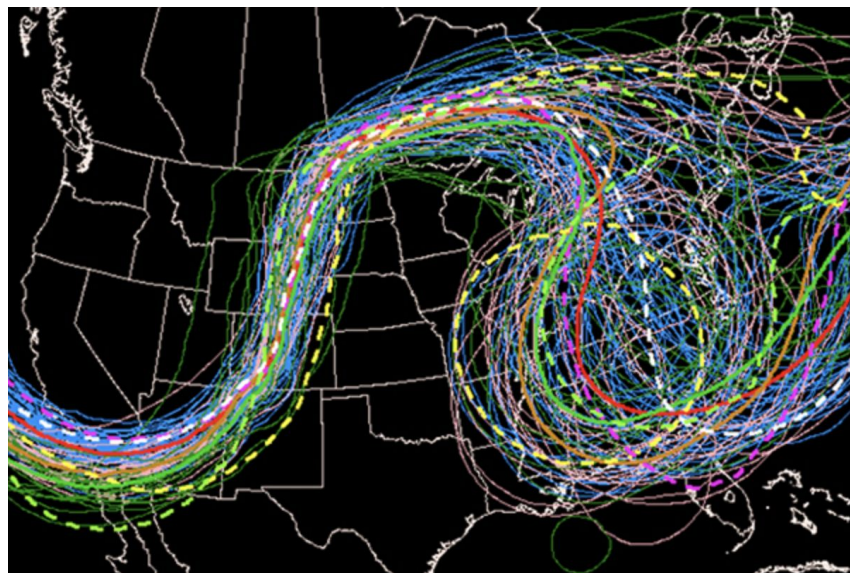


Ensemble Spread and Dispersion

Quick Reference Guide

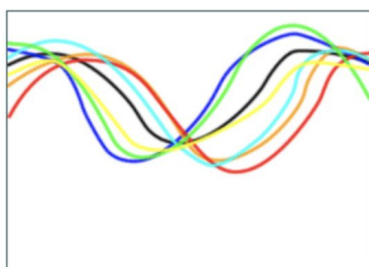
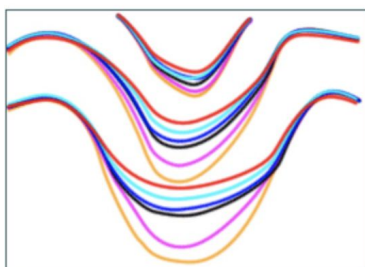
Ensemble Spread describes the range of outcomes in a specific forecast from an ensemble system.

“**Spaghetti**” diagrams of ensemble data can help the forecaster zero in on regions and forecast time steps with small spread (good agreement) or large spread (poor agreement) among the ensemble membership, which is related to forecast confidence.



In this example spaghetti diagram of 500 mb geopotential heights, ensemble spread is relatively small in the western CONUS lending confidence to the forecast, but spread is relatively large over the eastern CONUS, yielding lower confidence there.

Spaghetti Diagram
Ensemble Mean-Black
Ensemble Members-Colors



Idealized spaghetti diagrams showing uncertainty in ensemble data regarding a trough's amplitude (left) and location (right)

Ensemble Dispersion describes the climatological range of an ensemble forecast system relative to the range of the observed outcomes.

Most NWP ensemble systems are **underdispersed**, meaning they are generally too confident in their range of solutions compared to what is observed. Therefore, some skepticism might be warranted in situations with low ensemble spread.