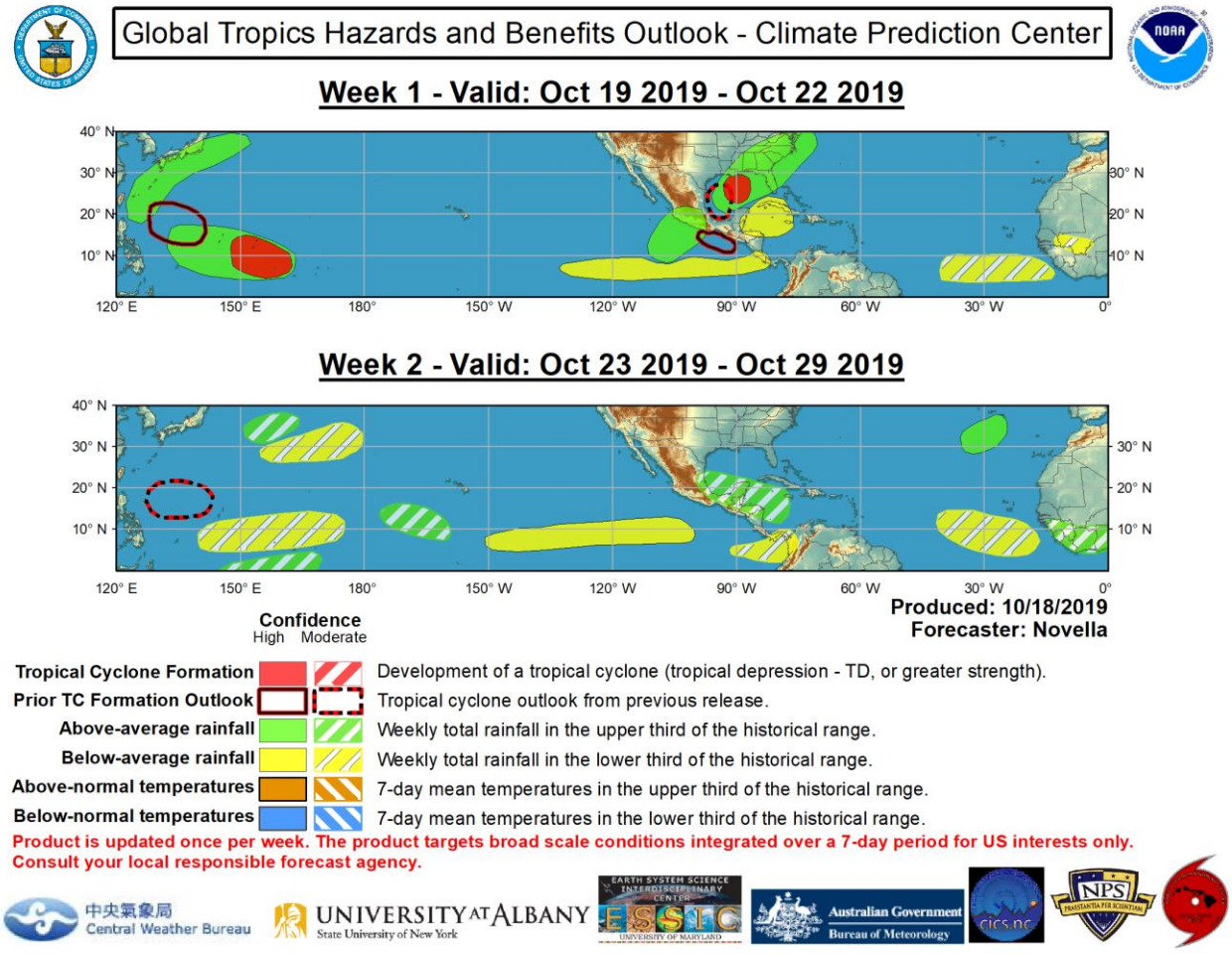

There has been little change to the state and evolution of the MJO. Analysis of zonal winds, upper-level velocity potential, and OLR anomalies continue to indicate stationary signals associated with a significantly strong positive phase of the Indian Ocean Dipole (IOD). Similar to earlier this week, dynamical models are in agreement on the MJO gaining amplitude while remaining stationary, with some eastward propagation before weakening in amplitude by Week-2. The increase in MJO amplitude in the RMM space during the next few days is still likely tied to the low frequency footprint, with a continued enhancement of lower-level easterly anomalies persisting over the equatorial Indian Ocean through the remainder of October.

Over the past few days, the National Hurricane Center (NHC) has been monitoring a low pressure system located in the Gulf of Mexico (Nestor). Convection associated with the disturbance has continued to increase, with better indications of a rotating center according to satellite imagery. This low is forecast to strengthen and track to the northeast. In the next 24 hours, storm surges along the Gulf coast and locally heavy rainfall accumulations are possible over the Florida panhandle which may result in flash flooding in the region. Following landfall, above-average precipitation amounts are expected across the

parts of the southeast and mid-Atlantic regions of the CONUS as the system transitions to an extratropical storm during the next few days.

In the eastern Pacific, a broad area of convection associated with potential Tropical Cyclone Seventeen (10/15) resulted in heavy rains to the Oaxaca and Chiapas states of southern Mexico , as the low moved on land and quickly dissipated. Further west, an area of low pressure deepened over the last 48 hours and led to the development of Tropical Storm Octave (10/18) which is currently located at approximately 10N, 127W and embedded in the ITCZ. Model guidance suggests very little storm motion over the next few days and it is expected to weaken into a remnant low over the weekend. In the western Pacific, Tropical Cyclone Neogori formed on 10/16 at approximately 17.5N, 130E. While models had previously shown a forecast path over the northern Philippines, an area of upper-level convergence (associated with the IOD) located to the west of its initial position is expected to limit westward movement of the system, and it is now forecast to track to the northwest and remain out at sea as it weakens over the next several days.

