



# Newsletter

*Of the Multiscale Infrastructure for Chemistry and Aerosols*

## *Summary*

Welcome to the first MUSICA newsletter. These bi-monthly bulletins are being put together to update the community on MUSICA activities. In this issue of our newsletter you will find information on:

- MUSICA tutorials
- MUSICA<sub>v0</sub>, its availability to the community and upcoming release of output from a simulation of the 2012-2013 time period
- MusicBox, the box model version of MUSICA
- Upcoming SIMA Meeting
- Science highlights and recent presentations

## **MUSICA Online Tutorial Series - Starting November 12**

- Monthly Tutorial series on running MUSICA<sub>v0</sub>, MusicBox and MELODIES

<https://www2.acom.ucar.edu/workshop/musica-tutorial-2021>

# MUSICA Developments

---

## ■ MusicBox development

MusicBox is available as a terminal-based, command line version and as an interactive version with a browser interface. The interactive version has three example chemical mechanisms for getting started. For information on how to access and use MusicBox, please go to the MusicBox github site.

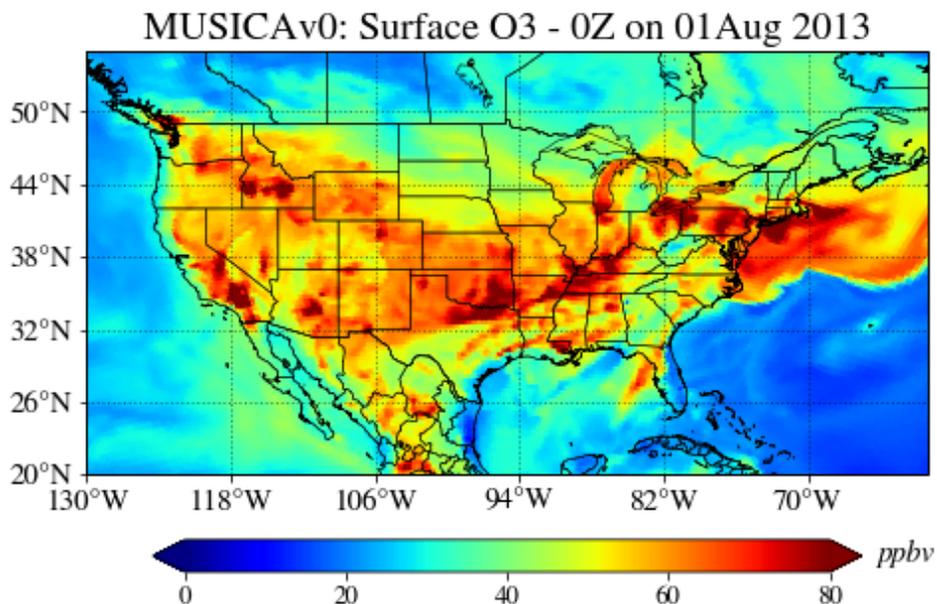
<https://github.com/NCAR/music-box>

## ■ MUSICA<sub>v0</sub> is now available for the community

MUSICA<sub>v0</sub> has been released as a configuration of CAM-chem in CESM2.2.0, with a refined grid over the continental U.S. Guidance on getting started running MUSICA<sub>v0</sub> is available on the MUSICA wiki page:

<https://wiki.ucar.edu/display/MUSICA/MUSICA+Home>

We are providing the output from a simulation of MUSICA<sub>v0</sub> for community. Currently 2012-2013 are completed and will be made publicly available soon. An example of surface ozone concentrations as predicted by MUSICA<sub>v0</sub> for August 1, 2013 is shown below.



## Evaluating the impact of chemical complexity and horizontal resolution on tropospheric ozone with a global variable resolution chemistry model

Contributed by **Rebecca H. Schwantes** (Rebecca.Schwantes@noaa.gov)

CIRES Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder  
NOAA Chemical Science Laboratory, Boulder, CO

Submitted to *J. of Advances in Modeling Earth Systems (JAMES)*, October 2021

### ■ In short

This paper describes, and presents the first evaluation of, the MUSICA<sub>v0</sub> model, which is CAM-chem with variable resolution, which has 14 km horizontal resolution over the contiguous U.S. and 1 degree resolution over the rest of the globe. The base MUSICA<sub>v0</sub> simulations are compared to standard resolution (uniform 1 degree for the globe) and higher chemical complexity configurations of the model. A comprehensive comparison of these several model configurations to aircraft observations of ozone and its precursors across the U.S. during 2013 is presented.

### ■ Findings

This work shows that increasing both the horizontal resolution and the chemical complexity improved the simulation of ozone and its precursors near the surface in the U.S. Results from this work suggest future studies should consider that 1) more complex chemistry is needed to achieve the full impact of using finer horizontal resolution and 2) increases in horizontal resolution often raise simulation costs by orders of magnitude while increases in chemical complexity often only fractionally raise simulation costs when determining the appropriate balance between horizontal resolution, vertical resolution, and chemical complexity.

### **Rebecca H. Schwantes**

Rebecca graduated from the California Institute of Technology in 2017, and did her Postdoc at NCAR for three years. Now Rebecca works at NOAA.



Rebecca's research focuses on:

- i) reduced chemical mechanism development;
- ii) tropospheric ozone formation and loss processes;
- iii) secondary organic aerosol formation; and
- iv) model evaluation against aircraft and surface monitoring data.

## IGAC 2021 Conference

- MUSICA overview, available at:

<https://www2.acom.ucar.edu/sections/musica-meetings>

# MUSICA Meetings

---

## SIMA Community Update Meeting:

- *The System for Integrated Modeling of the Atmosphere (SIMA) is an effort to unify NCAR community atmosphere models in a common framework to better serve the climate, weather, geospace and chemistry modeling.*
- Note that MUSICA is part of the SIMA effort and that the MUSICA team will begin MUSICA V0 and MusicBox tutorial sessions soon after the SIMA update meeting.
- We are pleased to announce the availability of new integrated configurations and simulation output for SIMA.
- We will be having a virtual meeting to update the community on these new SIMA capabilities and products, and plans for further development, **on Tuesday 9 November from 0900-1100 MT (1100-1300 ET)**. The workshop is open to all in the research community and to NCAR staff.
- If you are interested in attending, please register at:  
<https://www2.acom.ucar.edu/workshop/musica-tutorial-2021>
- Approximately the first hour of the meeting will be dedicated to the presentation of new SIMA-designated cases and component sets, including high-resolution polar configurations and a non-hydrostatic climate modeling capability, and simulation datasets for chemistry and geospace applications. The second hour will be devoted to the discussion of plans for further SIMA development and new applications, and to getting feedback from participants on these plans.

*More information is at <https://sima.ucar.edu>*