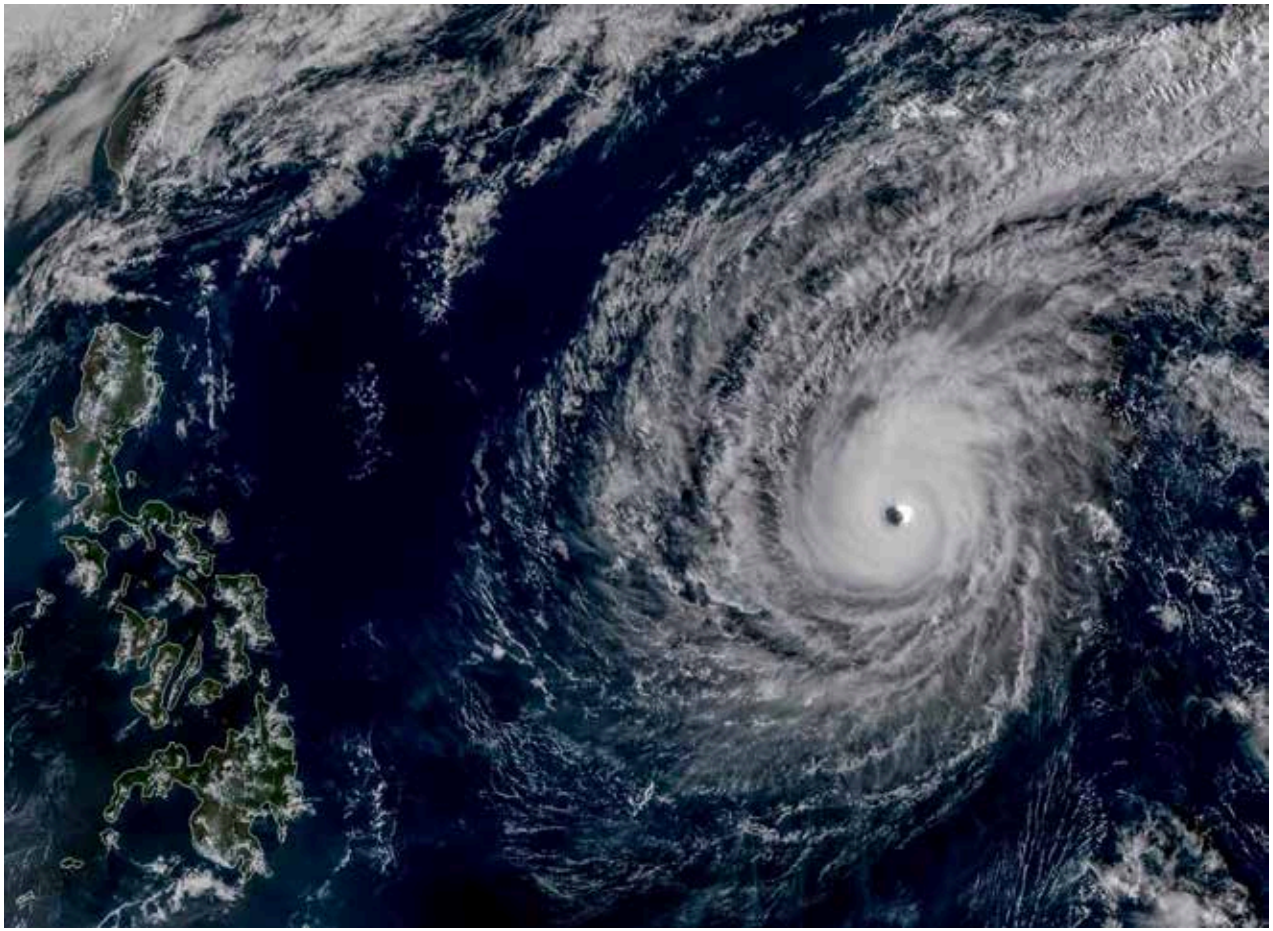
JTWC: New Products and Services / Research and Development