Across the Main Development Region, model guidance indicates the potential for tropical cyclogenesis to remain low due to high environmental shear conditions through the end of October. In the western Pacific, the Joint Typhoon Warning Center (JTWC) is currently monitoring an area of convection (97W) located near 8N, 164E that is currently in a favorable environment for gradual development. A high confidence is posted due to good model agreement during the next 72 hours. During days 5-11, both GFS and GEFS guidance suggest high amplitude trofing and a frontal passage over the Gulf of Mexico and western Caribbean, which is expected to enhance rainfall in the region; however ensemble solutions do not suggest much potential for tropical cyclogenesis at this time.

----- Original Discussion from Tuesday, October 15, 2019 follows: -----

During the past several weeks, the RMM index has continued to depict a weak and stagnant MJO signal which continues to be reflective of the robust lower-level easterly anomalies over the Indian Ocean, and westerly anomalies over the Maritime Continent tied to the significantly positive phase of the Indian Ocean Dipole (IOD). Analysis of upper-level velocity potential anomalies since early October indicates the stationary presence of enhanced convection centered over Africa, with suppressed convection over the Maritime Continent supportive of the low frequency variability driving the signal.

Dynamical model MJO forecasts are in better agreement this week which generally depicts the MJO re-emerging with eastward propagation across the Indian Ocean during the next couple of weeks. ECMWF

guidance remains the most robust and progressive of the models, with many ensemble members propagating the MJO through phases 1 and 2 before weakening later during the Week-2 period. Despite the model agreement with an emerging MJO event, forecast confidence for a renewed MJO is low for a few impeding reasons. First, the significantly positive phase of the IOD has registered its highest weekly index value (2.15) since 2001 (according the Australian Bureau of Meteorology), as differences in weekly sea surface temperature anomalies also suggest a continued strengthening of the temperature gradient over the Indian Ocean during mid-October. Additionally, CFS and GEFS mean wind anomalies both depict a strengthening and expansion of the anomalous lower-level easterlies over the equatorial Indian Ocean which would likely continue to anchor the enhanced envelope of convection and upper-level divergence over Africa. Furthermore, ECMWF rainfall anomaly forecasts for Week-1 and Week-2 reflect this scenario with continued suppression of precipitation over the Maritime Continent through the end of October. Given how strong the low frequency footprint has been, and with no indications of weakening, it is likely the IOD will continue to be the primary player across the global tropics.

Since last week, two tropical disturbances have formed. The formation of tropical cyclone Ema (10/12) in the central Pacific was short lived, peaking in intensity with 45mph sustained winds approximately 300 miles west of Lihue, Hawaii. Lastly, tropical depression fifteen formed within the last 24 hours in the Atlantic, and is forecast to slowly intensify into a tropical storm while tracking to the northwest near the eastern Cabo Verde Islands. This system is expected to encounter high environmental shear and weaken into remnant low in the next few days.

For the Week-1 period, the National Hurricane Center (NHC) is currently monitoring two areas in the eastern Pacific for tropical cyclogenesis. The first area located a few hundred miles south of Guatemala has with a high chance of development (80%) over the next five days. Latest satellite imagery suggests this area of low pressure has become better organized, and model guidance depicts the low to deepen while tracking to the northwest near the Gulf of Tehuantepec over the next few days. This system is expected to bring heavy rainfall to parts of Guatemala and southern Mexico, and possible landslides in the higher elevations of the region. The second area (approximately located at 12N, 124W) has a low chance of formation (20%) over the next five days according to NHC, however both GFS and ECMWF guidance suggest further development of this low is still possible later in the Week-1 period. In the tropical Atlantic, NHC is monitoring two areas of tropical cyclogenesis. One of these areas located near the Yucatan Peninsula has a 40% chance of formation over the next 5 days and is forecast to track towards the Bay of Campeche, where environmental conditions are expected to become more conducive for development. Regardless of formation, enhanced rainfall is expected over the Gulf of Mexico and over portions of the southeastern U.S during Week-1. In the western Pacific, the Joint Typhoon Warning Center (JTWC) is monitoring an area of low pressure near 16N, 135E, and models are in agreement that this low will further develop while tracking west-northwest towards Luzon, Philippines. In addition, GFS and GEFS guidance since yesterday have indicated another tropical cyclone forming further east near Micronesia with the potential for rapid intensification. However, because

ECMWF solutions and other forecast tools diverge on the location, rate of development, and the probability of enhanced rainfall associated with this low, this area is omitted from this outlook.

During Week-2 period, model guidance suggests the potential for tropical cyclogenesis to continue across the West Pacific, as well as the Indian Ocean. Since yesterday, both GFS and ECMWF solutions depict a broad area of low pressure centered over the Indian subcontinent where two local areas of low pressure develop (one in the Arabian Sea, and one in the Bay of Bengal) during the early portion of the Week-2 period. However, confidence is not high enough to warrant the addition of a formation shape at this time. In the Tropical Atlantic, a predominately high shear environment during Week-2 is expected to reduce the likelihood for tropical cyclogenesis, particularly across the Main Development Region. However, an area of low pressure in western Caribbean is expected to increase the chances for above-average precipitation over the Gulf of Honduras and the Bay of Campeche.

Forecasts for suppressed and enhanced rainfall were made using a consensus of dynamical model forecasts and anticipated tropical cyclone tracks. Forecasts over Africa are made in consultation with CPCs international desk, and can represent local-scale conditions in addition to global-scale variability.