LSM/Hydro WG *Membership*

- *Mike Ek (NCAR/RAL/JNT)***
- *Helin Wei (NOAA/EMC) ***
- *Trey Flowers (NOAA/NWS/NWC)***
- Jack Kain (NOAA/EMC)
- Christa Peters-Lidard (NASA/GSFC)
- Tanya Smirnova (NOAA/ESRL)
- Fei Chen (NCAR)
- Brent Lofgren (NOAA/GLERL)
- Elena Shevliakova (OAR/GFDL)
- Sergey Malyshev (OAR/GFDL)
- Chris Milly (OAR/GFDL)
- Randy Koster (NASA/GSFC)
- David Gochis (NCAR)
- David Lawrence (NCAR)
- Brian Cosgrove (NWS/OWP)
- Xubin Zeng (U. Arizona)

• *Co-Chair ***

Land surface Models (LSM) and Hydrology *Working Group*

Presented by

Helin Wei, EMC/NOAA

Presented at

Coordination Meeting for the Unified Forecast System

Strategic Implementation Plan (SIP) Annual Update

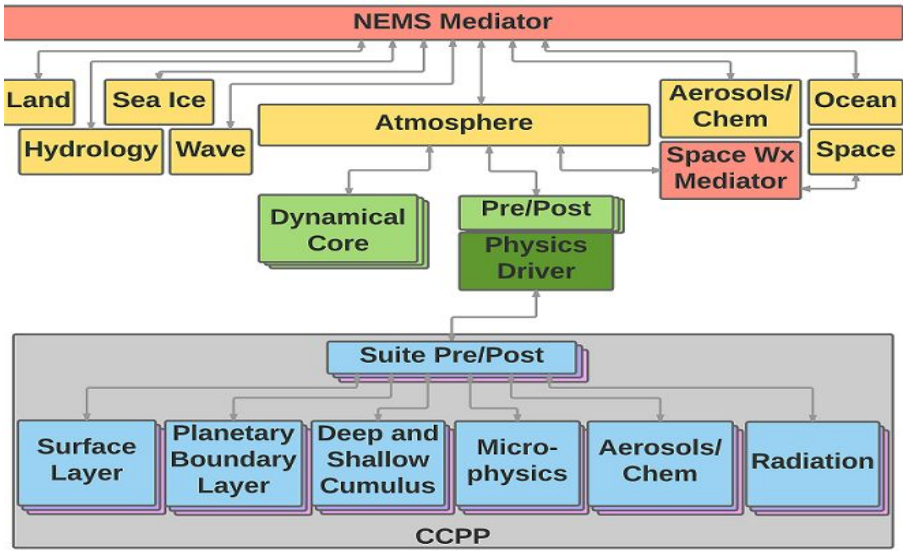
August 2, 2018; College Park, MD

LSM/Hydro WG
Project Milestone Accomplishments

- **SIP project accomplishments to date:**
  - Noah MP and Flake were in-line coupled to the FV3GFS
  - LIS was externally coupled to the NEMSGFS
  - NULDAS forcing strategy developed, GLDAS V2.0 dev complete
  - The impact of snow DA on FV3GFS was initiated
  - National Water Model V1.2 implemented into operations
  - National Water Model V2.0 development completed
  - OWP Analysis of Record for Calibration (forcing) completed
- **SIP project issues:**
  - Lack of high-quality land dataset for land DA
  - Further clarification needed on hydro-NWM coordination
  - Resource identification challenging in constrained environment

