PRECIP Daily Science Report
0000 UTC 9 Aug 2022 - 0000 UTC 10 Aug 2022
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Summary:

Today we had a slightly different day. Southeasterly flow dominated over the region as the monsoon gyre continues nearly stationary over the South China Sea (Fig. 1). Thermodynamic conditions were generally dry over the region. We sampled short-lived convection (or at least shorter lived than during the previous 3–5 days). Convection developed predictably along the southwestern slopes. After 2–3 hours of rainfall, the storms dissipated as soon as the sun went down. The diurnal cycle and sea-breeze circulations likely played big roles in helping trigger convection even with the southeasterly flow, which would imply downslope flow over the western slopes. Skies were clear over Taipei with no clouds in sight.

Strongly diurnally forced - as soon as the sun went down, storms died down as well.

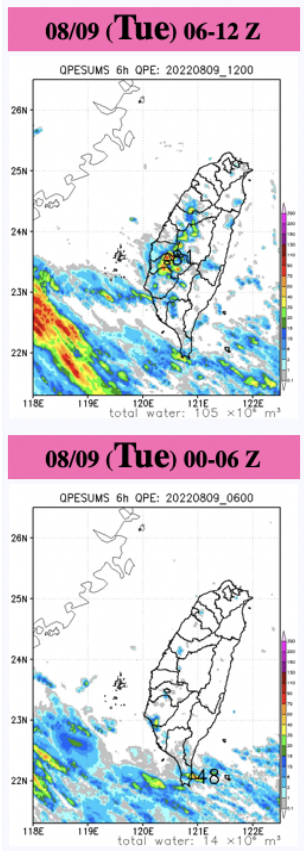


Figure 1: 6-hourly rainfall on 8/9.

Day Zero Forecast (0-24 h; 00 UTC 9 Aug - 00 UTC 10 Aug)

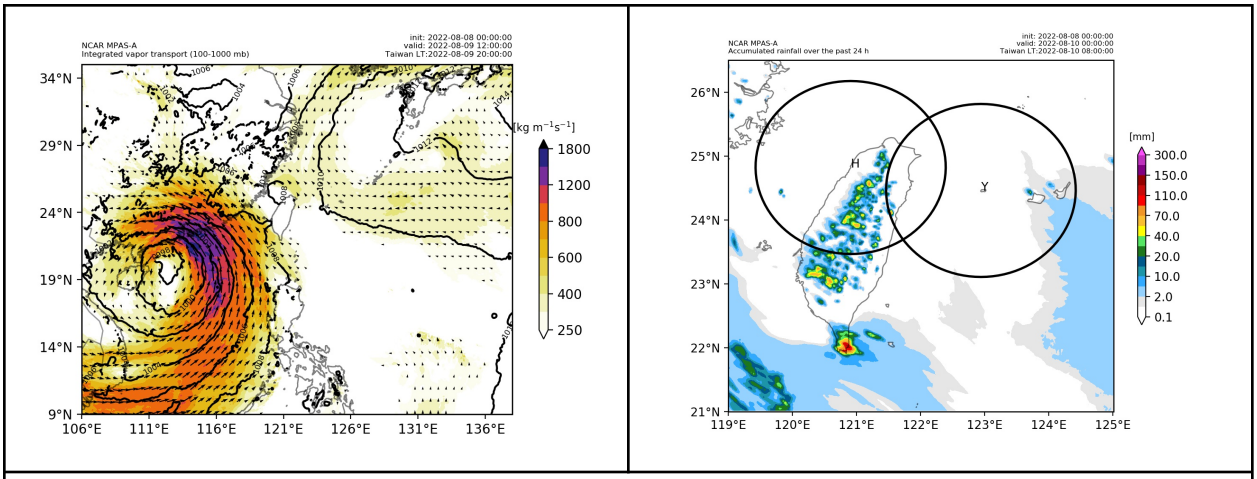


Figure 2: MPAS initialized 0z Aug 8 showing 24-hr accumulated rainfall at the end of Day 0, and IVT at 12z.

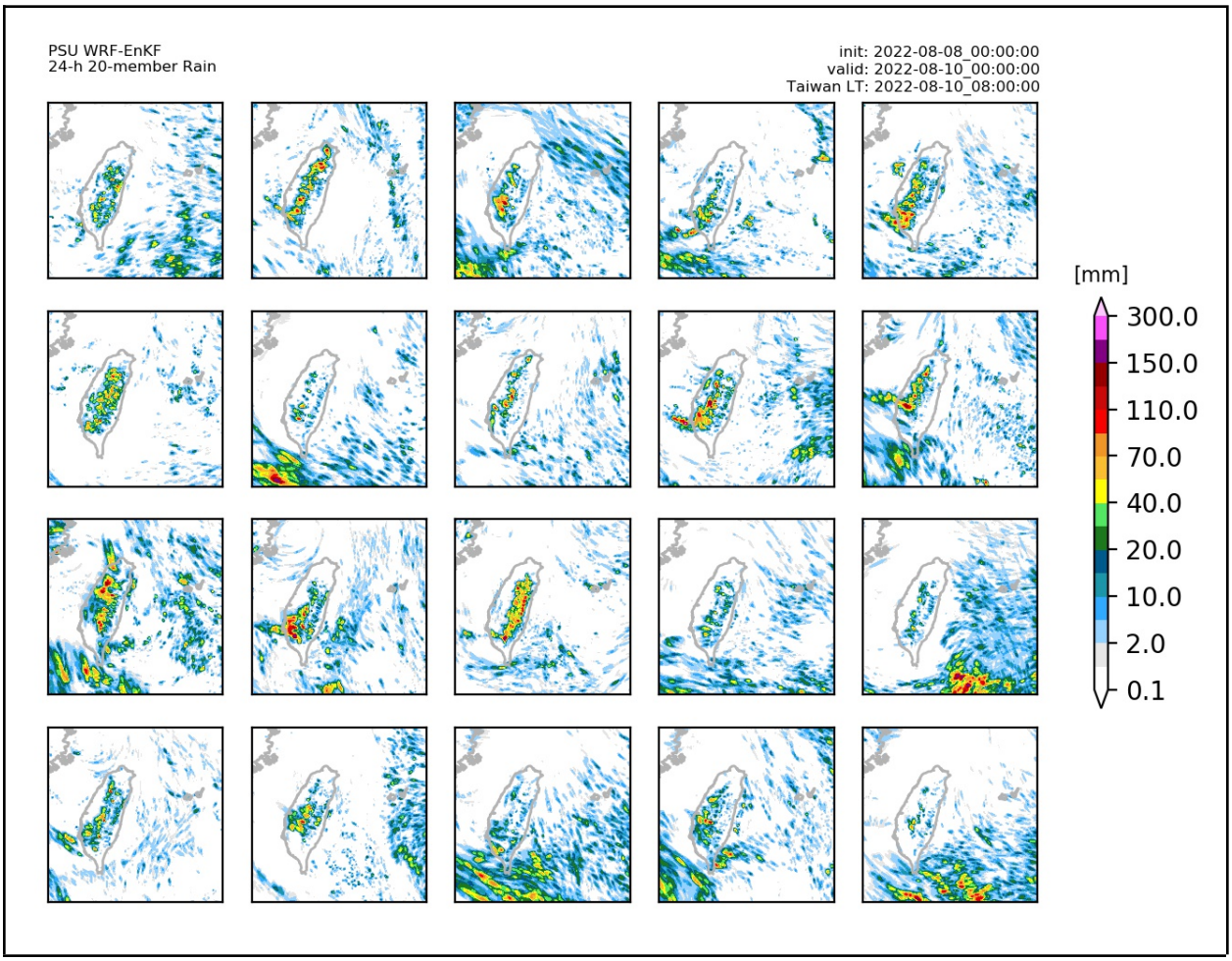


Figure 3: PSU WRF ensemble initialized 0z Aug 7, valid at the end of Day 0 at 0z Aug 9.

