

warmer air

Related S2S operation:

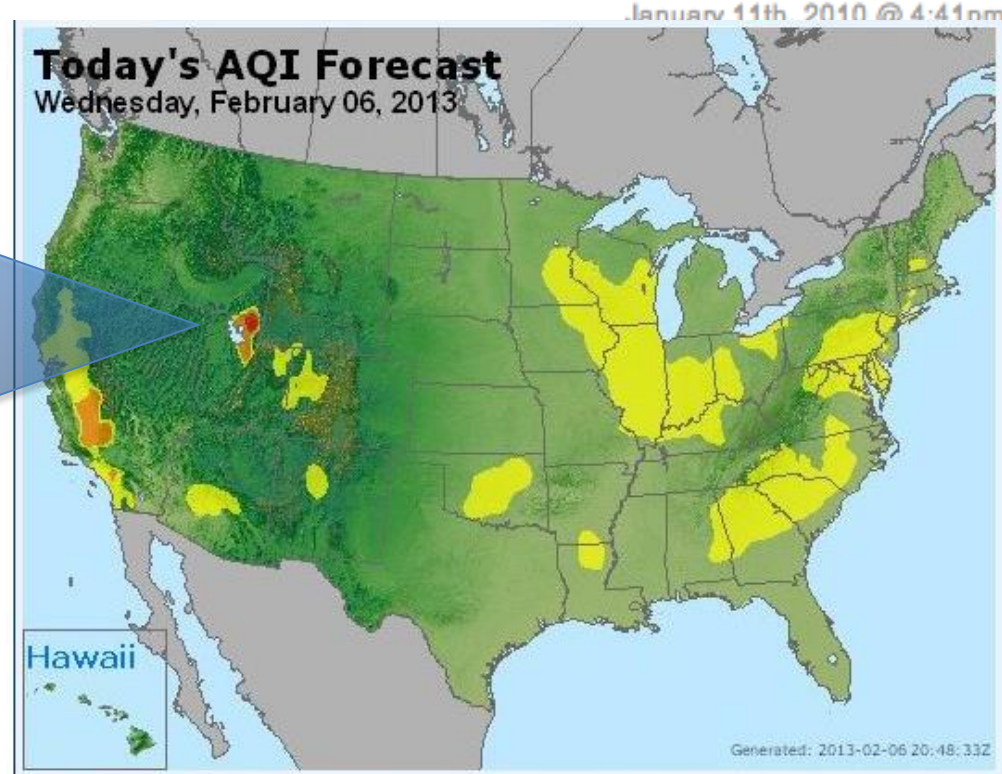
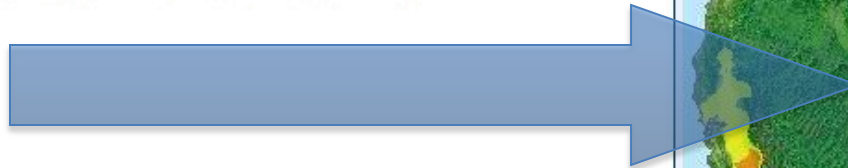
cooler air