Presented by Mr. Matthew Kucas, Technical Services Team
12 March 2019

JTWC: New Products and Services

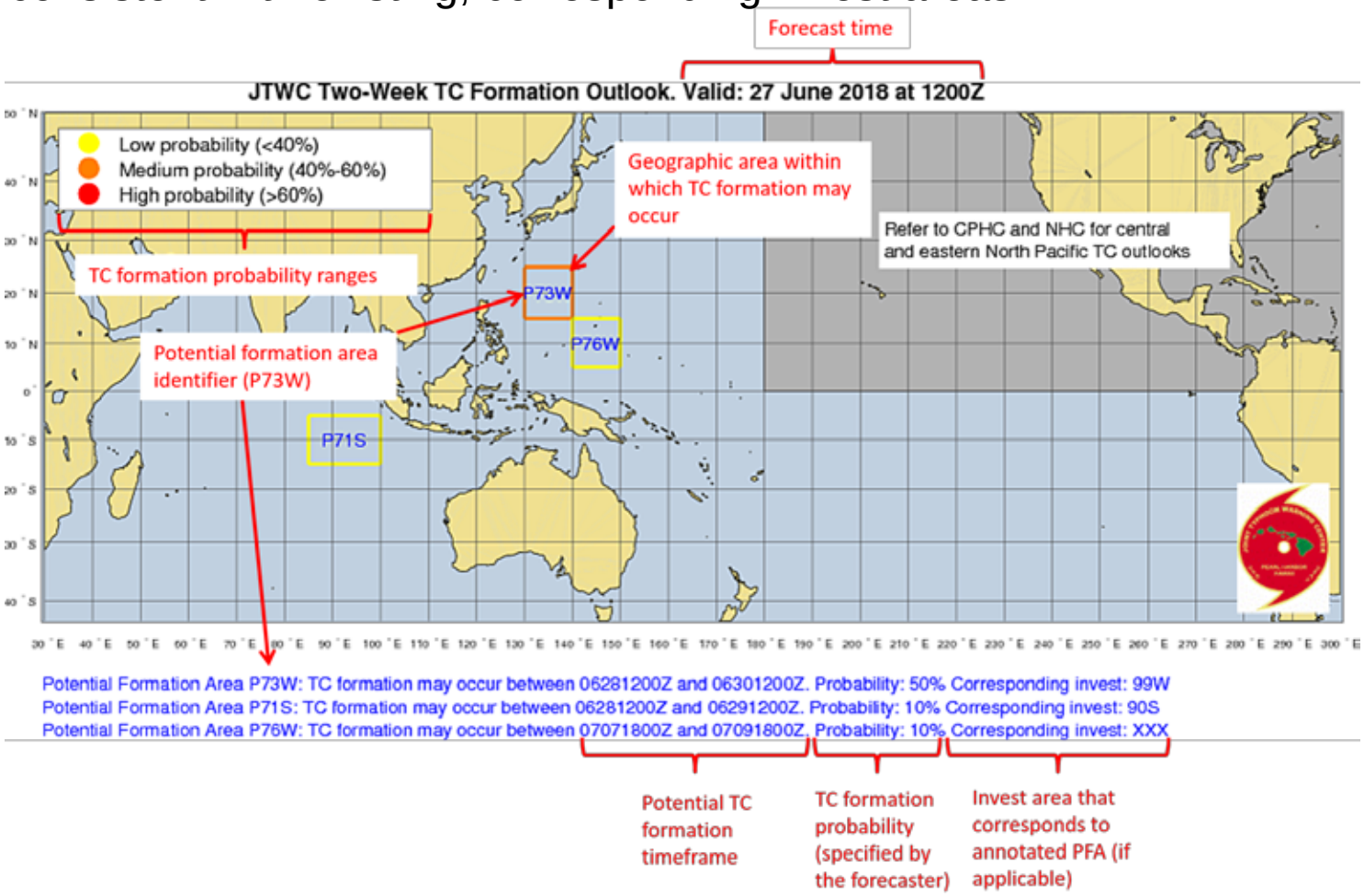
- Expressing uncertainty (prognostic reasoning)
  - Current process: Uncertainty subjectively assessed by forecasters
  - Developing procedures to objectively classify analysis position, track forecast and intensity forecast spread

