South American Desk Daily Discussion Guide

A half-hour discussion is held daily as a key component of the South American Desk training routine. The discussion has the ultimate purpose of attaining an understanding the current atmospheric situation and its expected evolution over a five to six day period. The discussion bases upon an analysis of the current situation, a verification of previous forecasts and a forecast discussion highly focused on model output analysis. The discussion allows the South American Desk team to draft five-day forecasts that are refined during the generation of the daily forecast products.

Topics covered and tools used

1. Analysis of the current situation.

1.1. Water vapor satellite data loops (IR3).

Water vapor data are used for the analysis of features at 300-400 hPa. This analysis helps to depict mid/upper tropospheric systems such as ridges, open troughs, cutoff lows, jet streams, mid/upper dry air intrusions, mid/upper moisture plumes, thunderstorms, potential areas with upper divergence and the general movement of the mid/upper troposphere.

1.2. Infrared-4 satellite data loops (IR4).

Infrared-4 data can be interpreted as the temperatures of surfaces and cloud tops. They reveal different types of cloud regimes, convective processes and other tropospheric features. Cloud top heights can be inferred by cloud top temperatures. Cloud types can then be inferred by complementing analysis with cloud morphology and behavior. IR4 imagery can be used to find surface boundaries such as fronts, shear lines, the Inter Tropical Convergence Zone (ITCZ), the South Atlantic Convergence Zone (SACZ), upper jets, mountain waves, subsidence inversions and orographic clouds among others.

1.3. Observations.

Surface and radiosonde observations and are explored when considered necessary.

2. Forecast verification.

The forecast from the previous day(s) is (are) verified to assess forecast skill and to consider pertinent adjustments to the forecasted rainfall amounts/areas. Verification is done by overlaying the forecast over IR4 satellite data and over rainfall amounts observed during the forecast period on the NAWIPS workstation.

3. Forecast Discussion.

3.1. Evaluation of run-to-run GFS model adjustments.

Models make adjustments to their forecast as different initialization data are ingested. These forecast adjustments are evaluated by comparing 500 hPa geopotential heights from the current GFS 00Z run with those of the previous GFS 00Z run.

3.2. GFS-ECMWF and GFS-UKMET Intercomparison.

Model differences are evaluated by comparing 500 hPa geopotential heights from the current GFS 00Z run with those of the ECMWF 00Z run and those of the UKMET 00Z run. It shows how very similar initializations can produce different results upon the model used. This evaluation helps to

build perspective on the confidence regarding the forecast, based on how model solutions cluster or diverge. This is also applied to sea level pressure fields.

3.3. Ensemble forecasting.

Global Model Ensembles means and standard deviation area analyzed using 500 hPa geopotential heights of the GFS, ECMWF and Canadian Model ensembles. The clustering versus divergence of ensemble members, shown as small versus large standard deviation, is a good indicator of high versus low forecast confidence.

3.4. Upper flow and divergence.

Flow at 250-200 hPa and divergence are analyzed using both the GFS 00Z and ECMWF 00Z model runs. This shows the forecasted evolution of upper systems and associated regions of divergence or ventilation for deep convection. Systems of interest include upper jet, jet streaks, the subtropical high, the Cavado do Nordeste or Northeast Brazil Low, the Subequatorial ridge and other upper ridges and troughs. This analysis is particularly useful across Tropical South America during the rainy season, when convective systems develop through the entire troposphere.

3.5. Precipitable water, 850 hPa flow and stability.

GFS 00Z precipitable water is evaluated to determine the moisture available for precipitation. This is analyzed together with 850 hPa winds, as they are often associated with the moisture transport at low-levels. The Lifted index is also analyzed to attain a rough assessment of stability for areas between central Argentina and middle sections of the continent.

3.6. Galvez-Davison Index (GDI).

Stability is further explored by looking into the GFS 00Z forecasted GDI using Wingridds. The GDI can be calculated by running the macro GDI1.cmd. The macro shows the GDI, 1000-850 hPa averaged streamlines in black, 400-200 hPa averaged streamlines in black, 850 hPa moisture transport in green (precipitable water times 850 hPa winds), and enhanced 400-200 hPa divergence in light blue and yellow.

3.7. Model Precipitation.

Model precipitation is analyzed by looking into the GFS 00Z convective precipitation, the GFS 00Z total precipitation ensembles and the ECMWF 00Z total precipitation. Looking into these different fields allows to revisit forecast confidence and to gain some final insight on the expected distribution and intensity of forecasted precipitation.

3.8. Quantitative Precipitation Forecast Drafts.

Areas with expected 24-hr precipitation totals, expected amounts and potential risks are drafted for five forecast days. The potential risks indicated in the charts include severe weather, MCS formation, echo training, rain/snow, snow and heavy showers. The drafts are used as guidance for the forecast charts created in the NAWIPS workstation. The drafts are usually put together while analyzing sections 3.6 and 3.7 simultaneously. The analysis is complemented with printed charts of 500 hPa geopotential height and 24-hr height falls. Height falls stimulate cyclogenesis, frontogenesis and convective development.