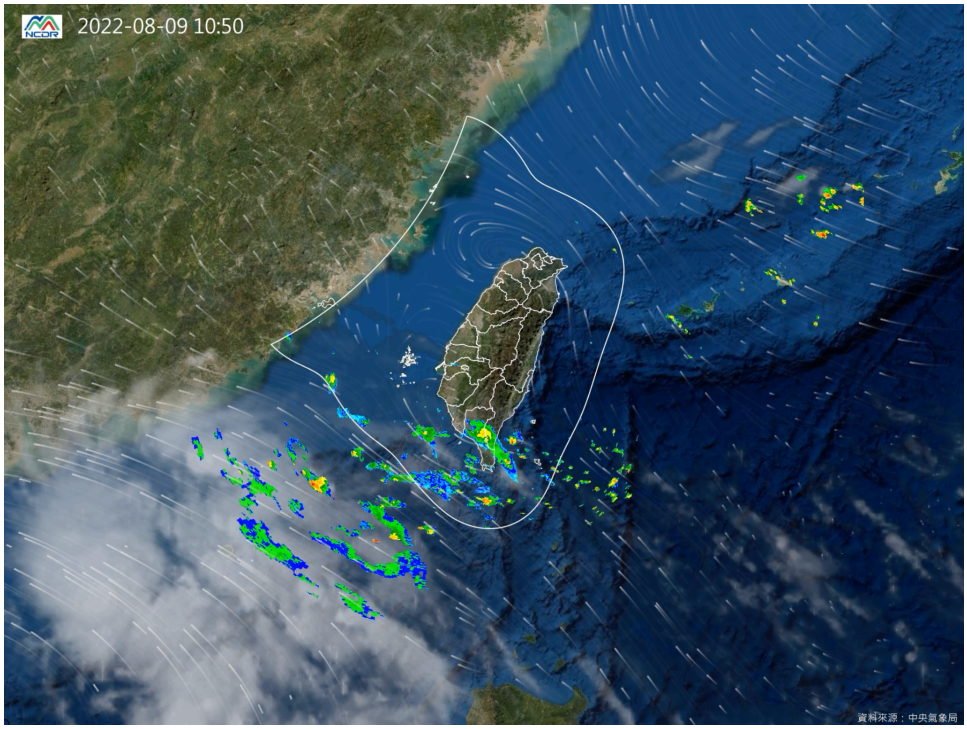


Figure 4: Satellite and radar image from 10:50 am LT on Aug 9.

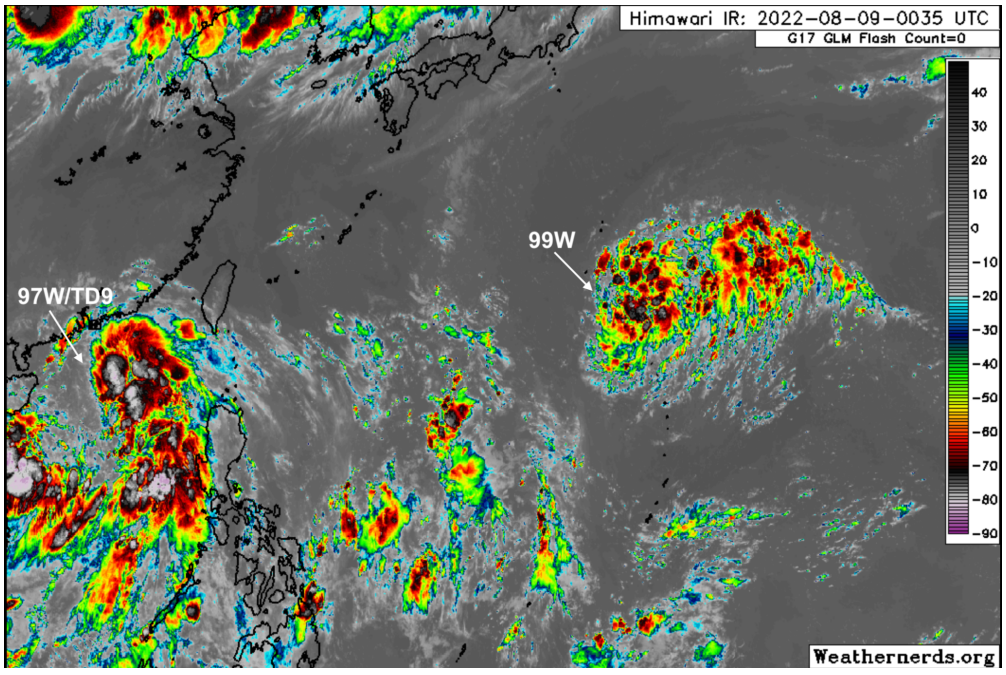
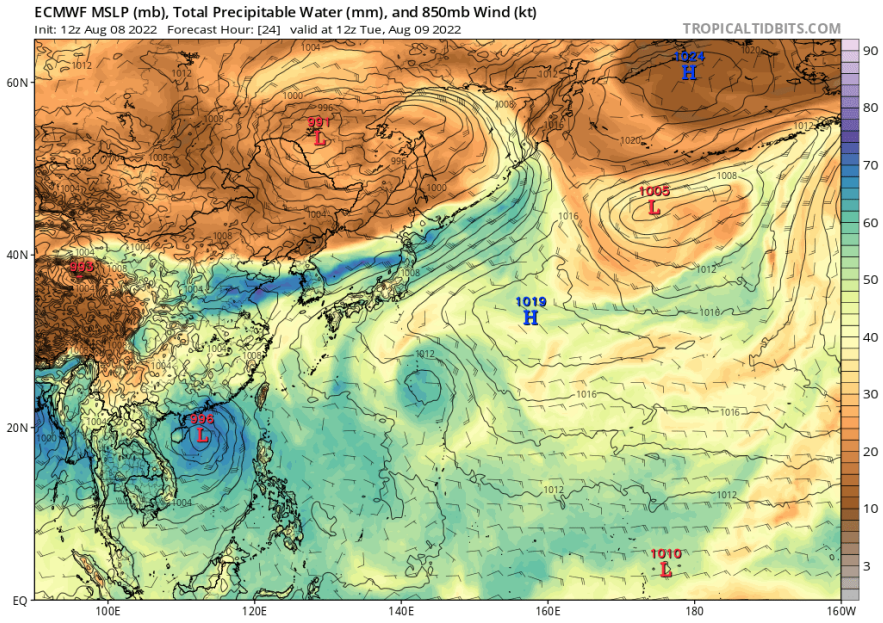


Fig. 5: Himawari infrared satellite image at 0035 UTC.



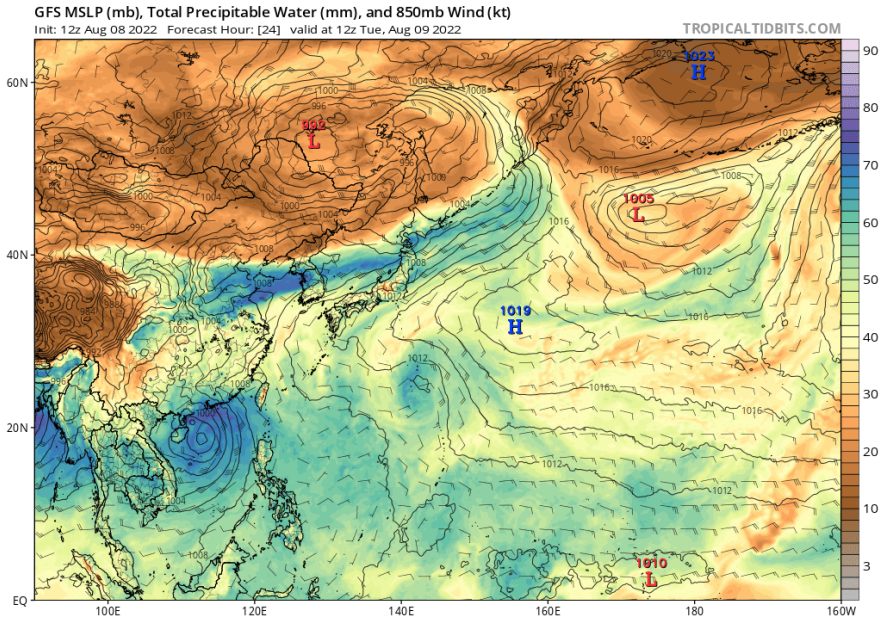


Fig. 6: EC & GFS, initialized 12z Aug 7, showing PWAT and 850 mb Wind for the whole Pacific at 12z Aug 8.

