Real-time NLDAS System

- An Upgrade from Current OPS NLDAS-2 System

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Bug Fix Issues

a. What NDAS precipitation should be used?
   
   **APCP vs LSPA**

b. What NAM forecast product should be used?
   
   **12Z run Cycle 0-24hr forecast vs 00Z run cycle 15-36hr forecast**

c. What should be solved for NAM precipitation bucket?

In the case of NAM precipitation, for 00Z NAM cycle 15-36 hour forecast, the accumulation period is 15HR (12Z-15Z), 18HR (12Z-18Z), 21HR (12-21Z), 24HR (12Z-00Z) today, and 27HR (00-03Z), 30HR (00-06Z), 33HR (00-09Z), 36HR (00-12Z) tomorrow. The precipitation needs to get 3-hourly total first.

Thank Ying Lin who provided next three slides
Difference between natural NDAS pcp and LSPA ("NDASSOIL")

18 June 2016 from Stage IV

18 June 2016 from CPPA

18 June 2016 from NDAS natural APCP

18 June 2016 from NDASSOIL LSPA

Gauge-based bias-corrected stage IV
ConUS-averaged 3-hrly pcp, NAM/NAMX/CCPA, May 2016

00Z cycles

06Z cycles

12Z cycles

18Z cycles
An example of dry initial NAM fcst

18June2016 24hour accumulation from Stage IV ending 2016061812

24hour accum from NAM 24-hr forecast ending 2016061812

24hour accum from 30-hr NAM forecast ending 2016061812

24hour accum from NAM 36-hr forecast ending 2016061812
Comparison analysis for new run when bugs are fixed

**OPS**

**Test**
Precipitation comparison

29 June 2016

(a) $\text{ops}(0-23Z)$

(b) $\text{ops}(0-11Z)$

(c) $\text{ops}(12-23Z)$

(d) $\text{test}(0-23Z)$

(e) $\text{test}(0-11Z)$

(f) $\text{test}(12-23Z)$

30 June 2016

(a) $\text{ops}(0-23Z)$

(b) $\text{ops}(0-11Z)$

(c) $\text{ops}(12-23Z)$

(d) $\text{test}(0-23Z)$

(e) $\text{test}(0-11Z)$

(f) $\text{test}(12-23Z)$
Precipitation Comparison (continue)

1 July 2016

(a) ops(0–23Z)
(b) ops(0–11Z)
(c) ops(12–23Z)
(d) test(0–23Z)
(e) test(0–11Z)
(f) test(12–23Z)

2 July 2016

(a) ops(0–23Z)
(b) ops(0–11Z)
(c) ops(12–23Z)
(d) test(0–23Z)
(e) test(0–11Z)
(f) test(12–23Z)
Difference of Soil Moisture (volumetric) between Test and OPS

SM1

SM2

SM3

SM4

29JUN

30JUN

02JUL

-0.05  -0.04  -0.03  -0.02  -0.01  0.01  0.02  0.03  0.04  0.05
Difference of top 1m and 2m soil moisture (volumetric) between Test and OPS
Possible reasons for the differences of soil moisture

For 4-day gap, these differences from forcings can have:

a. precipitation: NDAS precipitation, stage II precipitation, NAM forecast and CPC gauge precipitation. CPC gauge precipitation was re-processed after three days when more gauges are included.

b. Radiation: Bias-corrected NARR for OPS. GOES downward direct insertion, NDAS and NAM radiation

c. The other forcings: NARR vs NDAS/NAM

Nevertheless, the effect on soil moisture in this test may be small. However, the effect on ET in summer is large. The effect on Q in summer is intermediate. As expected, it may draw a reverse conclusion in winter.
Daily Evaporation Comparison

OPS

Test
Daily Total runoff comparison

OPS

Test
Plan A

a. Extend Noah and its routing to the other three models

b. Combine current OPS system (codes and scripts) with real-time system (test version) into one system

c. Cron job run in one system

d. Stage experimental data to EMC LDAS website for internal users

e. Test experimental realtime NLDAS drought monitor
NDAS and NAM Upgrade
12-h NDAS vs 6-h NDAS “Catchup cycle”

NDAS = 12-h; 12 km parent analysis, 3-h fcst

Parallel NAM with this configuration = **NAMX**; all model/analysis changes, uses ops NDAS/NAM data (NAM data dump at T+ 70 min)

NDAS = 6-h; 12km parent + 3 km CONUS/AK nest, 1-h fcst

Parallel NAM with this configuration = **NAMRR**; almost all model/analysis changes (differences will be noted); used RAP data dumps at T+ 30 min)
since it was set up assuming it would be part of the hourly NAMRR
Plan B

New Scripts:
Follow NAMX and NAMRR Upgrade

a. NDAS (4 cycles run) and NAM data are directly used without spatial and temporal interpolation (awldas output)

b. Read NDAS/NAM grib2 format directly

c. Use 13-60 hour NAM forecast to complete realtime product for today afternoon and tomorrow morning
Open Discussion

(1) MODIS IGBP vegetation type (will be used for next NCEP GFS and CFS upgrade). Current OPS NLDAS used UMD vegetation type and will need to test MODIS to keep in the same page.

(2) MODIS albedo (snow maximum and snow-free albedo)
Robinson and Kukla, 1985; AVHRR 5-year average monthly snow-free albedo

(3) VIRS weekly real-time greenness vegetation fraction from NESDIS
Monthly 5-year climatology GVF (Gutman and Ignatov, 1988)

(4) GLDAS-alike direct insert SWE or Snow Cover method (if we will transition LIS-based NLDAS as suggested by CTB proposal, it should include SNOW-DA and SM-DA part, do we still plan to go to GLDAS-alike method here?)

(5) Soil data: STATSGO-based is the same as GFS/CFS update. Do we want to test SSURGO soil type data?
Your Comments/Suggestions are very appreciated

Thank you