- NWS customer support
  - Increasing operational coordination with WSO American Samoa

- Two-week TC formation outlooks
  - Operational products available to DoD entities

New Products and Services: Two-week Formation Outlook

- Regularly issued once every 12 hours; reissued to ensure classifications consistent with existing, corresponding invest areas



New Products and Services: Two-week Formation Outlook

- Detailed information for each area identified in two-week outlook, including prospective formation location and timeline
- Future work: Accompanying text discussion, forecast initial motion vector

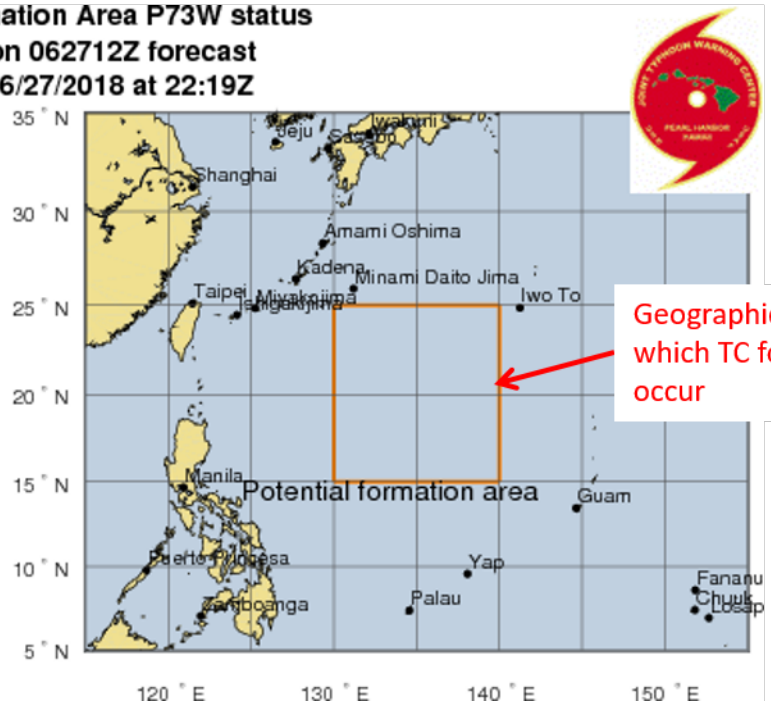
Time to formation based on first warning time estimate and graphic update time

TC formation probability: 50%
TC may form between 28/12Z and 30/12Z
Est. time to formation: 1.6 days (~29/12Z)

Projected invest classification times, based on first warning time estimate (middle of formation timeframe)

Projected classification timeline:
Invest: 24/12Z
Low: 26/12Z
Medium: 27/12Z
High: 28/12Z
First warning: 29/12Z