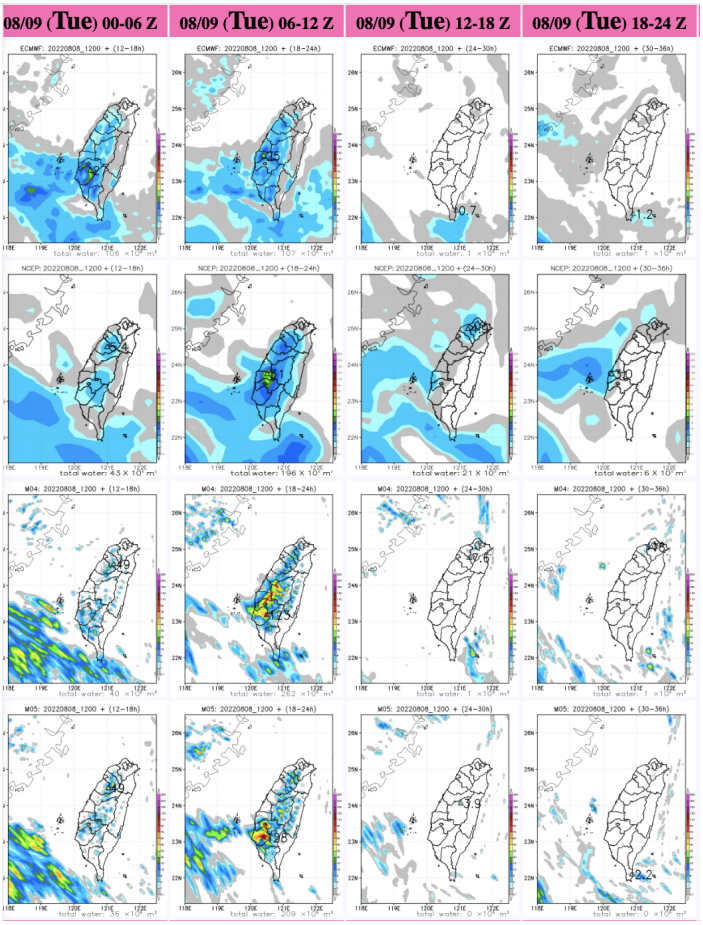


Figure 7: 6-hourly QPF on Day 0 from (top to bottom) EC, NCEP, WRFD and TWRF initialized 12z August 8th.

Discussion

Below are a number of screenshots of S-Pol, gif loops of rainfall, soundings etc. Descriptions are given in the figure captions.

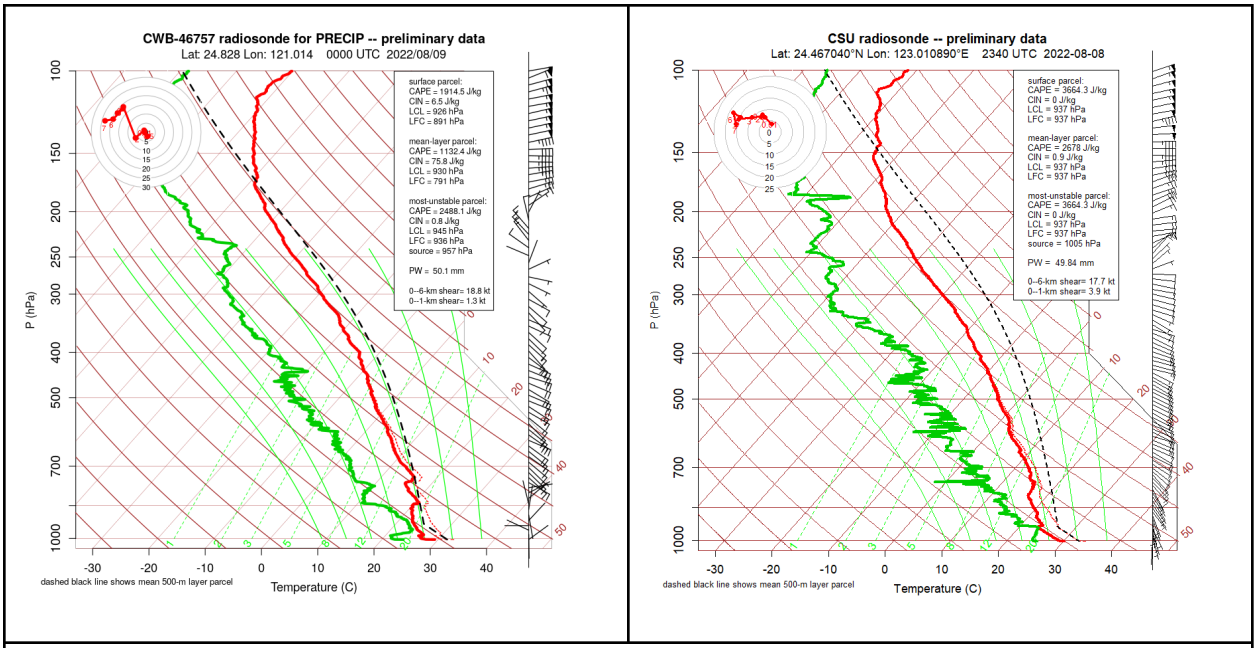


Fig. 8: (left) Hsinchu and (right) Yonaguni soundings valid at 00 UTC. Dry air persists through most of the column at both places. Deep easterlies also persist in the region, except for near the surface at both locations and around 200 hPa at Hsinchu.

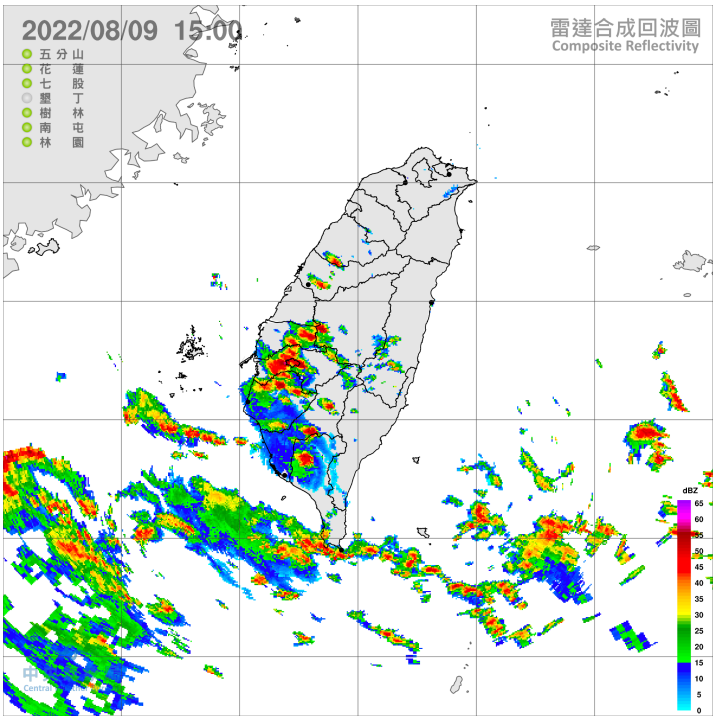


Fig. 9: CWB composite reflectivity mosaic showing the preferred location for storm initiation today over southwestern Taiwan. Also lots of rain happening over water south of Taiwan in association with the broad monsoon gyre (99W).