forecasting prolonged inversions
in northern Utah



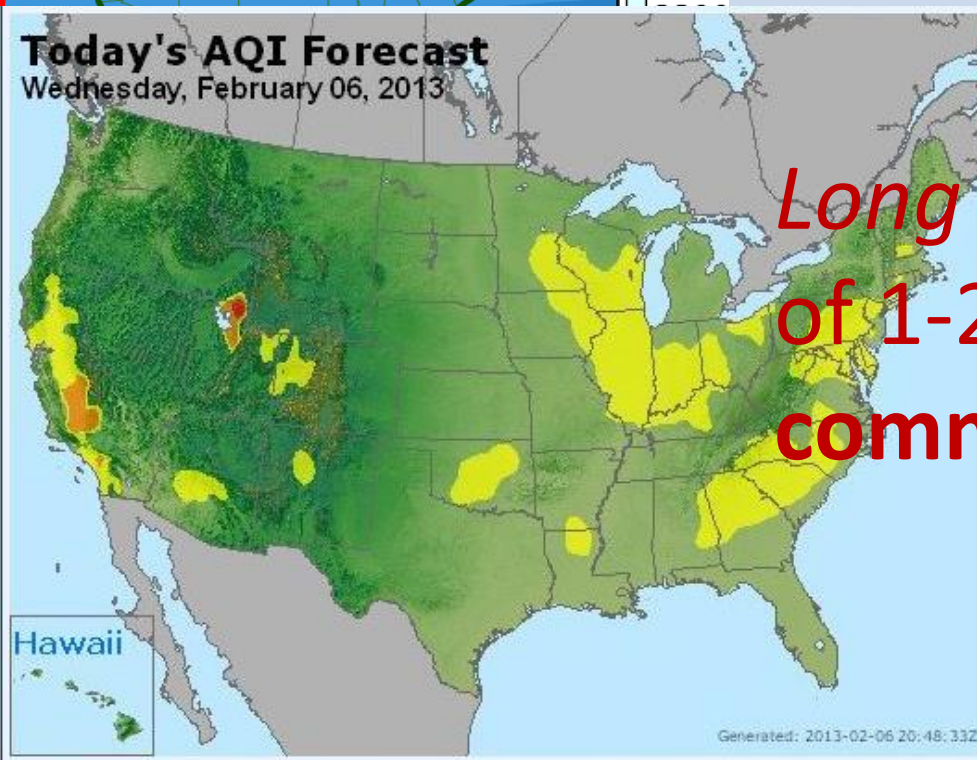
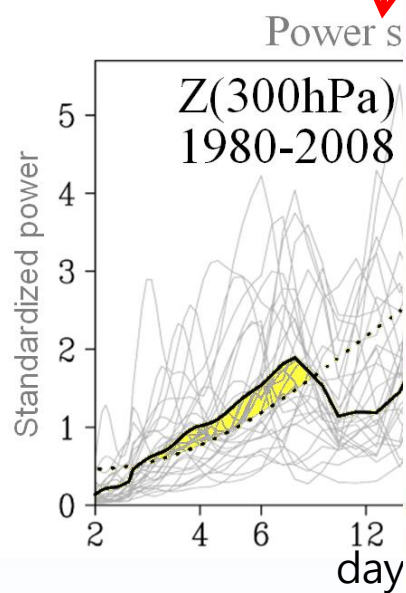
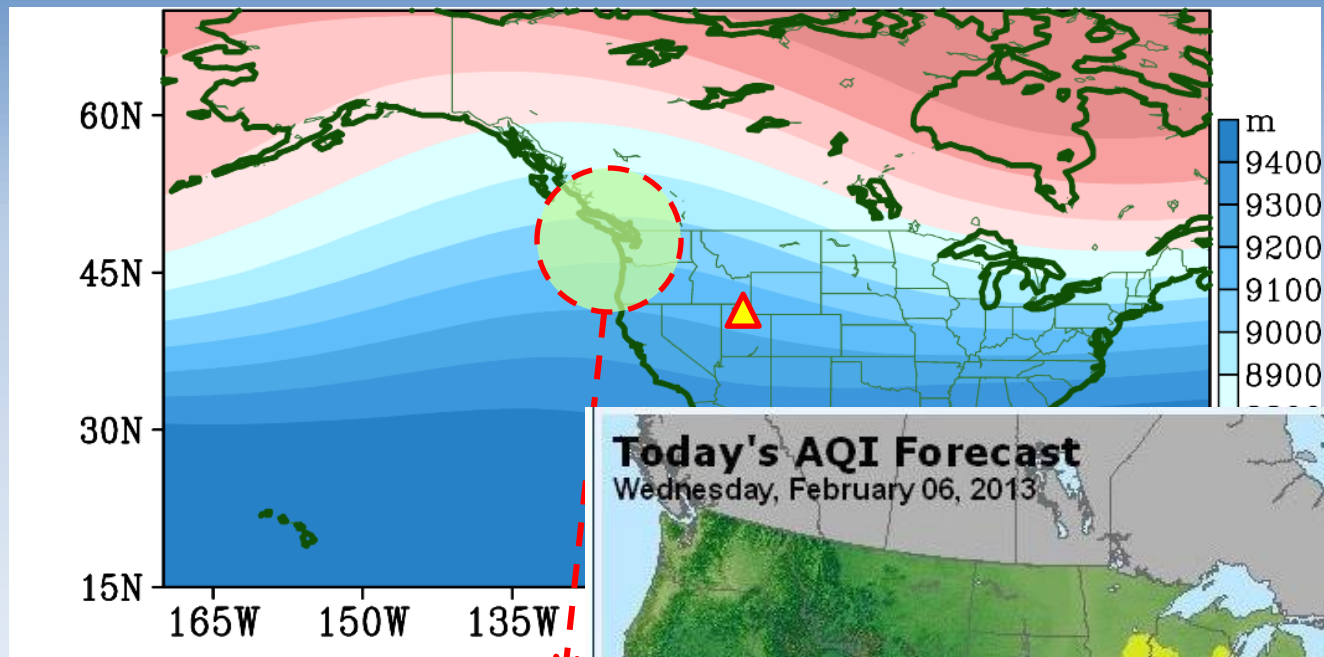
Northern Utah's air is the worst in the nation

