The Current Status and Future of WRF-Chem

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No new additions for V4.1, only bug fixes..

Even lots of talk about strange new models

Is this the end?

The beginning of the end?
A look at significant success stories this year

• Acceptance for operational implementation at NCEP (RAP/HRRR Smoke) – simplest possible application of WRF-Chem

• Implementation of **WRF-Chem chemdriver** as NUOPC chemistry component into FV3 (ESMF coupling)
  • Currently only GOCART modules used (planned NGAC replacement in 2020)
  • **Other chemistry modules could easily be turned on** (eg. ECMWF like setup would also be possible)
  • Some simple WRF-Chem modules will also be implemented into CCPP (CPF? Xxx?) – and maybe also more complex modules
WRF-Chem is very successful and is widely used around the world

• Original papers have more than 2000 citations (1400 for Grell et al., 600 for Fast et al.) on Research Gate, more on Google Scholar

• Several highlighted publications, also 2017 Hagen-Smit prize for the Grell et al. paper

• Thousands of users and by now over 600 users subscribed to the WRF-Chem discussions email list

• European WRF-Chem Workshop for last 3 years
Current developments

• Implementation of simple SOM-MOSAIC in WRF-Chem to model organic aerosol - simulates multi-generation gas-phase chemistry, kinetic gas/particle partitioning, heterogeneous chemistry, and oligomerization reactions (CSU)

• Updates to gas-phase and multiphase chemistry schemes for SOA and to MOSAIC-VBS SOA, i.e. more detailed biogenic SOA (PNNL)

• Tagged ozone mechanism from NOx and VOC sources (Potsdam, Germany)

• Higher frequency (e.g. hourly) fire emissions (GOES-16 FRP-based). Updates to anthropogenic emissions. Updates to RACM-MADE-VBS speciation and reactions for fire chemistry (ESRL/CSD)

• Updates to aerosol optical properties computation (UCLA)

• Changes to the WRF-Chem code and linking some external model code to the WPS program - for bioaerosols, in particular allergenic pollen and fungal spores (UK, Manchester and Worcester)

Currently no plans for major new WRF-Chem developments by NCAR
But: WRF-Chem community support, gate keeping, getting stuff back into community version...

• Support for WRF-Chem questions, errors, and development is small and getting smaller
  • NCAR/ACOM, PNNL will continue to provide support for the tools they have contributed
  • Concern about having enough support to release major additions (e.g., conduct regression tests, documentation, support)

• Major WRF-Chem Development Contributors have been NOAA/ESRL, PNNL, NCAR
  • NOAA/ESRL have been the gatekeepers (mostly unfunded), but are moving on to FV3-Chem
  • NCAR/ACOM will eventually switch to MUSICA which is part of SIMA
  • PNNL will continue to use WRF-Chem
Death sentence
....??

What will the future bring for WRF-Chem?
WRF-Chem - Other Thoughts

- For help, best practice is to make use of WRF/WRF-Chem Forum:
  

- At present we question availability of gatekeeper for WRF-Chem
  - Community version of chemistry is essentially frozen, unless we find someone... or funds to hire someone

- Should we be ready to switch to next generation models? Can they do what WRF-Chem can do? Direct, indirect feedback? LES? Data assimilation?

  **Live forever? Be frozen? Death sentence?**

Find Funding?

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