



Strategic Implementation Plan (SIP) for a Community-based Unified Forecast System

# *Ensemble Working Group*

*Presented by*

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*Presented at SIP Coordination Meeting*

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# Ensemble Working Group *Membership*



- *Tom Hamill (ESRL/PSD; co-chair)*
- *Yuejian Zhu (EMC; co-chair)*
- *Ryan Torn (U. Albany; co-chair)*
- *Carolyn Reynolds (NRL Monterey)*
- *Walter Kolczynski (EMC)*
- *Isidora Jankov (CIRA and ESRL/GSD)*
- *Phil Pegion (CIRES and ESRL/PSD)*
- *Dingchen Hou (EMC)*
- *Vijay Tallapragada (EMC)*
- *Jon Gottschalck (CPC)*



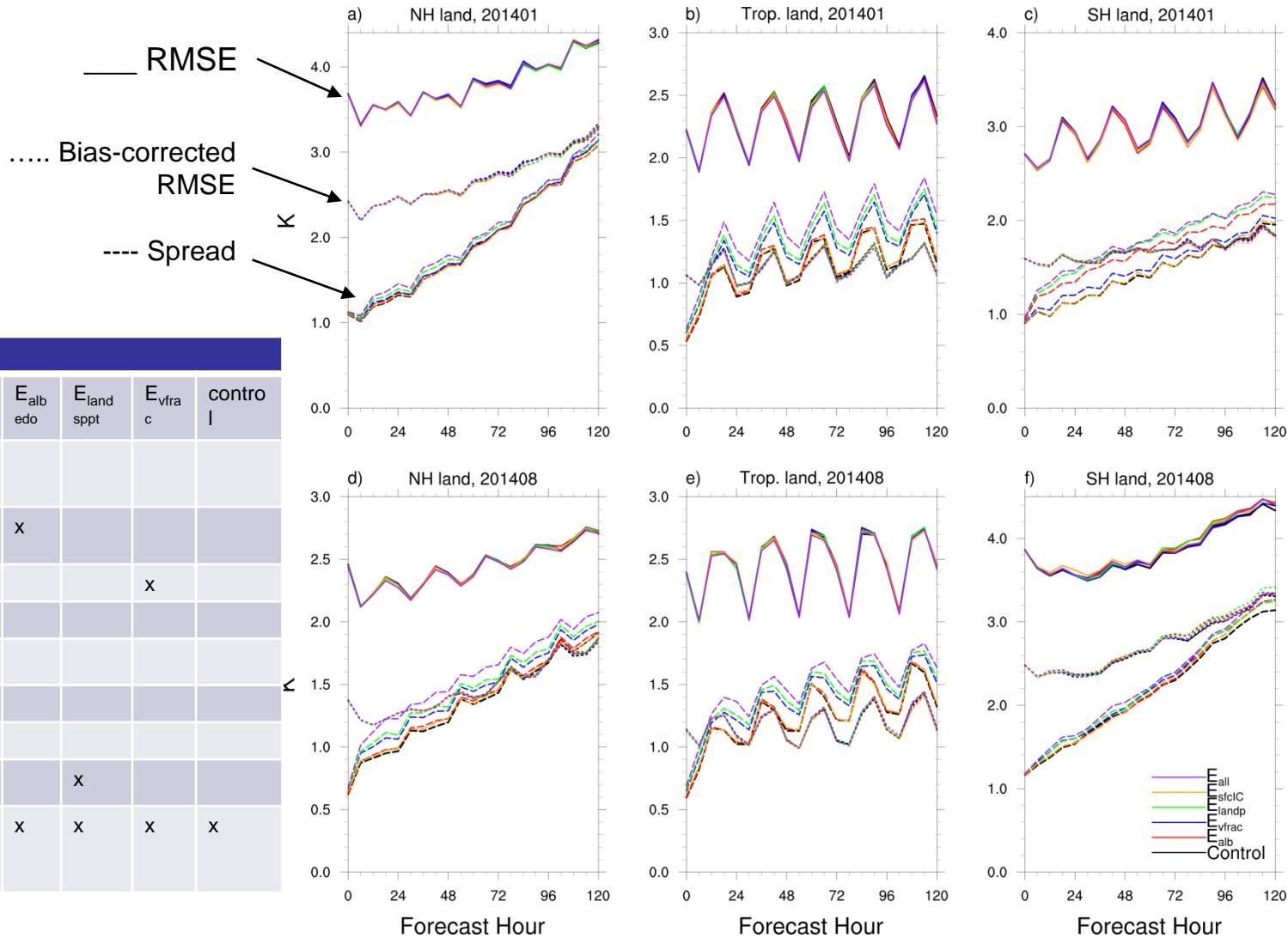
# (Title, ex “Governance”) WG Project Milestone Accomplishments



- **SIP project accomplishments to date:** Main activity is preparing for FV3 GEFS v12 implementation.
  - Stochastic physics ready, with SPPT modifications (thanks Phil Pegion) to deal with issues caused by mountain blocking.
  - Land-surface perturbations out of scope; insignificant impact.
  - Coupled ocean not ready, so will proceed with transplantation of CFS v2 anomaly.
  - Reanalysis production begins 1 April, reforecast over the summer.
- **SIP project issues:**
  - With focus on GEFS v12, less focus on making ensembles into a community software. A lot of software involved in eventual coupled atmosphere/ocean/land ensemble.
  - Next GEFS (v13) will involve coupling and more stochastic physics development. Need to make sure R2O mid-funnel funding now to deal with scientific issues.