Corresponding invest designator: 99W



Geographic area within which TC formation may occur

JTWC: Process Development

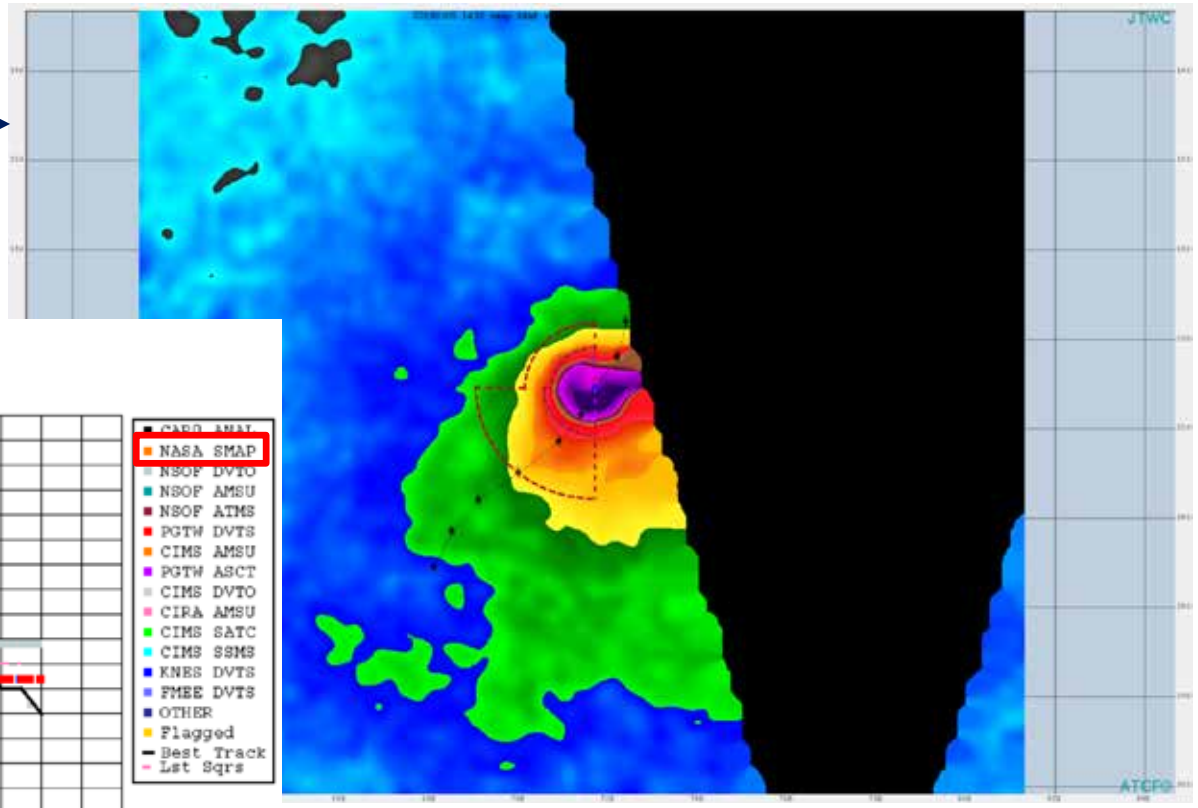
- AWIPS
  - Hardware installed; training and procedure development in progress
  - Operational application anticipated by end CY 2019
  - Prospective GALWEM GRIB data ingest

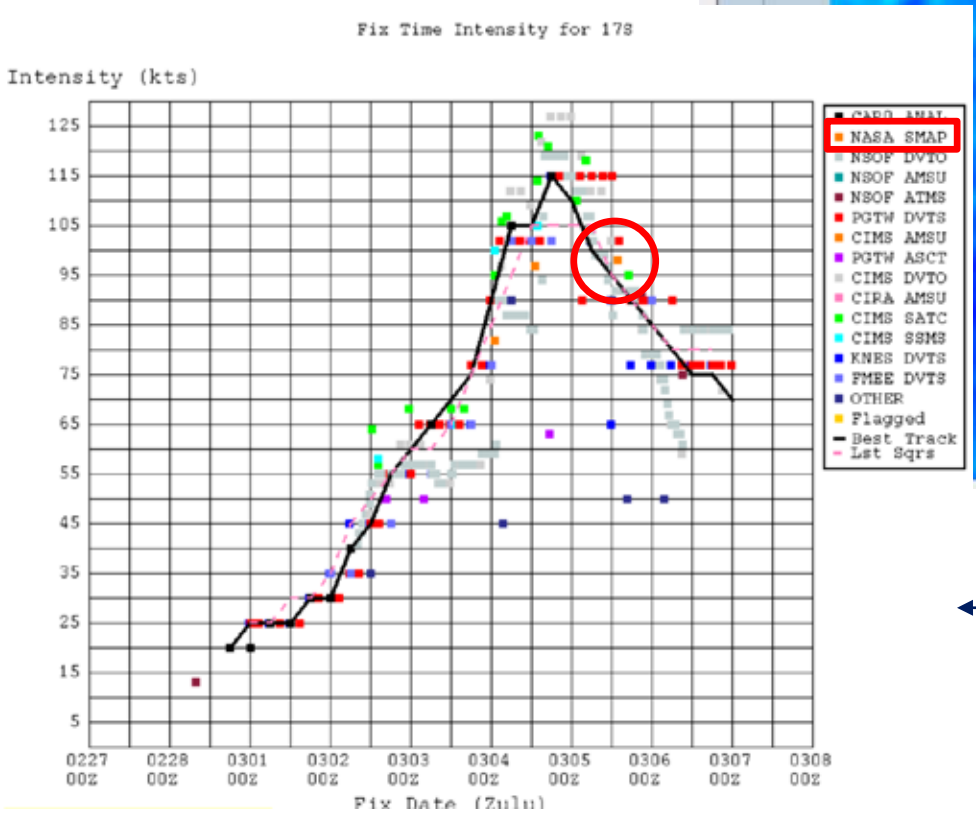
- Intensity analysis using microwave satellite imagery
  - AF Institute of Technology students recently completed Masters thesis relating microwave imagery patterns to TC intensity
  - Further work required to apply findings operationally