WHY?



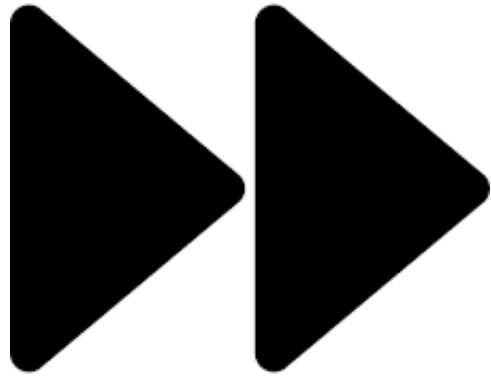
HGT(300 mb) December-February

Remember
the winter
stationary
waves?

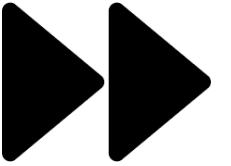


Long inversion
of 1-2 weeks is
common





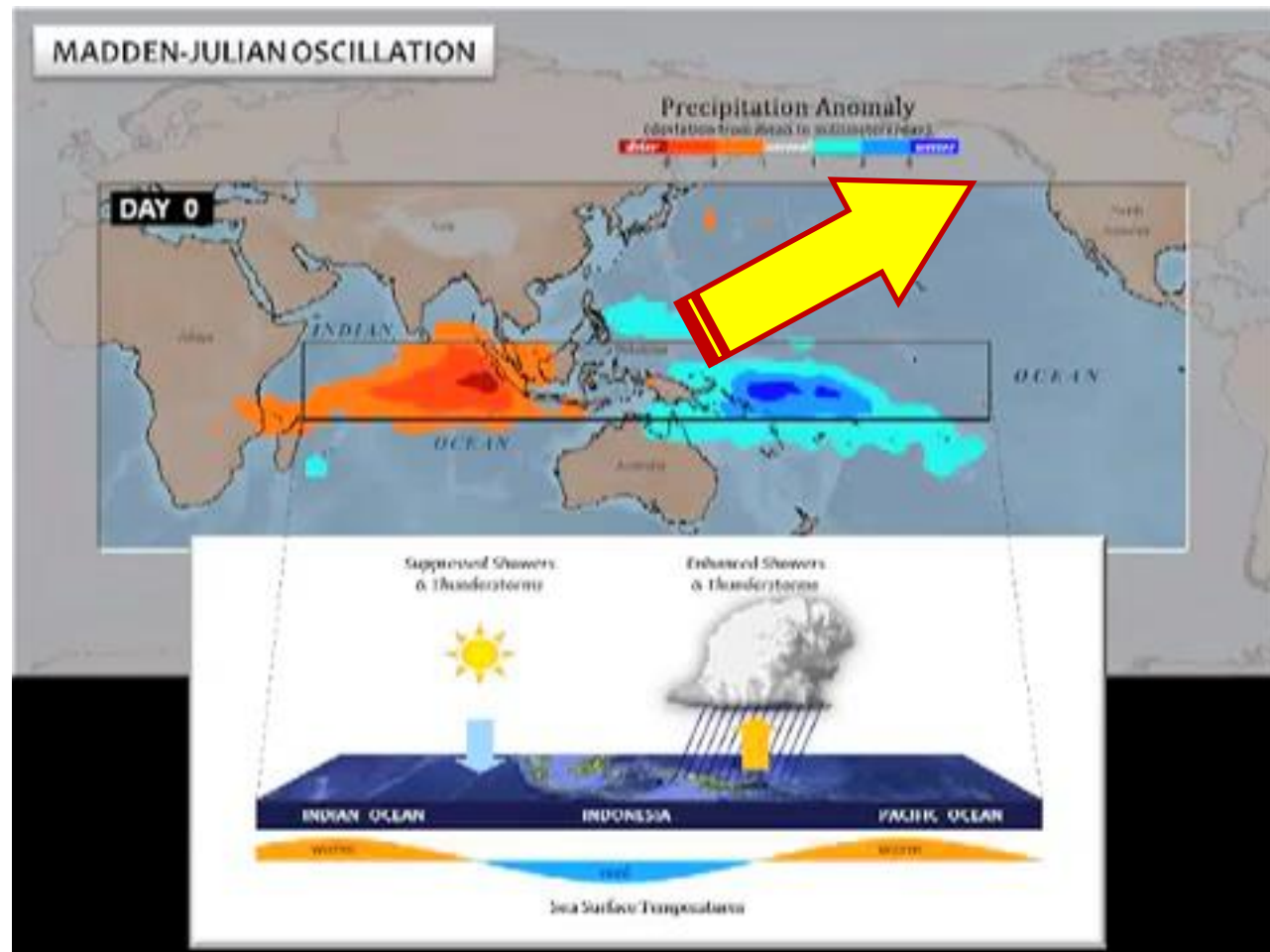
Through these research



- Gillies, R. R., S.-Y. Wang, and M. R. Booth, 2010: Atmospheric scale interaction on wintertime Intermountain West low-level inversions. *Wea. Forecasting*, 25, 1196–1210.
- Gillies, R. R., S.-Y. Wang, J.-H. Yoon, and S. Weaver, 2010: CFS prediction of winter persistent inversions in the Intermountain Region. *Wea. Forecasting*, 25, 1211–1218.