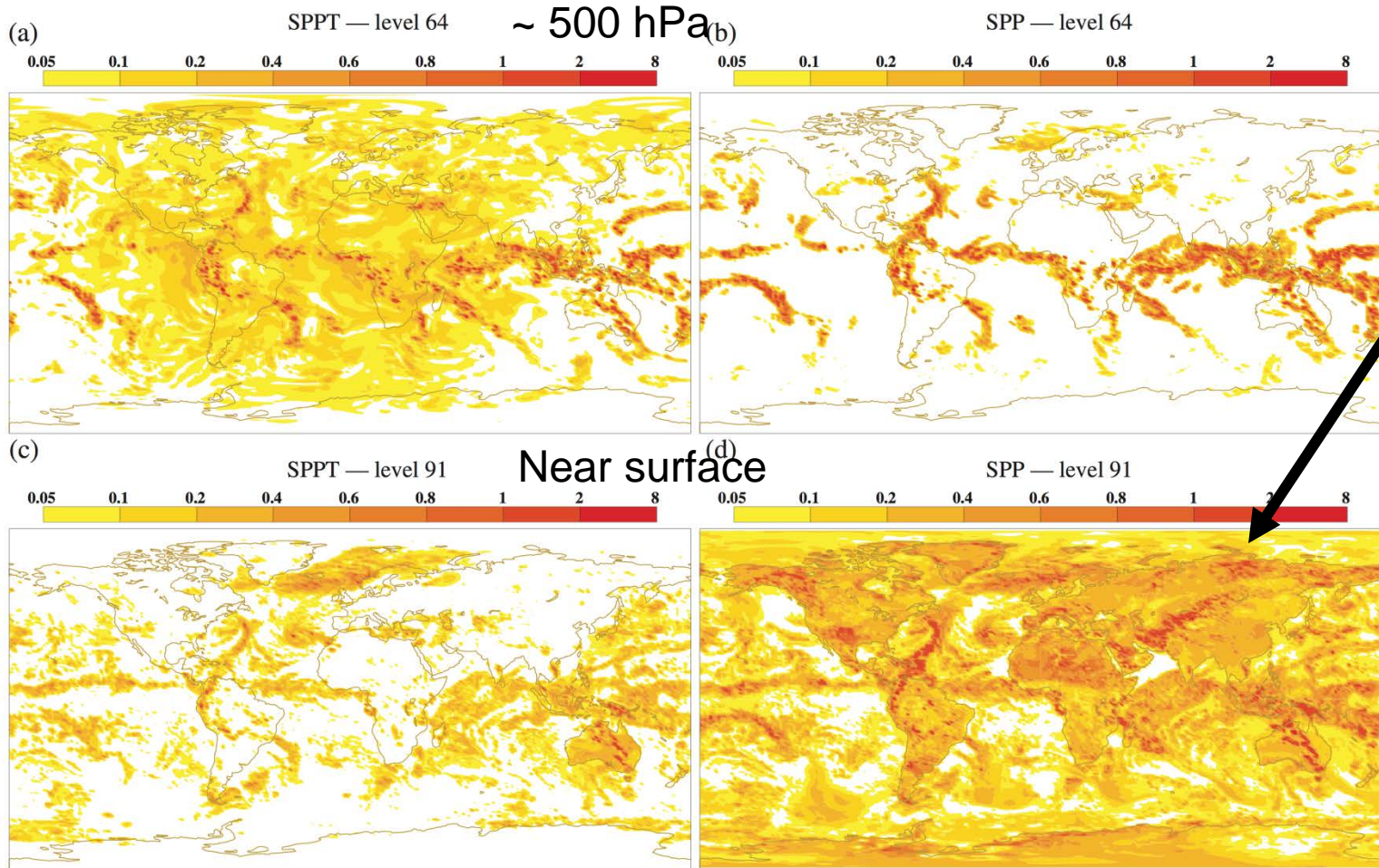


# Land-surface perturbation: 2-m temperature impact



	Experiments						
Perturbations	E <sub>all</sub>	E <sub>landp</sub>	E <sub>sfclC</sub>	E <sub>alb</sub> edo	E <sub>land</sub> sppt	E <sub>vfrac</sub> c	contro l
SMC, STMP IC	x		x				
alb	x	x		x			
vfrac	x	x				x	
Z <sub>0</sub>	x	x					
Z <sub>h</sub> /Z <sub>0</sub>	x	x					
SHC	x	x					
LAI	x	x					
landspt	x				x		
SPPT, SKEB, SHUM	x	x	x	x	x	x	x

# ECMWF result: atmospheric parameterization perturbation impact



Increase in 2-m temperature spread with atmospheric stochastic parameter perturbation providing greater diversity of cloud amounts and hence different solar radiation reaching the surface.

Ensemble team working with physics team to ID sensitive parameters in physics makes sense.

**Figure 2.** Ensemble standard deviation of 0–3 h accumulated tendencies of temperature (unit:  $K (3 h)^{-1}$ ) at model levels 64 ( $\sim 500$  hPa) and 91 (10 m above ground) for experiments perturbed with (a, c) SPPT and (b, d) SPP. Initialised on 4 December 2013, 00 UTC.



# Ensemble WG

## Team Coordination and Dependencies



- **Coordination:** will want to follow up with :
  - Postprocessing (making sure reforecasts useful)
  - Coupling (timing and strategy for testing coupled ocean)
  - MesoCAM (making sure global provides data needed for quality regional ensembles).
  - Physics (parameter sensitivity and perturbation, following ECMWF)
- **Dependencies:**
  - Computational horsepower for reanalysis, reforecast, GEFS system integration testing. Soliciting for time on WCOSS, Gaea, and DOE machines via ALCC grant.
  - FV3 GFS DA and forecast issues suitably addressed in a timely manner, including choice of microphysics, dry mass drift, stratospheric biases. With reanalysis production beginning 1 April, time is of the essence.
  - CPC and NWC product development will depend on our GEFS reanalysis/reforecast production.