- SMAP / SMOS
  - Imagery and ATCF fixes available to forecasters for TC intensity analysis

SMAP in ATCF

Image overlays
(clickable for data values)





Max intensity and wind radii
estimates (fixes)

JTWC R&D Needs

Priority	Need
1 TC Intensity Change	*Basin-specific* (WESTPAC, SHEM, NIO, SIO, and SWPAC) probabilistic and deterministic *forecast guidance for TC intensity change*, *particularly* the onset, duration, and magnitude of *rapid intensity change* events (including ERC, over-water weakening, etc.) at 2-3 day lead times.
2 TC Structure Specification	*Basin-specific* (WESTPAC, SHEM, NIO, SIO, and SWPAC) probabilistic and deterministic guidance for the *specification* (analysis and forecast) *of key TC structure variables*, *including* the production of 34-, 50- and 64- knot wind radii and a *dynamic* (situational) confidence-based *swath* of potential 34-kt wind impacts
3 Data Exploitation	Techniques or products that *improve* the utility and *exploitation of microwave satellite, ocean surface wind vectors, and radar data* for fixing (center, intensity, radii) TCs, or for diagnosing RI, ETT, ERC, *etc.* (*e.g.*, develop a "Dvorak-like" technique using microwave imagery).
4 TC Track Improvement	Model enhancements or guidance to *improve TC track forecast skill and* the *conveyance of probabilistic track uncertainty*. Includes development of guidance-on-guidance to identify and reduce forecast error outliers resulting from large speed (e.g., accelerating recurvers) and directional (e.g., loops) errors, or from specific forecast problems such as upper-level trough interaction, near/over-land, elevated terrain, and extratropical transition.
5 TC Genesis Timing and Forecast	Guidance to *improve* the *forecasting of TC genesis timing* and the subsequent track, intensity and structure of pre-genesis tropical disturbances at both the short-range (0-48 hours) and the medium-range (48-120 hours), that exhibits a high probability of detection and a low false alarm rate. Techniques to diagnose and predict the formation of TCs via transition of non-classical disturbances (e.g. monsoon depressions, sub-tropical, hybrids, etc).

JTWC R&D Efforts

1) TC intensity change
   - SHIPS-RI forecasts (through 48 hours) presented to forecasters and included in intensity consensus when available