- Wang, S.-Y., R. R. Gillies, and H. van den Dool, 2014: On the yearly phase delay of winter intraseasonal mode in the western United States. *Climate Dynamics*, DOI: 10.1007/s00382-013-1784-y
- Wang, S.-Y., L. Hipps, O.-Y. Chung, R. R. Gillies, and R. Martin, 2015: Long-term winter inversion properties in a mountain valley of the western U.S. and implication on air quality. *Journal of Applied Meteorology and Climatology*,

We found connection of inversions with the Madden–Julian oscillation (MJO)

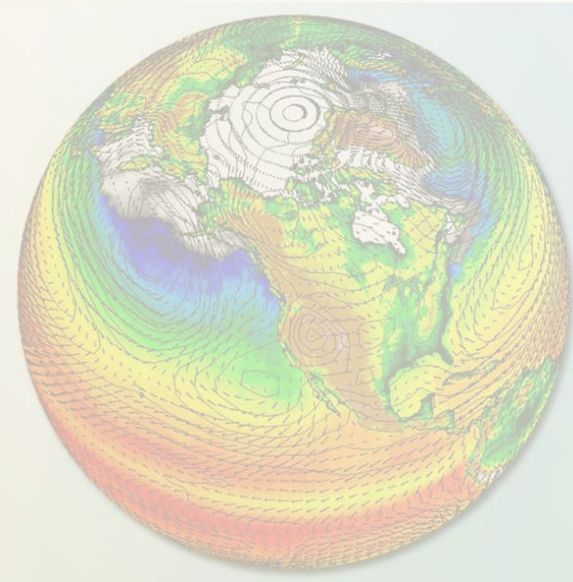
The largest element of intraseasonal (30–60 day) variability in the tropical atmosphere.



What we knew then (in 2009):

Operational mode: NOAA's Climate Forecast System (CFSv1)

CFS predicts MJO out to ~1 month
(Seo et al. 2007, 2009; Weaver et al. 2009)



