International Contributions to Regional Haze

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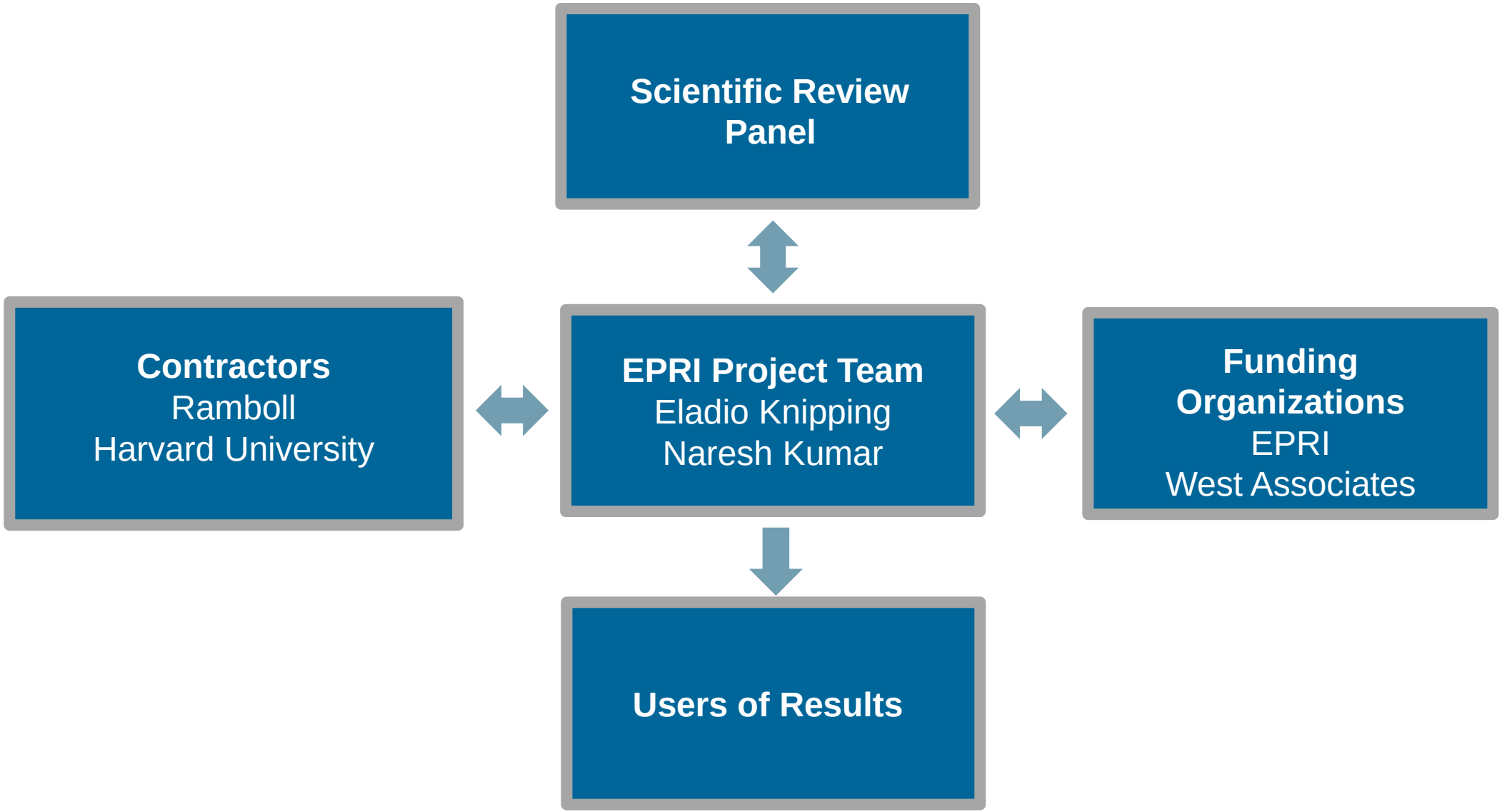
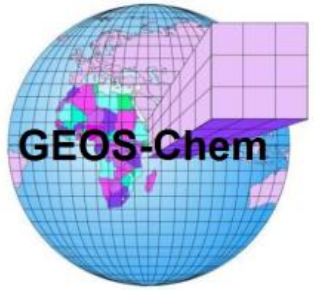
Motivation

- International transport can be a significant contributor to regional haze in some Class I areas.
- EPA's revised guidance for the Regional Haze Rule leaves it to the states to calculate impact of international transport on uniform rate of progress in consultation with EPA
- Given limited resources, a coordinated effort to assess contributions of international emissions on 2028 projections is needed

