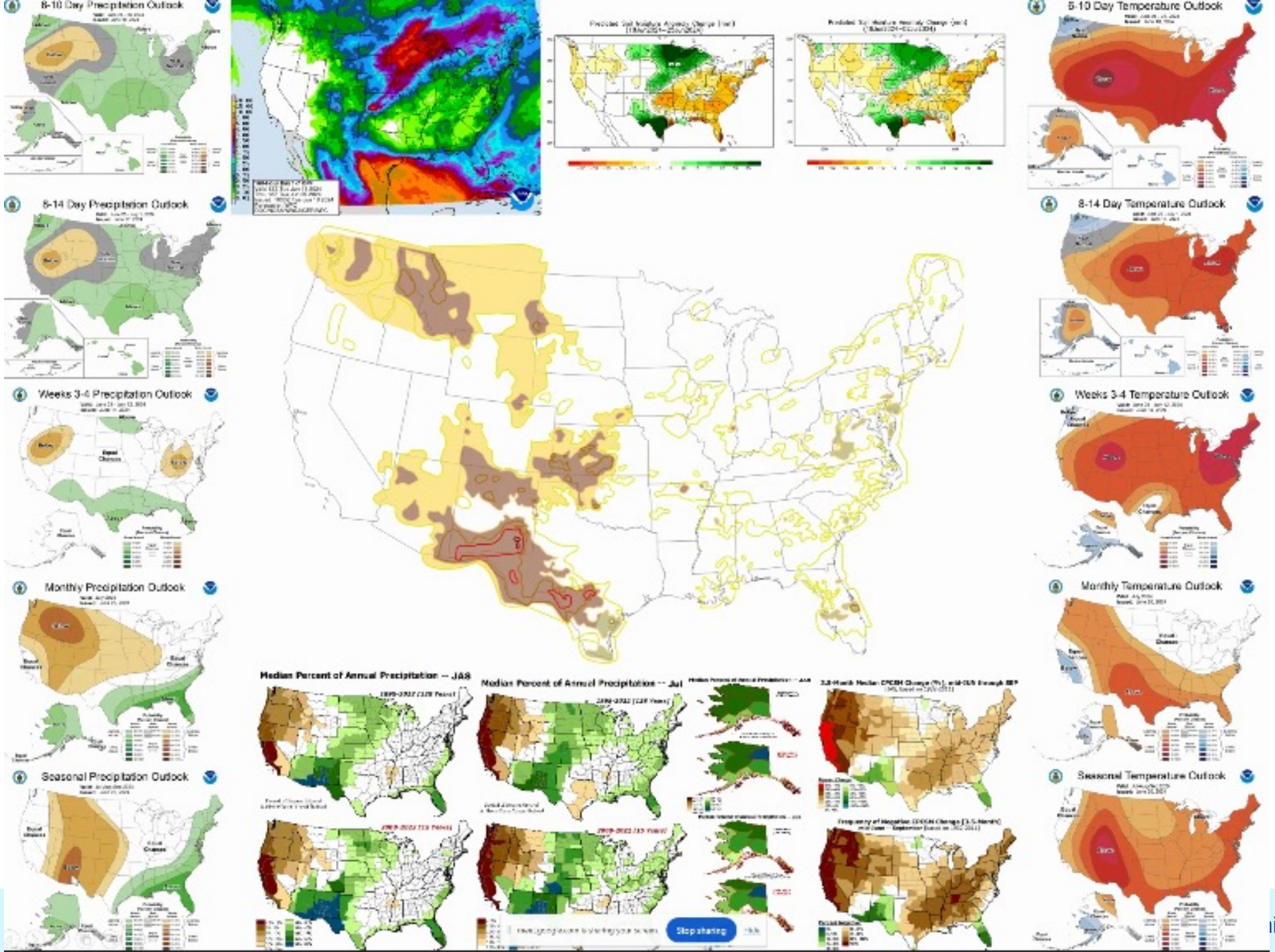
- Seasonal outlook
  - NMME monthly forecast
  - lead 0-9 month forecast
  - 6 models
  - At least 10 ensemble members for each model