LSM/Hydro WG Project Accomplishments

NEMS External Land



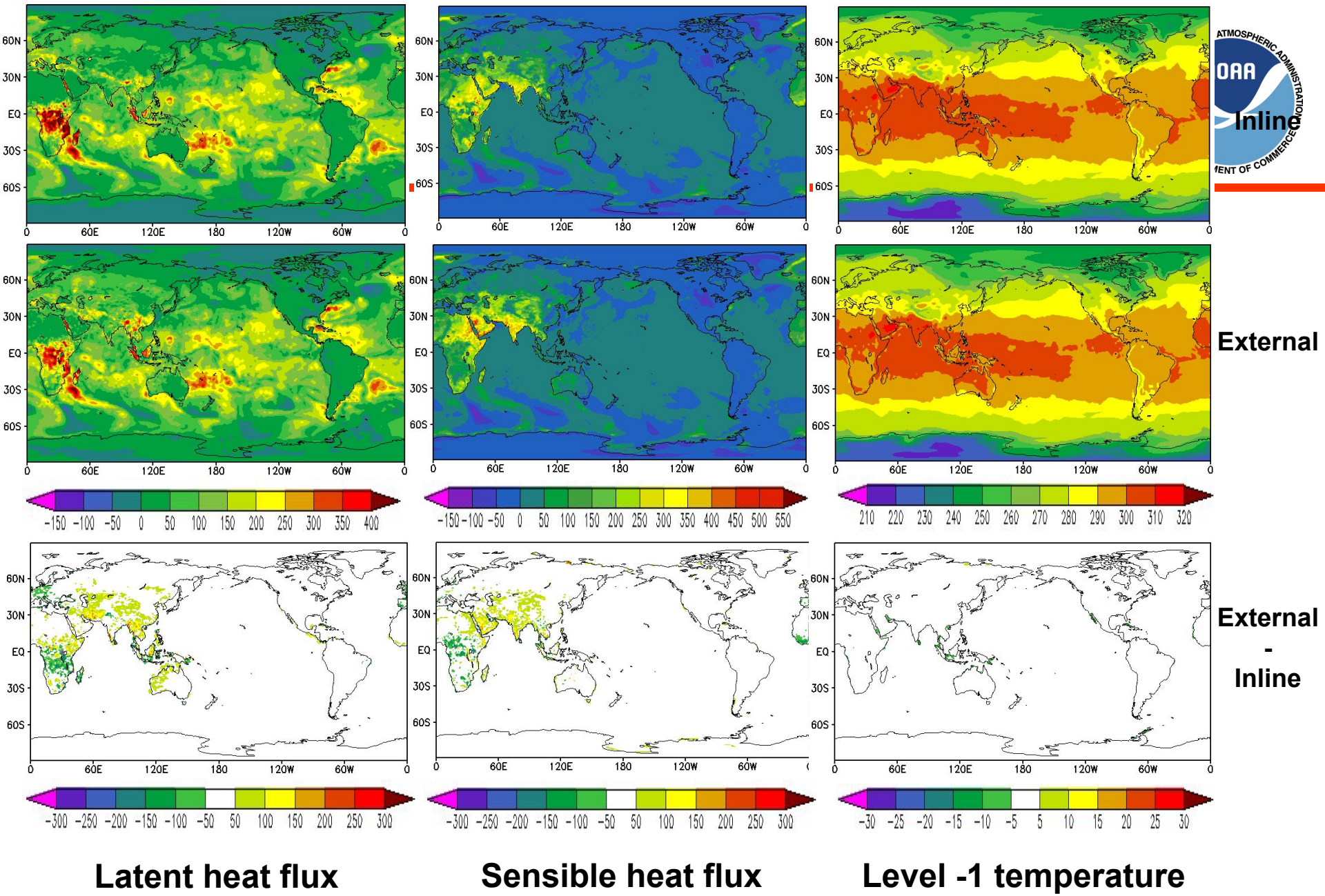
In-line: NEMS GSM_MOM5_CICE (GSM/Noah 2.7.1)

External: NEMS GSM_MOM5_CICE_LIS (LIS/Noah3.3)

NEMS UGCS-Seasonal 0.5 was released in *June 2017*. This milestone includes the existing three-way coupled system (ATM,OCN,ICE), a land component (LND), and a hydrology component (HYD). This milestone is a scientifically valid one-way coupling from GSM to LIS and LIS to WRF-Hydro, the core of the NWM.

NEMS UGCS-Seasonal 0.6 was released in *February 2018*. This milestone includes the current three-way coupled system (ATM,OCN,ICE), a land component (LND), and a hydrology component (HYD). This milestone includes soil moisture feedback from HYD to LND and land surface state feedback from LND to ATM.

NEMS UGCS-Seasonal 0.7 is an *internal release* to demonstrate physically realistic atmosphere-land coupling using an external land model with field exchanges through the NEMS Mediator. This release enables surface fields from LIS to be coupled back to GSM, thereby establishing two-way atmosphere-land feedbacks.



External

External - Inline

Latent heat flux **Sensible heat flux** **Level -1 temperature**

GSM_MOM5_CICE was initialized with April 1, 2015 CFSR-based initial conditions, and the LIS component reads the April 1, 2015 initial conditions from a custom binary format. The coupled configuration was run for 48 hours, and the above figures show 12-hr forecasts.

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LSM/Hydro WG Team Coordination and Dependencies

- Follow-up with SA WG on land-hydrology-atmosphere and land-hydrology-marine coupling strategy needed. Where appropriate coordinate with coupling work underway as part of Integrated Water Prediction effort.
- Follow-up with Aerosols/Chemistry WG on BVOC/Dust emissions & deposition velocity still needed.
- Follow-up with Verification WG on land/hydro-specific verification and process-based benchmarking.
- Follow-up with DA WG on JEDI and land/hydro DA needed. Proceed with LIS-based EnKF DA for LDAS-related work.
- Follow-up with Governance on UMAC-CACWP interactions
- Internal SIP dependencies are only one challenge—how does land/hydro align and collaborate across varied modeling efforts which feature different focus and operational/research missions?