Project Organization



Project Scope



- 3 GEOS-Chem simulations
  - Provide international transport contributions through CAMx boundary conditions (BCs)
    - 2016 Baseline
    - 2028 Base Case
    - 2028 Scenario with all anthropogenic emissions outside the U.S. set to zero ((Zero Out Rest of World run; ZROW)
  - Global anthropogenic emissions based on the CEDS and regional inventories
  - Natural emissions driven by 2016 meteorology (in-line)

CAMx Ozone Particulates Toxics

- 3 CAMx simulations with respective GEOS-Chem BCs
  - 2016 Baseline, 2028 Base Case, 2028 ZROW
  - Build off State/Federal Collaborative 2016 modeling database
  - Develop 2016 natural emissions

- Visibility analysis

Current Status on GEOS-Chem Modeling

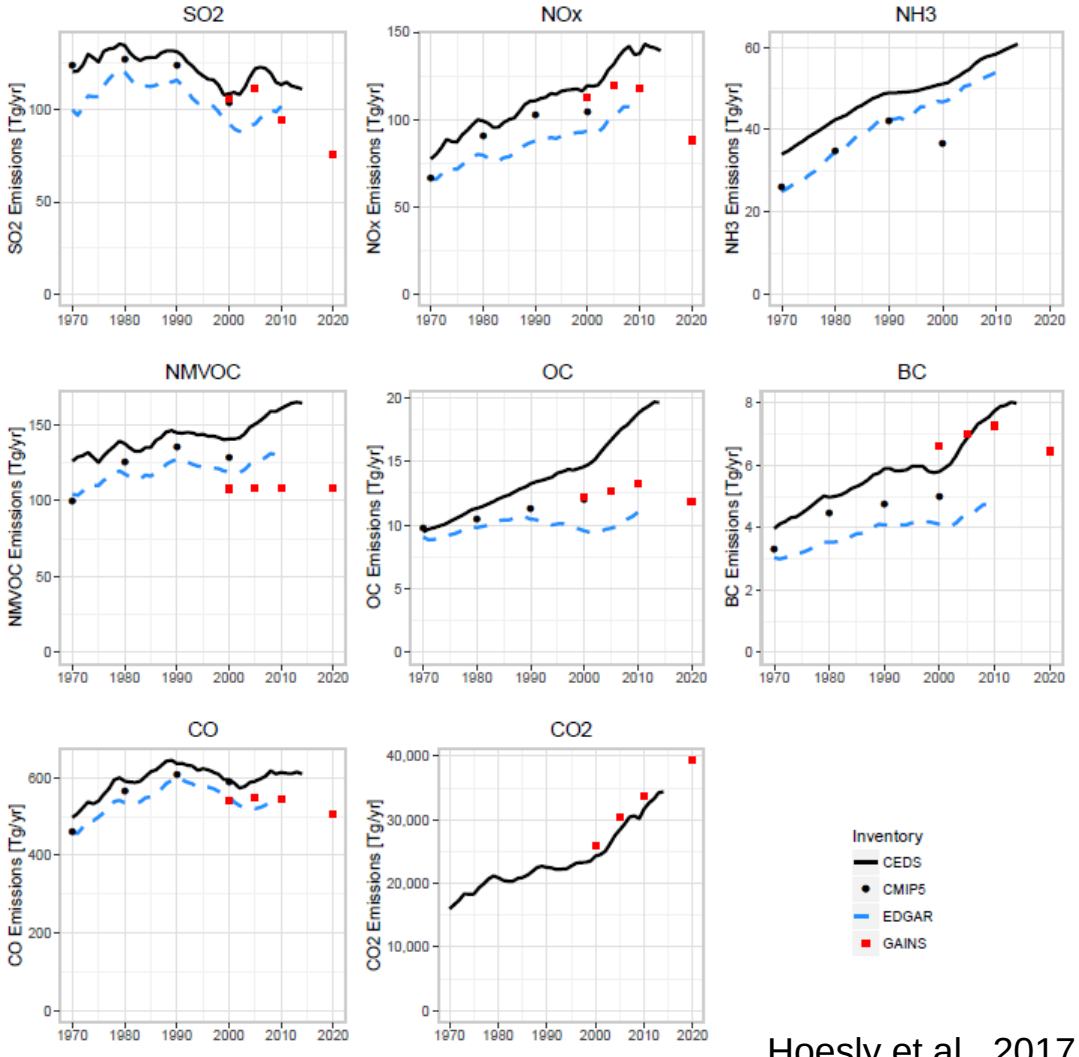
- Delay of v11-02f (expected end of April)

