



**Western Region Technical Attachment
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BEWARE OF BINARY PREDICTORS

The April 1 00Z LFM and NGM MOS PoPs for Los Angeles and San Diego displayed considerable variance, as shown below.

		12 HR 02/00Z	MOS 02/12Z	PoP(%) 03/00Z
Los Angeles	LFM	05	10	00
	NGM	70	70	30
		02/00Z	02/12Z	03/00Z
San Diego	LFM	10	10	10
	NGM	70	70	50

Synoptically, a closed 500 mb low was positioned southeast of the southern California coast and was progged by both models to slowly fill and drift east-southeastward over the next 48 hours. The air mass over the southwestern U.S. was unstable and scattered showers/thunderstorms were forecast for the region. An inspection of the LFM and NGM graphics available on AFOS (not shown) did not account for the disparate MOS PoPs that were generated from the model's output. The NGM appeared to keep slightly higher RH values across the Southwest a little longer than the LFM throughout the 48-hour period, but seemingly not enough to result in the considerably higher PoPs that were generated. So, what were the reasons for the disparate PoPs?

With the assistance of Paul Dallavalle, TDL, the equations that produced these PoP forecasts were investigated. As it turned out, the differences were attributed to the binary predictors in the MOS equations. Binary predictors are either "on" or "off", depending if a predefined threshold is reached.

In this particular case, the NGM equations for Los Angeles and San Diego included two binary predictors related to RH. One binary predictor, SFC-500 mb mean RH, is turned "on" if this RH value is $\geq 70\%$, and adds 22% to the PoP. A second binary predictor, 850 mb RH is also turned "on" if this value is $\geq 70\%$ and adds another 17% to the MOS PoPs. For the April 1 00 NGM cycle, both of these predictors were "on" (just over 70%) for the first two 12-hour periods, accounting for 39% of the NGM PoP value.

In the case of the LFM, the primary binary predictor is the SFC-700 mb mean RH, and is turned "on" if the value is $\geq 70\%$, and adds 33% to the MOS PoP. For the April 1 00Z LFM cycle, the interpolated SFC-700 mb mean RH for Los Angeles was 68% for the first 12-hour period and remained just below 70% for the next two 12-hour periods as well. Therefore, the 33% factor was not added into any of the LFM PoP values.

Cases such as this do not occur often, but if there are large differences between the NGM and MOS PoPs for a particular location, forecasters should be aware that the sometimes finicky behavior of the binary predictors may be involved.