FV3GFS-Chem Run History **September 27, 2019**

FV3GFS Real-time Forecasts

- **CURRENT CONTROL RUN at EMC**
  - V0.8.8 based **control** configuration:
  - Initial Start: July 1, 2019 at 00 UTC
  - Cycling: 24 hours
  - Forecast length: 120 hrs
  - Anthro emissions: Updated CEDS 2014
  - Background: Updated GMI
  - Smoke: GBBEPx C384
  - Smoke Plume Rise: Grell-Freitas
  - Dust: Fengsha (α=1.5, γ=2.0)
  - Wet scavenging in SAS (0.2 coefficient)
  - Sea salt: NASA 5 bin
  - DMS: ?
  - Sulfate: NASA version (same as GSD version)

Draft evaluation plan

Links to verification page for EMC control run :

- Total AOD against ICAP
- Dust AOD against ICAP :
- Sulfate, OC and Sea salt AOD against GEOS5
- Aeronet (against operational NGACv2, Kate's version of GBBPx PL with PDT)
- Met Grid stat for day 1 bias for total and dust AOD : No PDT vs NGAC
- ECMWF aerosol analysis

FV3-Chem vlab change log

Sept. 10, 2019

RT Run began/ Verification link	Run Ended	Version/	Label in the figures and output location	Code delivery	Changes
July 1 GSD	Present	V0.8.8 pp25-Deep+Shallow update for OC, BC and Sulf (0.2)	v0.8.8, Fengsha, pp25+Deep-Shallow wet scav (OC, BC, Sul)	September 10, 2019	- Update tuning for wet scavenging from deep+shallow convection for OC only - Update dust turning factor (v2) for Fengsha - Officially released as v0.8.8 - W/ pp25 fire and anthro. emission in OC - With updated GBx emission from July 15
July 1 GSD	9/17/19	V0.8.8 pp25-Deep+Shallow update for OC only (0.4)	v0.8.8, Fengsha, pp25+Deep-Shallow wet scavg HPSS	September 10, 2019	- Update tuning for wet scavenging from deep+shallow convection for OC only - Update dust turning factor (v1) and bug fixed for Fengsha - Officially released as v0.8.8 - W/ pp25 fire and anthro. emission in OC - With updated GBx emission from July 15
July 1 GSD	9/7/19	V0.8.8 pp25-Shallow wet scavenging update	v0.8.8, Fengsha, pp25+Shallow wet scavg HPSS		- Decreased wet scavenging from shallow convection only - 0.8.8 with bug fix for SAS wet scavenging - Turned on Fengsha w/ latest alpha coeff - W/ pp25 fire and anthro. emission in OC - With updated GBx emission from July 15
July 1	9/3/19	0.8.8-pp25	v0.8.8, Fengsha, pp25 HPSS		- 0.8.8 with bug fix for SAS wet scavenging - Turned on Fengsha w/ latest alpha coeff - W/ pp25 fire emission in OC - With updated GB emission from July 15

July 1	9/2/19	0.8.8	v0.8.8, corrected, Fengsha HPSS		- 0.8.8 with bug fix for SAS wet scavenging - Turned on Fengsha w/ latest alpha coeff - With updated GB emission from July 15
July 1	8/28/19	0.8.8	Deleted		- 0.8.8 with bug fix for SAS wet scavenging - Turned on Fengsha w/ latest alpha coeff - With bug GB emissions
May 16, 2019	9/3/19	0.8.8/ARL		N/A	Same as 0.8.8P1 except Fengsha dust scheme - Addresses dust overprediction (ARL run)
May 16/	July 1	0.8.8-P1/P2-GSD	Stopped	N/A	GBx, SAS transport but bug, , Plume Rise - Consistent w/ met
May 16, 2019	June 30. 2019	0.8.8 NOPR	Stopped	N/A	As 0.8.7 but w/ SAS PDT, GBx w/o plume rise - Addresses vert. transport/SO4 overprediction
May 16, 2019	Present	0.8.7-ctl	v0.8.7, AFWA THEIA	July 24, 2019	*ESRL control:* Use of GBx smoke;GF convection fixes, AFWA dust, tuning parms, PL bug fix SO4, GMI, CEDS emiss updated (on June 5) With bug GB emissions before August 4
May 16, 2019	Present	0.8.7-ctl	v0.8.7, Fengsha WCOSS	July 24, 2019	*EMC Control:* Use of GBx smoke;GF convection fixes, Fengsha dust, tuning parms, PL bug fix SO4, GMI, CEDS emiss updated (on June 5) With updated GB emissions after July 15
April 18, 2019	May 16,	0.8.6		April 18,	Output in FV3, SO2 units corrected

	2019			2019	
March 12, 2019	April 18, 2019	0.8.5		March 12, 2019	Seasalt update to NASA, dust bug fix
Feb. 6, 2019	March 12, 2019	0.8.4		Feb. 12, 2019	Increased wet deposition; Conv. transport
October 18, 2018		0.8.3		Oct. 18, 2018	Plume rise, precip scav correction
October 9, 2018		0.8.2		Oct. 9, 2018	Wet dep, Grell conv. correction
July 20, 2018		0.8.1		July 30, 2018	Initial GSD GOCART cpl to FV3/NEMS

Table 1. FV3GFS-Chem run history

Detailed AOD summary statistics (vs ICAP, GEOS-5)

Daily maps vs ICAP (V0.8.6, V0.8.7(GBx), V0.8.8 (PDT, PR), V0.8.7+PDT)

- **May 29-June 30, 2019: (Impact of GBx, Plume rise)**
  Total AOD: RMSE BIAS OC SO4 Sea Salt
  vs AERONET Dust Non-dust regions |
  - V0.8.6 (FRP) vs
  - V0.8.8 (GBx + PDT)
  - V0.8.8 P1 (GBx + PDT + Plume rise)
  -
- **June 11-30, 2019: (Impact of GBx, Plume rise)**

    - V0.8.6 (FRP) vs
    - V0.8.7+Plume-rise
    - V0.8.8 (GBx+PDT)
    - V0.8.8 P1 (GBx+PDT+Plume rise)
    -
- **May 19-June 9, 2019 (Impact of GBx, PDT)**
    - V0.8.6 (FRP)
    - V0.8.7 (GBx)
    - V0.8.7+PDT (V0.8.8)
    -
- **June 15-June 30, 2019 (Impact of dust schemes)**
    - V0.8.8
    - V0.8.8-D (Fensha dust run)

Potential future changes

- Wet scavenging for large scale precip in chemistry
- PDT and Wet scavenging directly in SAS -Delivered in V0.8.8
- Tracer transport directly in SAS/EDMF - Delivered in V0.8.8
- Adjust Tuning parameters for wet scavenging - Delivered in V0.8.8
- Unified GOCART with NASA version

Period	Run1	Run2	Run3	Run4	Purpose	Verification
5/29/-6/30/19	V0.8.6 (FRP)		V0.8.8 (PDT)	V0.8.8. P1	GBx, PR	
6/11-6/30	V0.8.6	V0.8.7+PR (GBx)	V0.8.8	V0.8.8 P1	GBx, PR w/ PDT	

5/19-6/9/10	V0.8.6	V0.8.7	V0.8.8		GBx, PDT	
6/15-6/30/19			V0.8.8	V0.8.8-D	Dust	

GBx positive: captures fires better esp over N. Americat
PDT positive: reduces overprediction of smoke, SO4, Seasalt
PR ??
Dust ??