- Important updates in v11-02f
  - Community Emission Data System (CEDS) global inventory, including Mexico
  - MEIC: Multi-resolution Emission Inventory for China (Asia) 2015 (pending)
  - Criteria Air Contaminant (CAC) Trends (Canada) 2014
  - Halogen chemistry

Community Emission Data System (CEDS)

- 1750-2014
- EDGAR 4.3 supplemented with regional/country-specific inventories

- Comparison with other inventories
  - Similar trends
  - Global-totals higher than EDGAR



Hoesly et al., 2017

Figure S40: Like with like comparison of global CEDS emissions with EDGAR, GAINS, CMIP5, and CDIAC (fo
CO2 only)

Current Status on CAMx Modeling

- CAMx modeling will rely on State/Federal Collaborative 2016 modeling platform
  - 2016a is available
  - 2016b with 2028 projections by summer/fall 2018 (we will use this)
  - 2016 version 1 with 2028 projections by Feb 2019

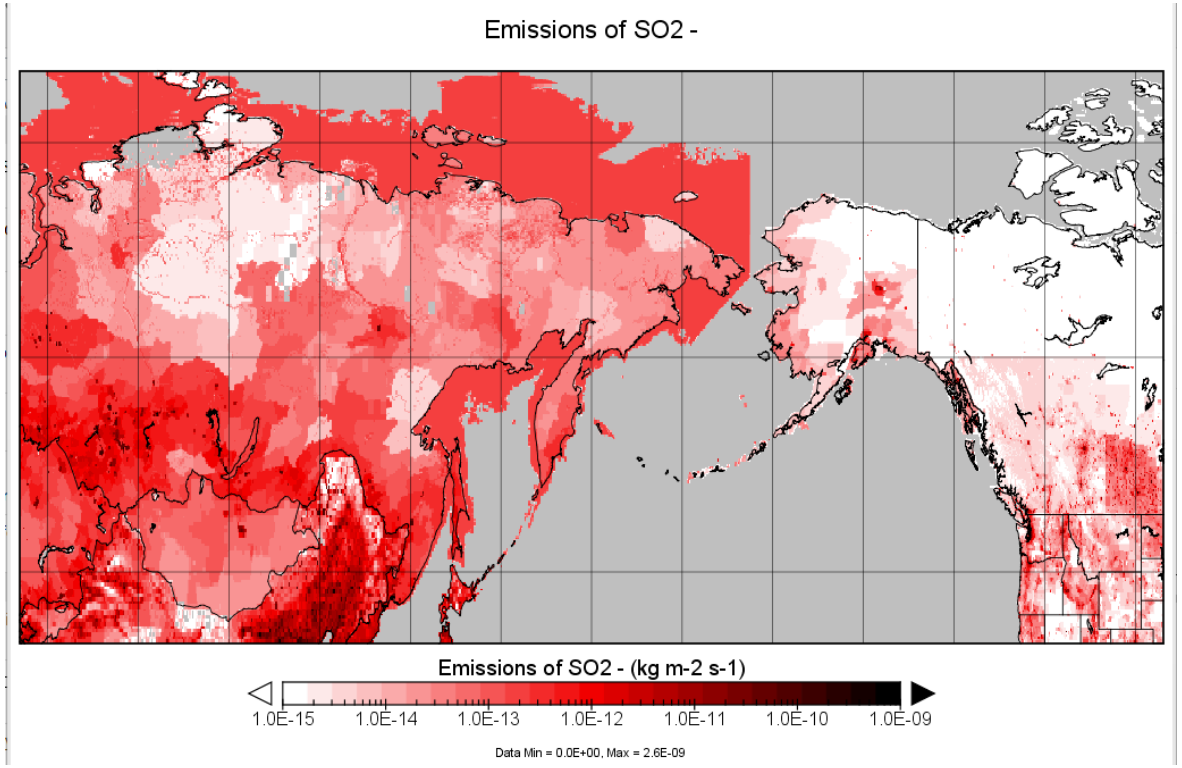
- Natural Emissions
  - Fires from the 2016 modeling platform
  - MEGAN biogenic emissions
  - Building stand-alone tools for wind-blown dust, DMS, lightning NOx