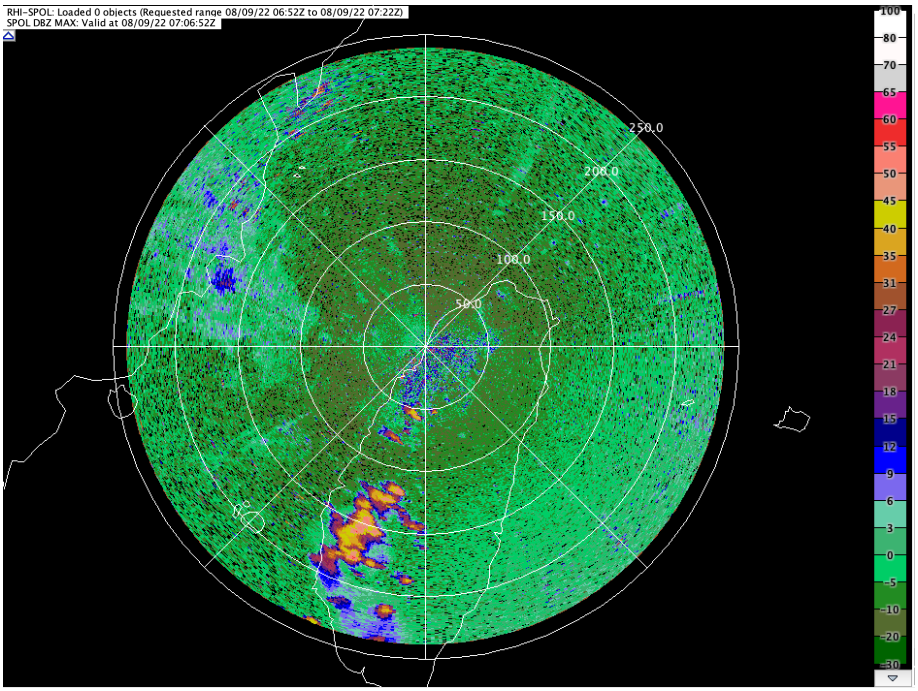


Fig. 10: S-Pol snapshot during the early stage of today's storms.

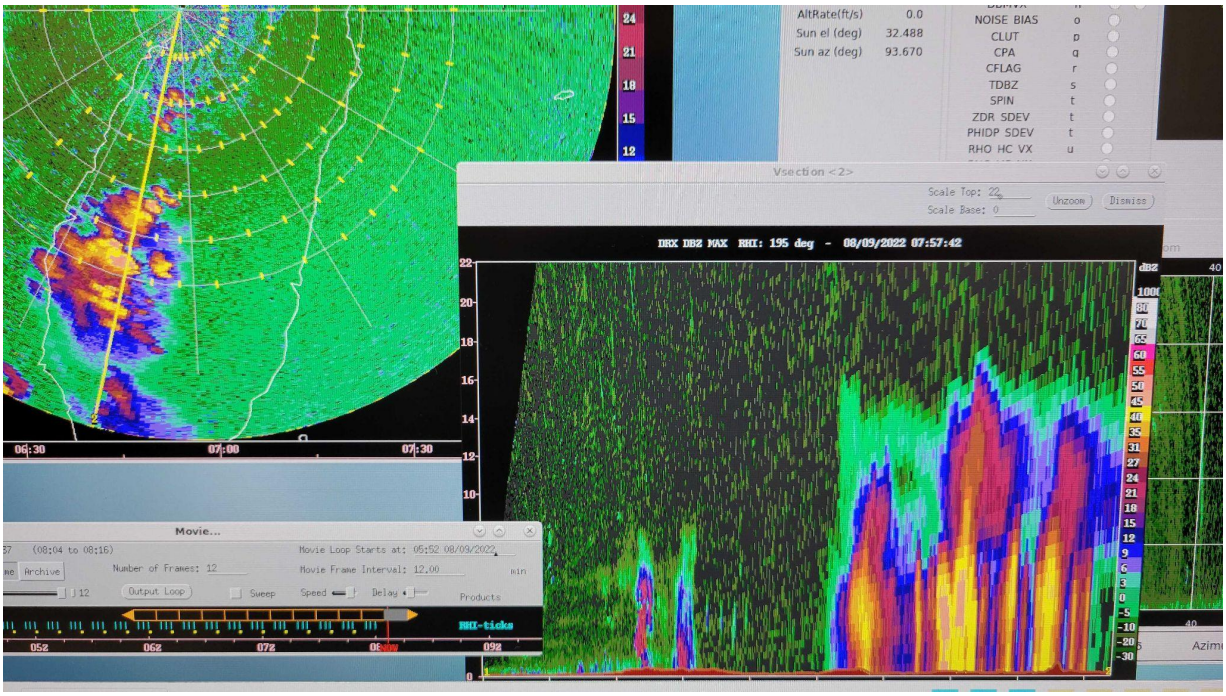
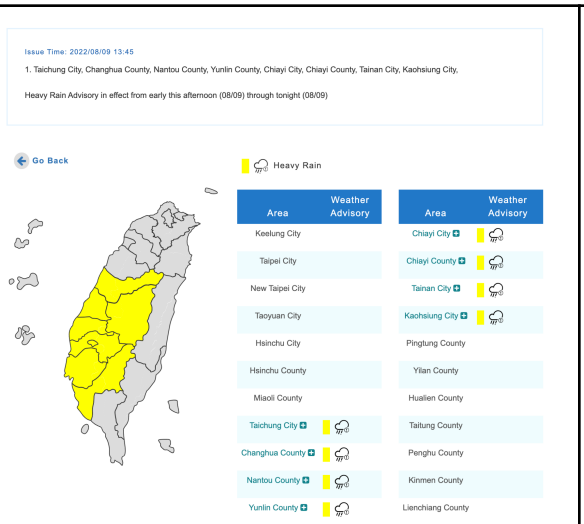


Fig. 11: S-Pol snapshot of reflectivity showing echo tops of over 18 km along RHI 195.



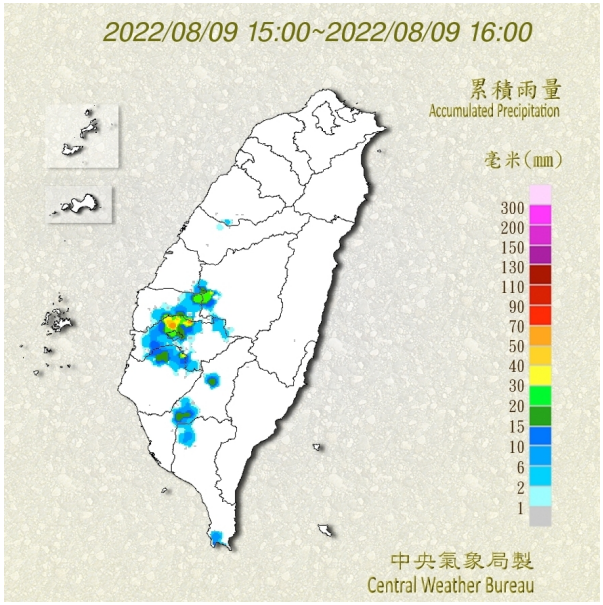
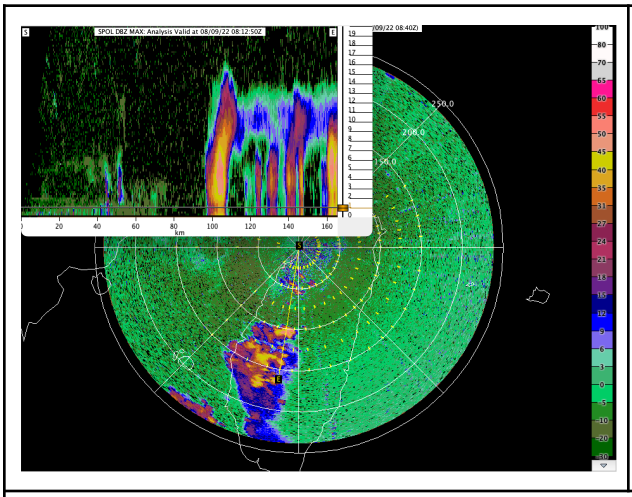


Fig. 12: (left) Heavy rain advisory issued by CWB at 13:45 LT (0545 UTC) for the usual suspects (Chiayi county, Nantou county, etc.). (right) Accumulated rainfall during the hour preceding the heavy rain advisory.