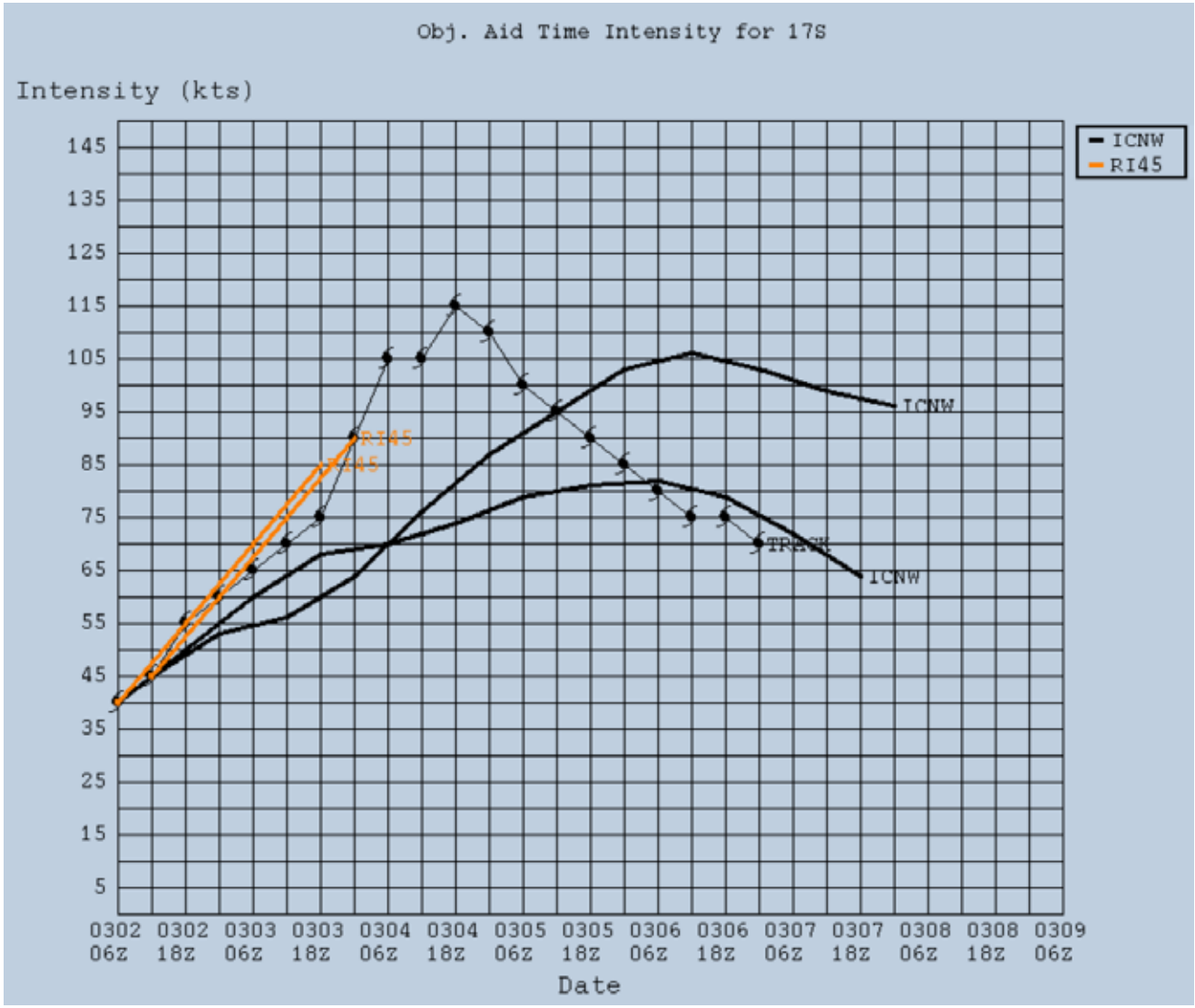
2) TC structure specification
   - SHIPS forecasts incorporated into wind radii consensus
   - TC diagnostics website development (M. Fiorino)

3) Data exploitation
   - MK-IVB satellite imagery enhancements and ATCF overlay generation
   - GIS-based observation and model data display systems