- Sub-seasonal outlook
  - GEFSv12 extend forecast
  - 00Z daily forecast to 35day
  - 31 ensemble members



CPC Operational drought outlook schedule

- Begin of month: collect obs data,
- 8-10th day: NMME forecast ready
- In the third Tuesday: drought briefing
- In the third Thursday: seasonal drought outlook
- Sanity Check:
- End of month: monthly drought outlook


8-10 Day Precipitation Outlook
8-10 Day Temperature Outlook
8-14 Day Precipitation Outlook
8-14 Day Temperature Outlook
Weeks 3-4 Precipitation Outlook
Weeks 3-4 Temperature Outlook
Monthly Precipitation Outlook
Monthly Temperature Outlook
Seasonal Precipitation Outlook
Seasonal Temperature Outlook
Median Percent of Annual Precipitation -- JAS
Median Percent of Annual Precipitation -- Jul
Stop sharing

Eastern Plains to the Eastern Seaboard - Removal & Improvement

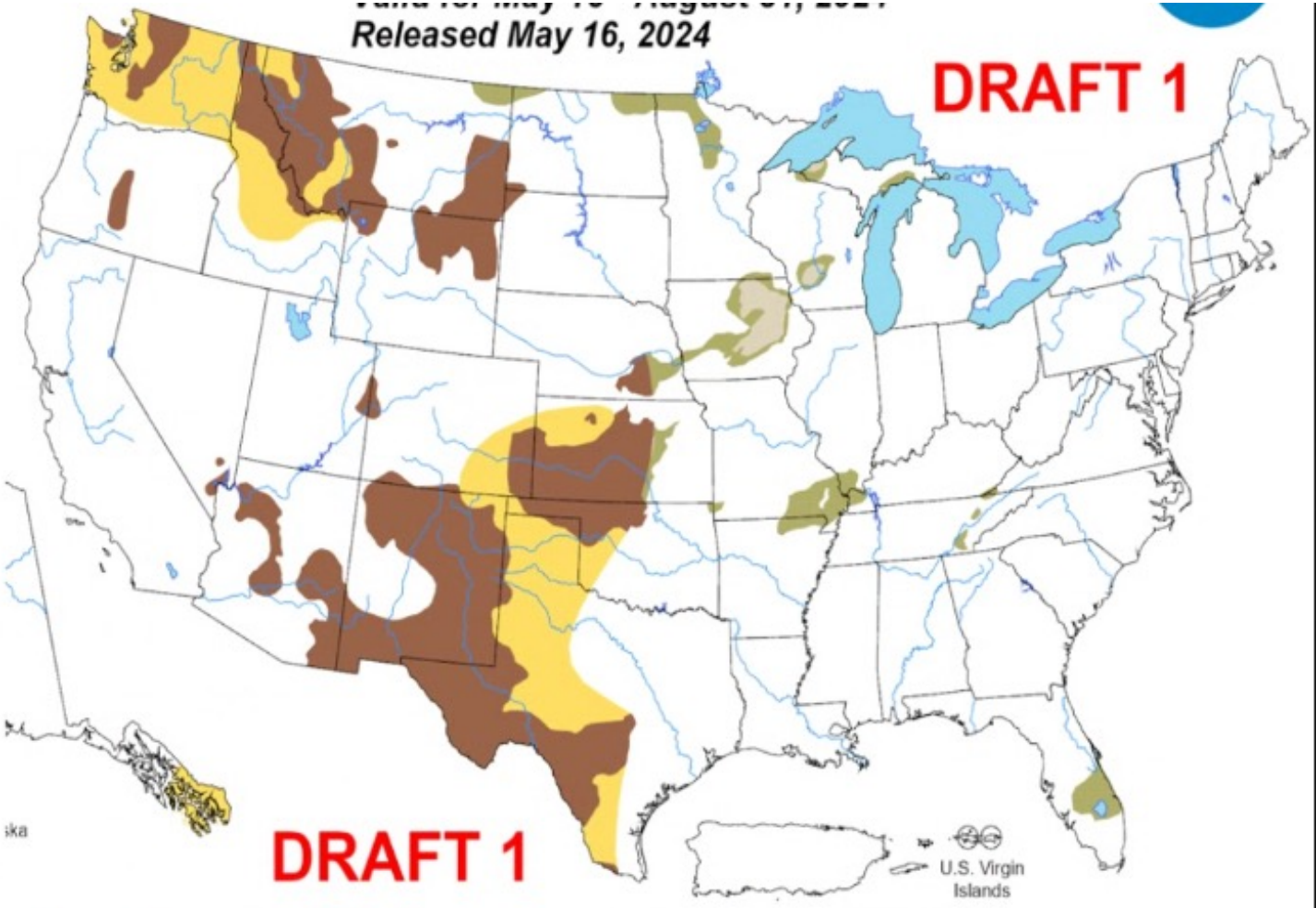
1. Above normal precipitation favored for the southeastern CONUS from the Lower MS Valley northeastward to southern New England for JJA, and favorable short- to medium-range outlooks
2. ENSO-neutral conditions favored
3. Potentially conducive conditions for tropical activity (per #2)