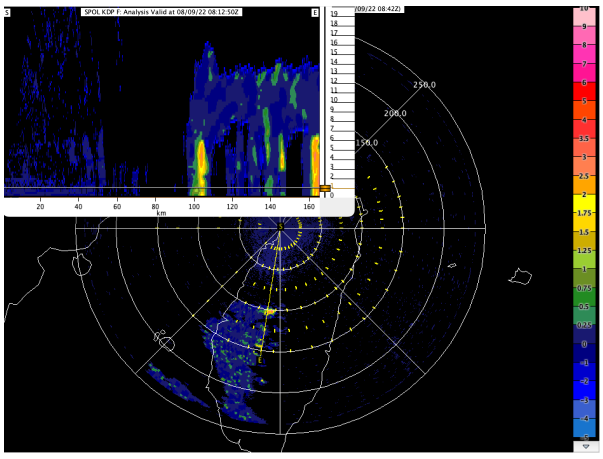


Fig. 13: S-Pol snapshots showing reflectivity (left) and kdp (right) around 8:12 UTC (4:12 PM local). Looks like mostly warm rain processes.

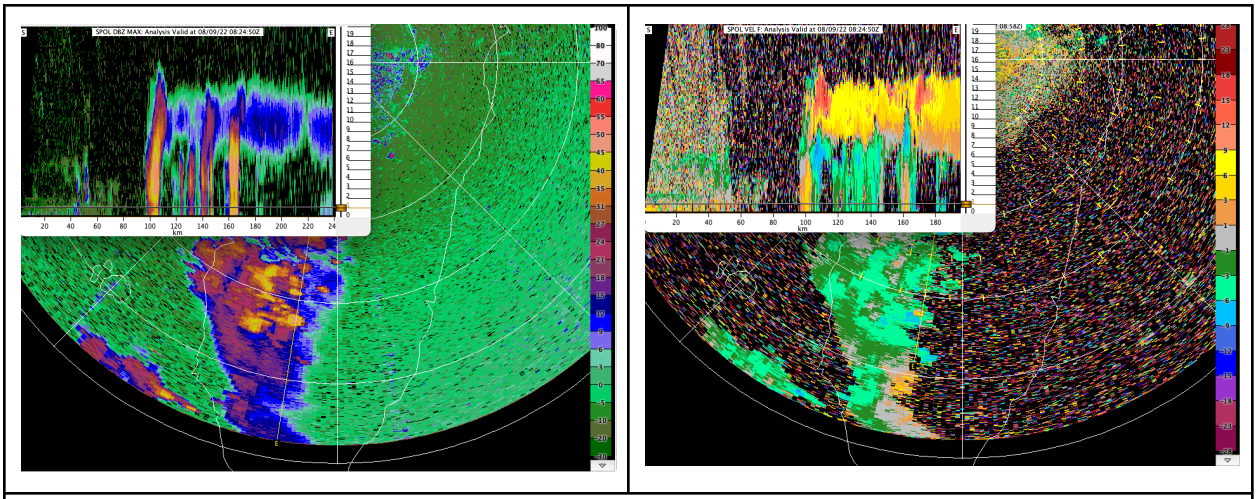


Fig. 14: S-Pol snapshots showing reflectivity (left) and radar velocity (right) around 8:24 UTC (4:24 PM local).

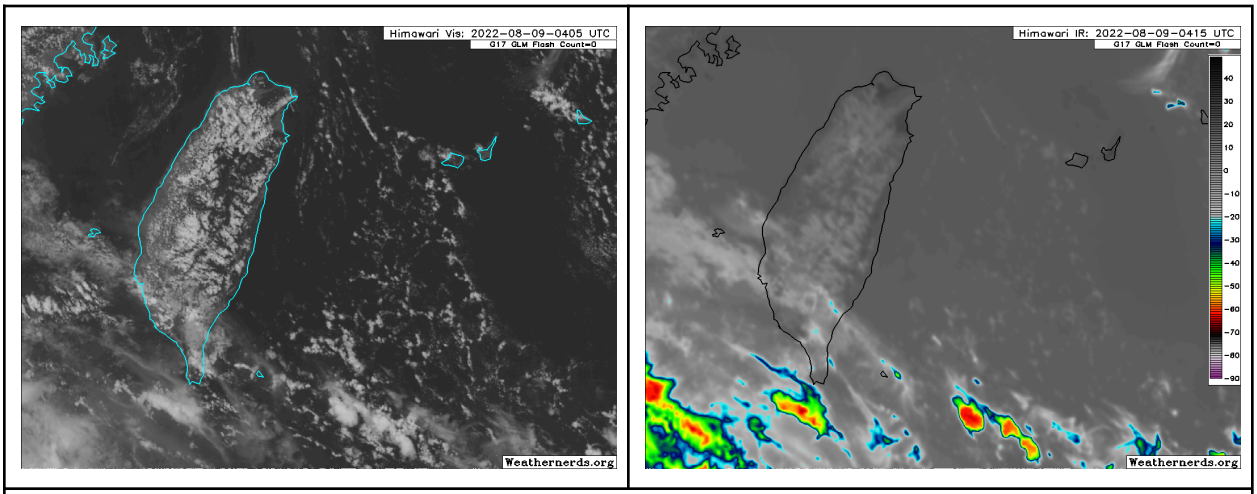


Fig. 15: (left) Visible and (right) infrared satellite loops showing today's (Aug 9) storms forming and deepening over southwestern Taiwan.

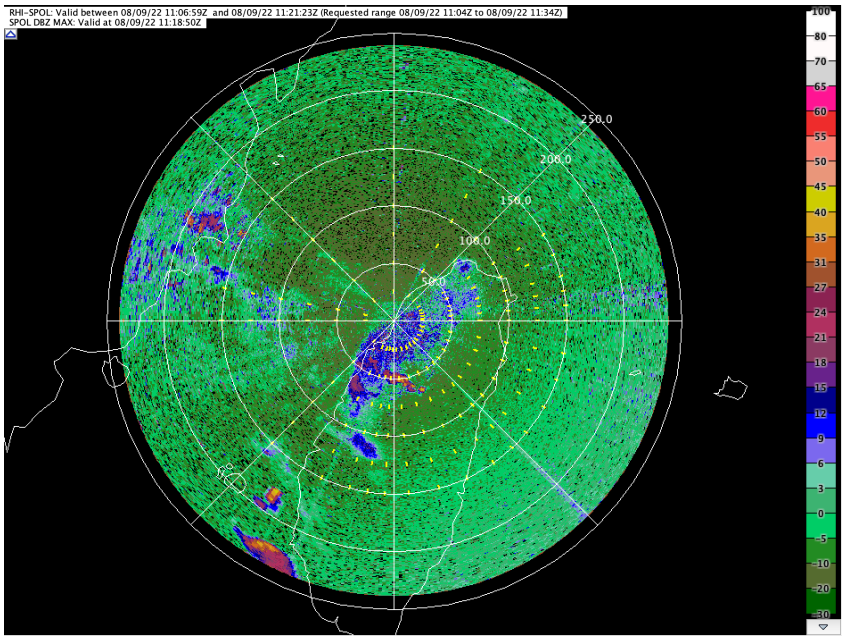


Fig. 16: S-Pol composite reflectivity at 1118 UTC (6:18 PM), just after sunset. Today's storms decayed much earlier than in the past several days.