Prolonged inversions (ridges) are linked to MJO



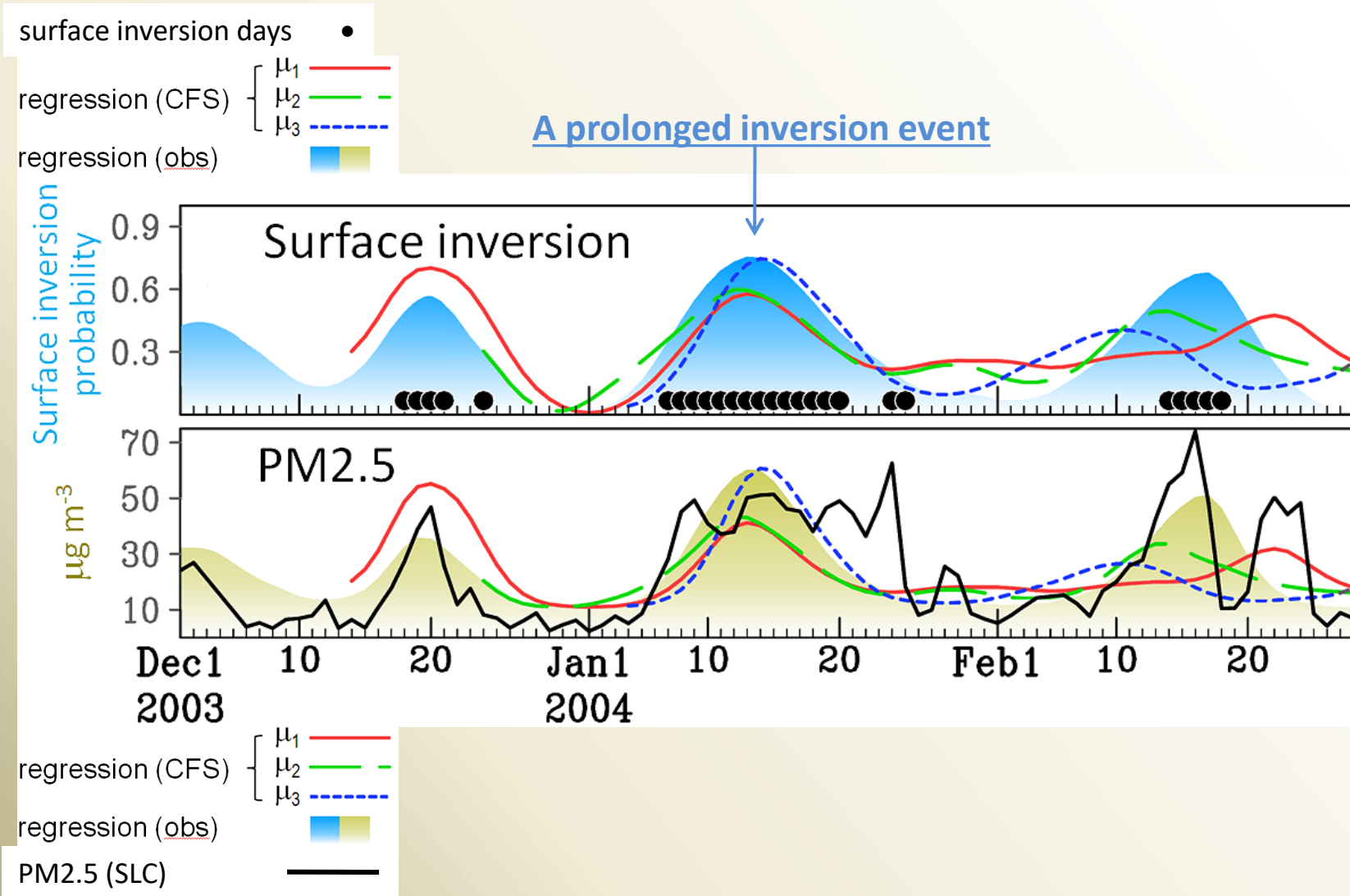
Fact:

CFS predicts MJO out to ~1 month
(Seo et al. 2007, 2009; Weaver et al. 2009)