CAMx Emissions

Country	Year	Available Data
US	2016	2016b platform
	2028	Available with the 2016 platform ERTAC for EGUs
Canada	2016	Could be available with the 2016 platform Develop projections; 2015 and 2025 available
	2028	Could be available with the 2016 platform ECCC projected 2025 inventory available
Mexico	2016	Could be available with the 2016 platform Develop projections; 2008 and 2017 available
	2028	Could be available with the 2016 platform Develop projections; 2025 and 2030 available
Natural-only	2016	Day-specific fire, biogenic VOC, wind-blown dust
	2028	Hold constant from 2016 (not using averaging approach)

Challenges in Project I

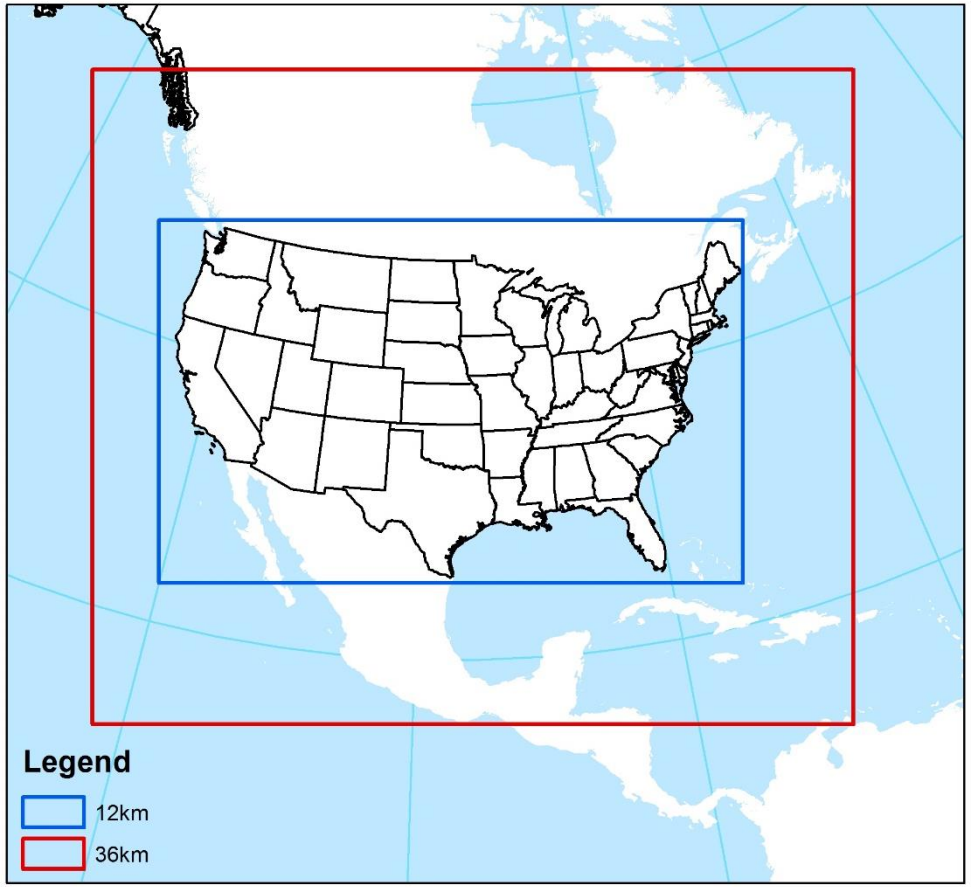
- Source code availability affecting schedule
- Some issues with GEOS-Chem default global inventories
- 2016 volcanic emissions not available in GEOS-Chem
  - Degassing emissions are relatively constant
  - Eruptive emissions are highly variable



Inland breeding of fisheries emissions in HTAP2 and EDGARv4.2

Challenges in Project II

- 2016 data availability for CAMx could affect project schedule
  - 2014 is readily available but will have a short shelf life
- Inconsistency between the EPA's 36 km and 12 km WRF
  - EPA's 36 km WRF used GFS for IC/BC and analysis nudging and their 12 km WRF used NAM



Expanded 36 km NA domain to improve downscaling between the GEOS-Chem ~ 200 km resolution to the 12 km CAMx CONUS resolution

Project schedule (assumed 2016b available by Aug 2018)

Proposed Tasks	Estimated Completion
Task 1. Global modeling	Sep, 2018
Task 2. Regional modeling (CAMx)	Aug, 2018 – June, 2019 Preliminary results – April 2019
Task 3. Communication	Throughout the project
Task 4. Final Report and Data Distribution	Aug, 2019

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