Verification (how well did the models do for this event?)

The models performed generally well.

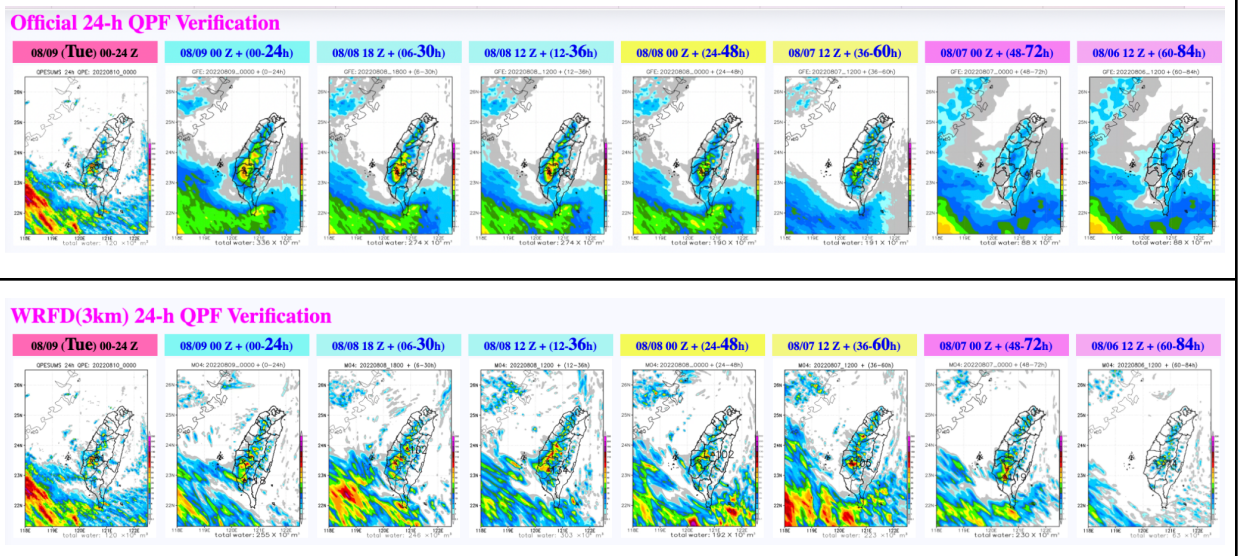


Figure 17: Official (top) and WRFD (bottom) 24-hr verification for August 9th.

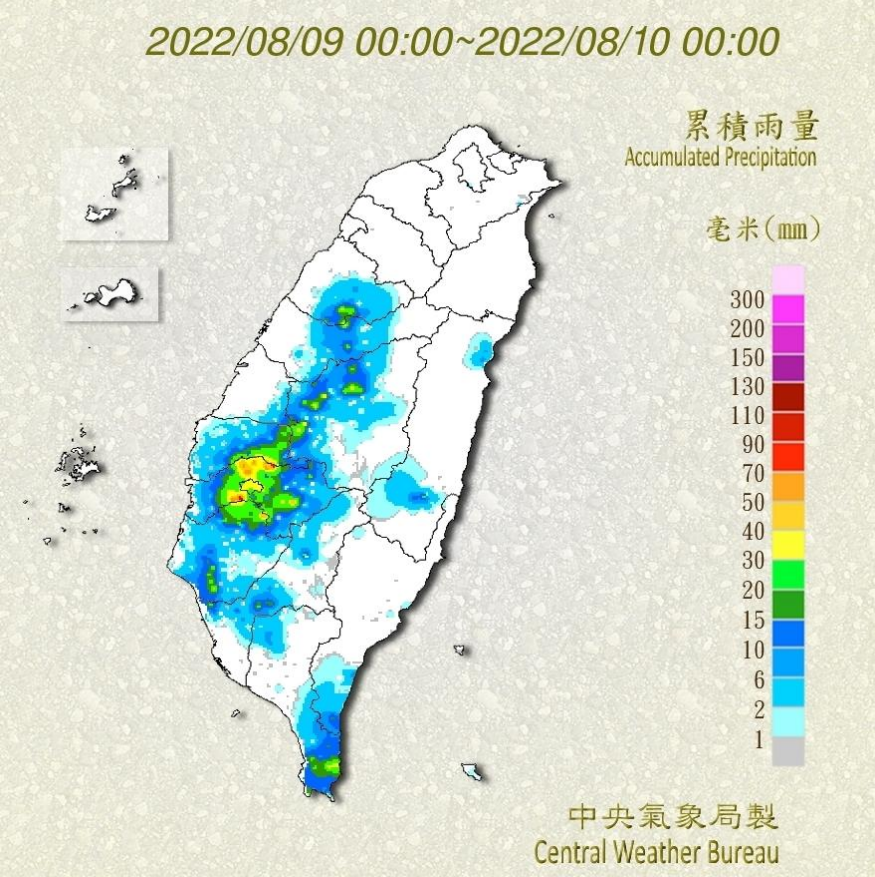


Figure 18: 24-hr rainfall accumulation from CWB. Note that this is LT.

Days One and Two Outlook (24-72 h; 00 UTC 10 Aug - 00 UTC 12 Aug)

Relatively dry conditions are expected to continue. The monsoon gyre is expected to move westward and dissipate after landfall. Newly identified 99W is expected to recurve and move far away from our region. MPAS predicts afternoon thunderstorms over the mountains for our last day of operations in Taiwan. MPAS also predicts light rainfall over the ocean and over Yonaguni on August 10–11. It is unclear how likely this light rainfall is—MPAS has been predicting too much light rainfall over the ocean this year.