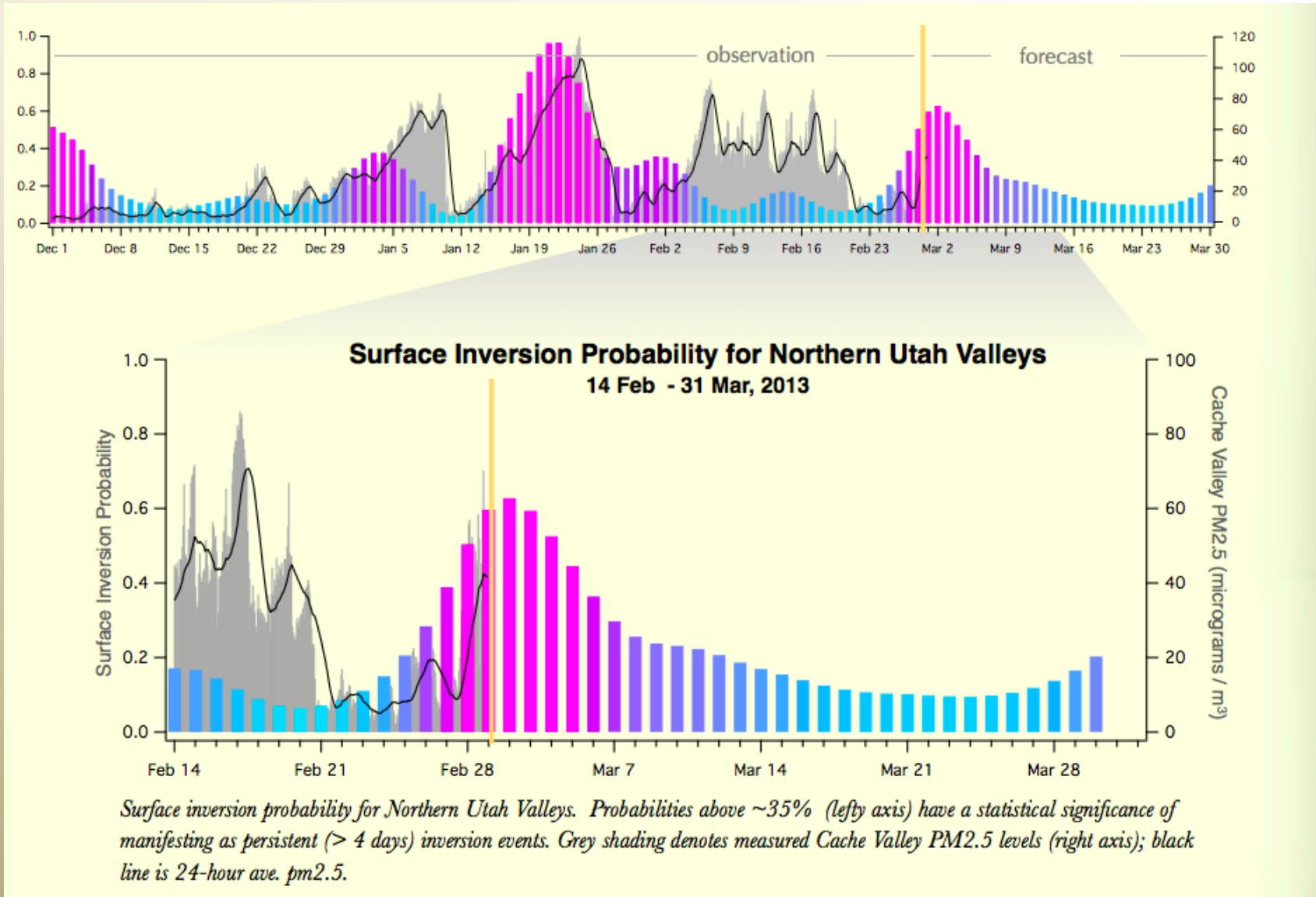


**Developed nCFS–empirical hybrid
prediction for prolonged inversions**

Experiment for the 2003-2004 winter



→ Utah Climate Center Product:



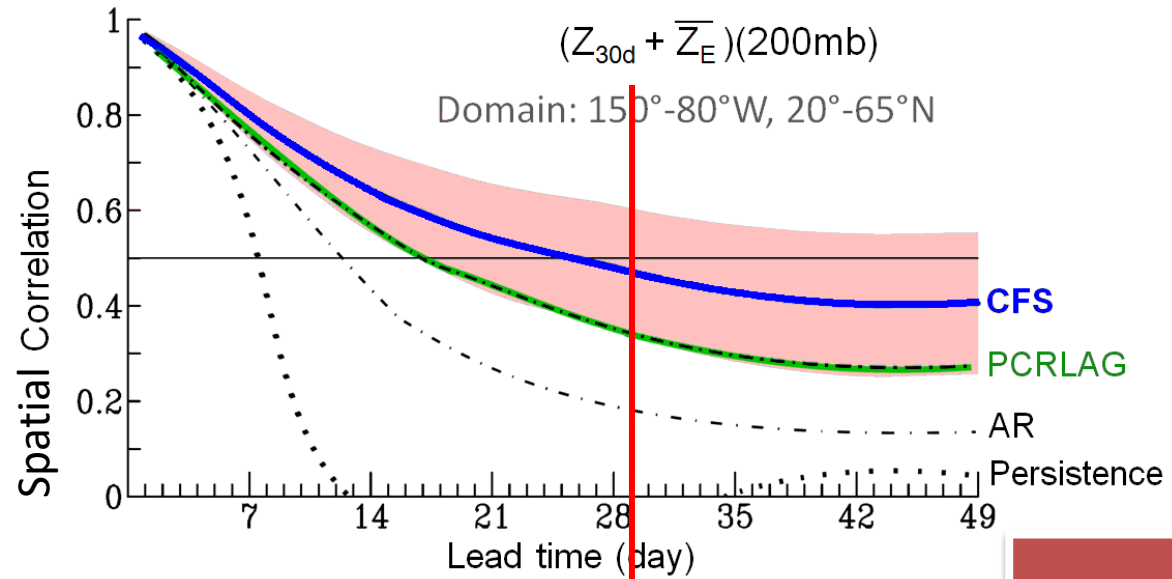
Operational
since 2010

Skill score:

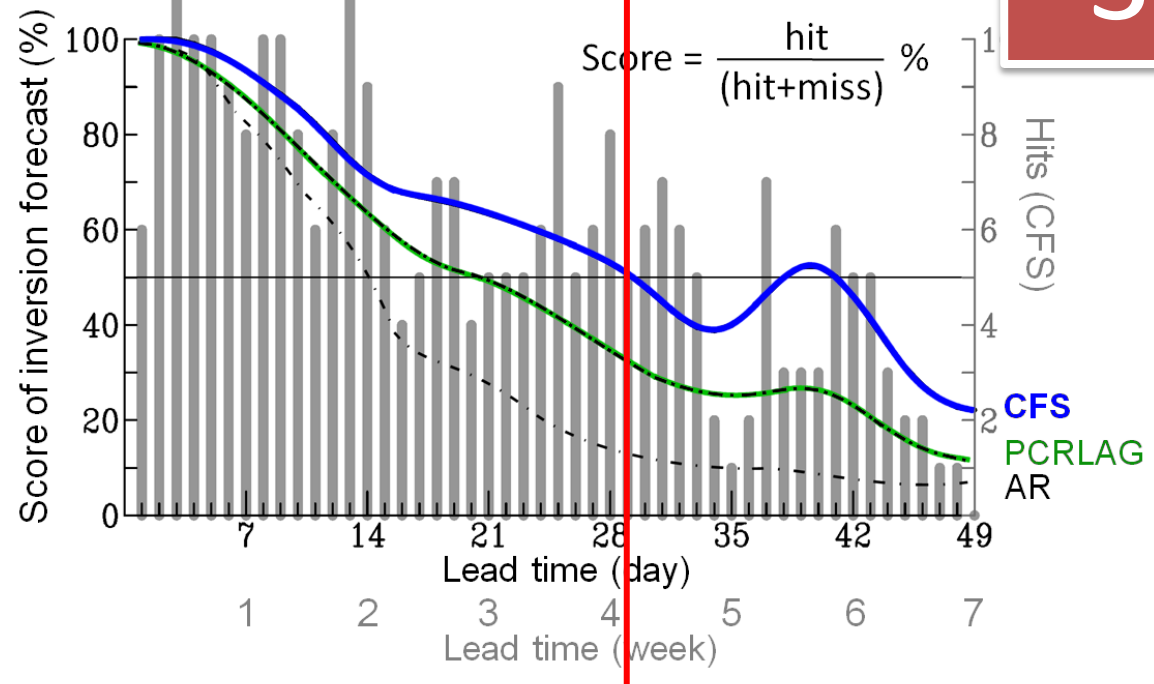
Circulation pattern
@ Western US

Testing how good the model is

Inversion prediction
for Salt Lake City



~30 days!



S2S forecast of the dipole is possible!