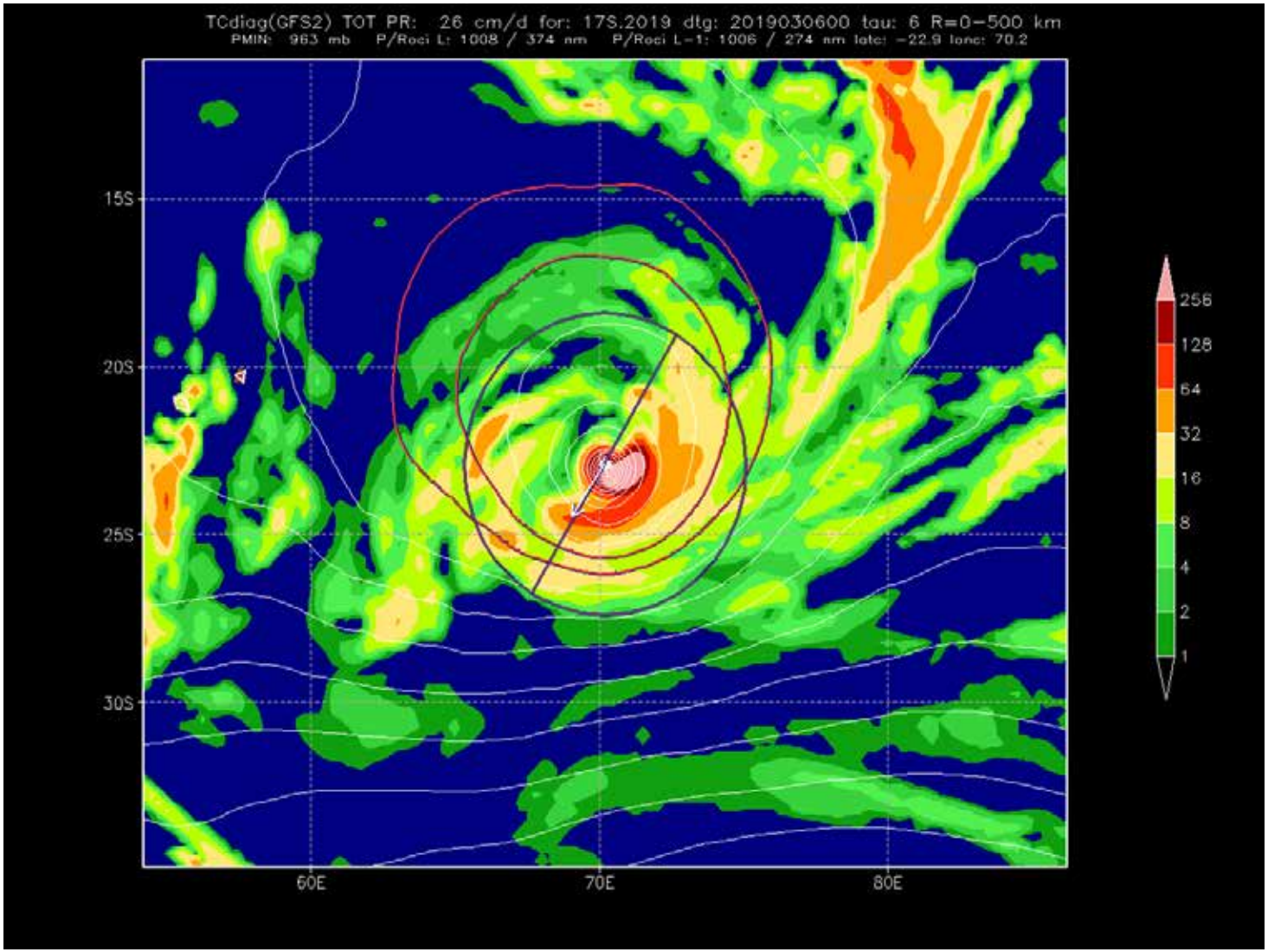
4) TC track forecast improvement
   - Updated track forecast consensus

5) TC genesis timing and forecast
   - Processing NCEP and ECMWF pre-formation track and intensity forecasts for two-week formation areas
   - JHT project: WAIP (analog) technique for pre-formation intensity outlook

RIPA (SHIPS-RI)



TC Diagnostics Website



Questions?