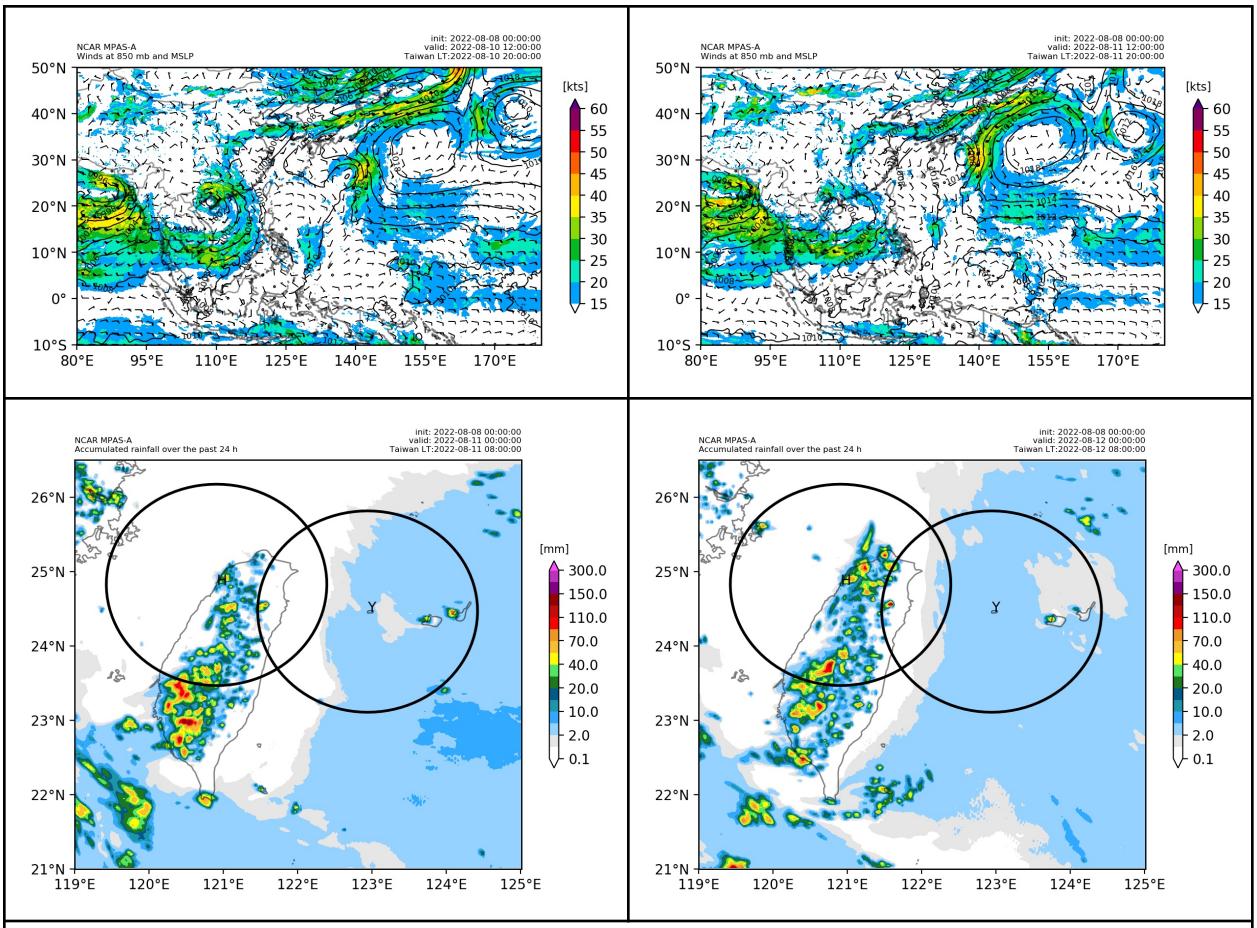


Fig. 19: MPAS run initialized 0z on 8 Aug. Left is Day 1, right Day 2. (top) is 850-hPa wind at the halfway point of the day (12z 10 Aug and 11 Aug) and (bottom) is 24-hr accumulated precipitation at the end of the day (0z 11 and 12 Aug).

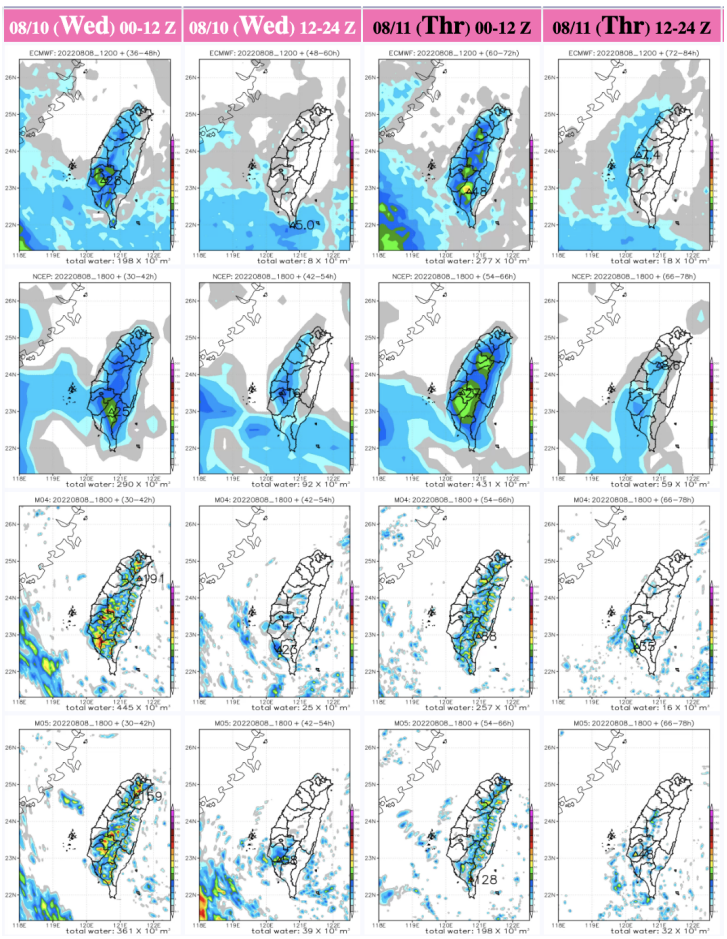


Fig. 20: Initialized 18z Aug 8, for Day 1 (our final day of PRECIP operations in Taiwan!) and 2 in 12-hourly increments.

Extended Outlook (Days 3-5; 00 UTC 12 Aug - 00 UTC 15 Aug)

We will only focus on potential tropical cyclones and rainfall over Yonaguni for the extended outlook as there will be 2x/day soundings and SEAPOL operations until at least August 13. The ensemble forecasts suggest that 97W will continue to move westward towards China, while newly identified 99W will recurve towards Japan' main island (possibly approaching Tokyo) (Fig. 19). The ECMWF ensemble additionally shows the likelihood of a low-pressure system or weak tropical cyclone approaching Yonaguni, but the likelihood is small (~8/50 members showing this possible scenario; Fig. 19). The rainfall forecast for Yonaguni (from MPAS) shows only light rain over the domain during August 13 (Fig. 20), but MPAS has been notorious for predicting too much light rain over the region this year. ECMWF also suggests that there could be light rainfall over the domain (Fig. 21). Days 4-5 look fairly dry within the SEAPOL in the global models (Fig. 21). Localized oceanic storms may still happen, but overall it looks like no significant weather event may happen near or over Yonaguni within the next 3–5 days.

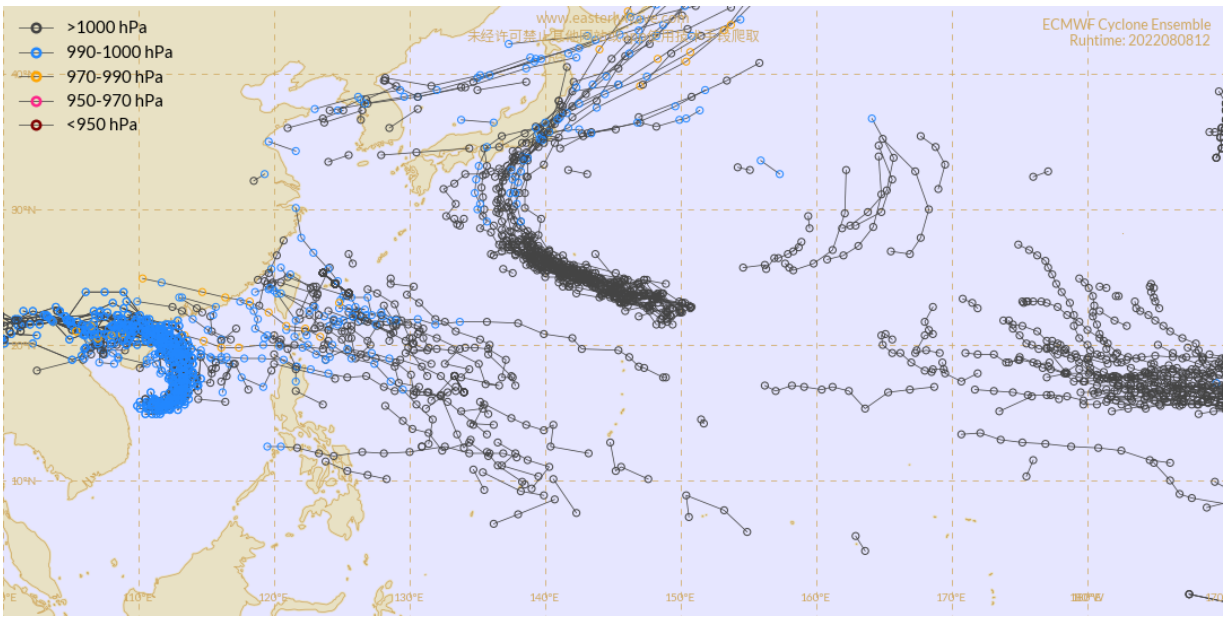


Fig. 21: ECMWF low-pressure track forecasts (from www.easterlywave.com) from the 12Z 8 August initialization.