Northern Plains and Upper Midwest - Removal & Improvement

1. Precipitation and temperature signals lacking for JJA
2. Favoring wet climatology

High Plains and Intermountain West - Persistence & Development

1. Above normal temperatures favored for June and JJA, below normal precipitation favored for JJA from the Rio Grande Valley north-northwestward to the PacNW, and equal chances for June precipitation in central Intermountain West
2. Decent antecedent soil moisture conditions and near to above normal snowpack across many parts of the central and southern Intermountain West
3. Climatological start to Southwest Monsoon in latter half of June
4. Wet climatology for much of the High Plains, despite dry signals for JJA



Questions

1. More development in the Four Corners with the climatological onset of the SW Monsoon looming?
2. Development in northern Maine in D0 areas?
3. Shift the development line farther westward over the Central Plains, in favor of climatology?

Alaska - Development

1. Antecedent dryness (D0)
2. Above normal temperatures favored for JJA
3. JJA precipitation signals lacking
4. JJA is a dry time of year for Panhandle

Hawaii - Persistence & Development

1. Antecedent dryness and drought
2. Near normal temperatures below normal precipitation favored for JJA in NMME
3. ENSO-neutral conditions favored
4. JJA is a dry time of year
5. Kept drought development to current D0 areas and leeward slopes

Puerto Rico & USVI - DROUGHT FREE!!!

1. Antecedent conditions
2. Enhanced above normal precipitation odds in NMME, in spite of above normal temperatures favored
3. ENSO-neutral conditions favored
4. Threat of tropical activity, especially

Practical session

- SPI/SPEI calculator
- QGIS:
  - Import drought forecast Geotiff
  - NMME
  - GEFS
- Python drought indices package
  - https://github.com/katiemkowal/pac_islands

Practice session:

- SPI/SPEI forecast
  - Optimal persistent drought forecast
    - Input next 6 month climatology
  - 20% dryer than normal
  - 2 degree below than normal
  - La Nina watch (July-Sep 2024 65% chance) and persist into the Northern Hemisphere winter 2024-2025 (85% change during November-January)
  - Probabilistic drought forecast

Nadi.txt (for SPEI)

- WMO_ID: 91680
- STN_CALL: NFFN
- GHCND_ID: FJ000091680
- City: NANDI_AIRPORT
- Latitude: -17.75
- Longitude: 177.45
- Elevation: 26
- Data Source: CMORPH + CPC T analysis (10min)

Suva.txt (for SPI)

- WMO_ID: 91683
- STN_CALL: NFNA
- GHCND_ID: FJ000091683
- City: NAUSORI_INTL_ARPT
- Latitude: -18.05
- Longitude: 178.57
- Elevation: 7
- Data Source: CMORPH

Climate Indices in Python¶

https://github.com/katiemkowal/pac_islands

- SPI, Standardized Precipitation Index, utilizing both gamma and Pearson Type III distributions
- SPEI, Standardized Precipitation Evapotranspiration Index, utilizing both gamma and Pearson Type III distributions
- PET, Potential Evapotranspiration, utilizing either Thornthwaite or Hargreaves equations
- PNP, Percentage of Normal Precipitation