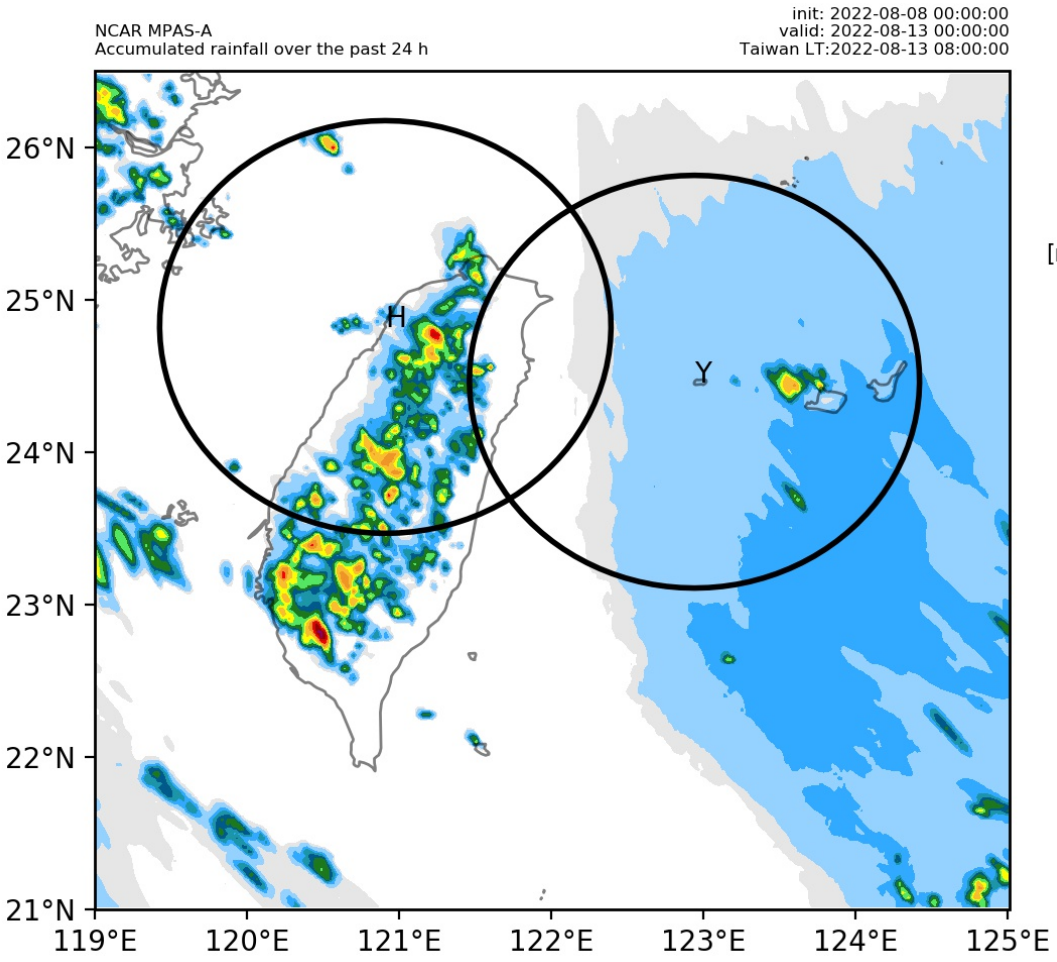


Fig. 20: 24-hour accumulated rainfall ending on 00Z August 13 from the MPAS forecast initialized on 00Z August 8.

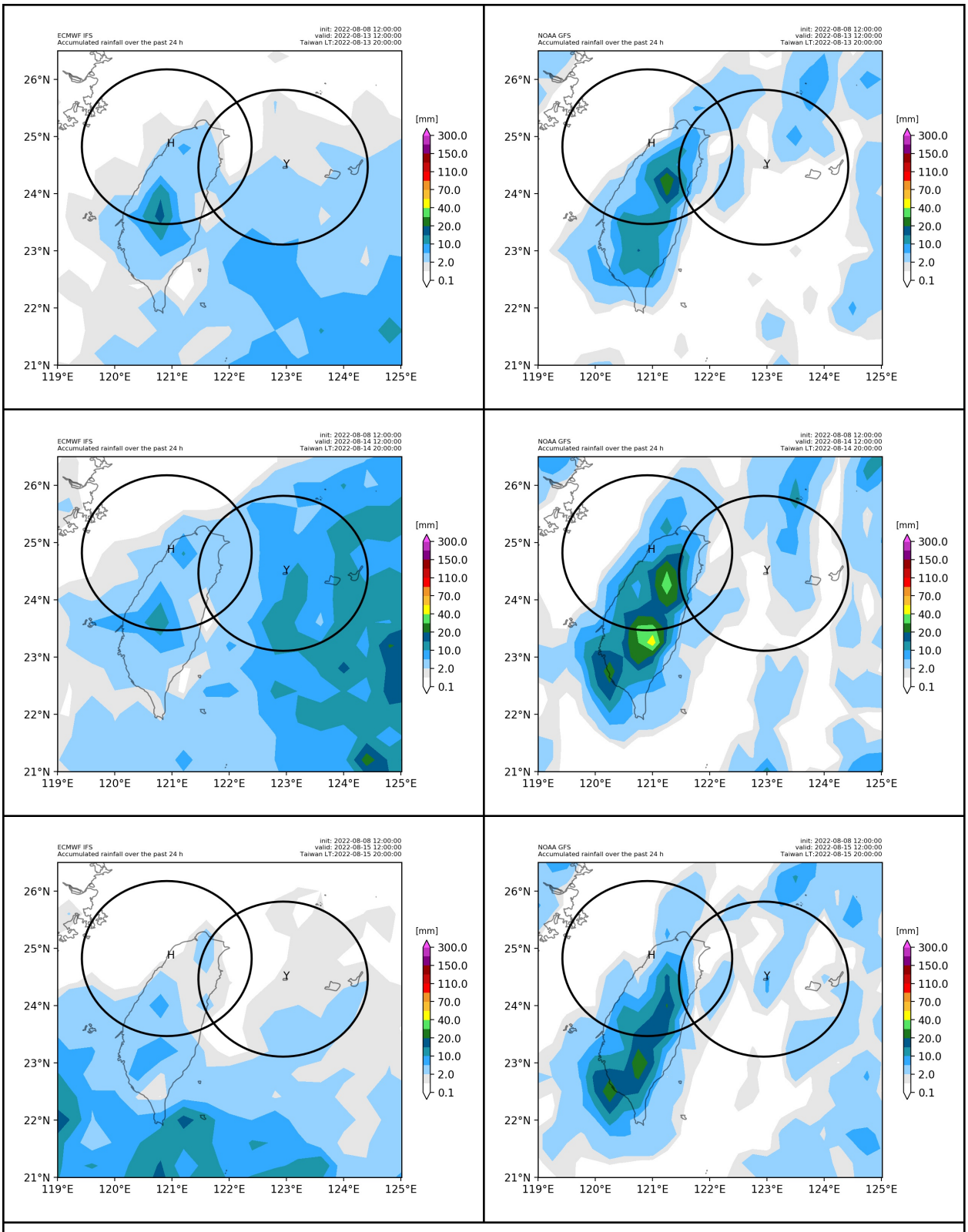


Fig. 21: 24-hour accumulated rainfall ending on 12Z August 13 (top), 14 (middle), and 15 (bottom) from the ECMWF (left) and (right) forecasts initialized on 12Z August 8.