2021 Online HYSPLIT Workshop (DAY 2 of 4) Wrap-Up

NOAA Air Resources Laboratory
June 15-18, 2021

Workshop guidance and resources posted at

Workshop Web Page

https://www.ready.noaa.gov/register/HYSPLIT_hyagenda.php

… this wrap-up presentation will be put on Workshop Web Page

Agenda – Day 1

UTC	EDT	Agenda Item
13:00 – 13:15	09:00 – 09:15	Welcome, Introduction and Logistics
13:15 – 14:00	09:15 – 10:00	1. Installing HYSPLIT
14:00 – 14:10	10:00 – 10:10	Break
14:10 – 14:50	10:10 – 10:50	2. Testing the installation
14:50 – 15:00	10:50 – 11:00	Break
15:00 – 15:45	11:00 – 11:45	3. Gridded meteorological data sets
15:45 – 16:30	11:45 – 12:30	Break
16:30 – 18:00	12:30 – 14:00	4. Trajectory calculations
18:00 – 18:15	14:00 – 14:15	Break
18:15 – 19:30	14:15 – 15:30	5. Trajectory options
19:30 – 19:40	15:30 – 15:40	Break
19:40 – 20:45	15:40 – 16:45	6. Trajectory statistics
20:45 – 21:00	16:45 – 17:00	First day wrap-up

Note: all times are approximate

Agenda – Day 2

UTC	EDT	Agenda Item
13:00 – 13:15	09:00 – 09:15	Comments / questions from previous day
13:15 – 14:45	09:15 – 10:45	7. Air Concentration Calculations
14:45 – 15:00	10:45 – 11:00	Break
15:00 – 16:30	11:00 – 12:30	8. Configuring the CAPTEX simulation
16:30 – 17:30	12:30 – 13:30	Break
17:30 – 19:00	13:30 – 15:00	9. Air Concentration Parameter Sensitivity
19:00 – 19:15	15:00 – 15:15	Break
19:15 – 20:00	15:15 – 16:00	10. Alternate Display Options
20:00 – 20:45	16:00 – 16:45	11. Pollutant Transformations and deposition *(start this section if time permits)*
20:45 – 21:00	16:45 – 17:00	Second day wrap-up / questions

Note: all times are approximate

Agenda – Day 3

UTC	EDT	Agenda Item
13:00 – 13:15	09:00 – 09:15	Comments / questions from previous day
13:15 – 14:15	09:15 – 10:15	11. Pollutant Transformations and deposition *(…continuing from Day 2)*
14:15 – 14:30	10:15 – 10:30	Break
14:30 – 16:00	10:30 – 12:00	12. Air Concentration Uncertainty
16:00 – 17:00	12:00 – 13:00	Break
17:00 – 18:00	13:00 – 14:00	13. Source Attribution Methods
18:00 – 18:15	14:00 – 14:15	Break
18:15 – 19:15	14:15 – 15:15	13. Source Attribution Methods *(continued)*
19:15 – 19:30	15:15 – 15:30	Break
19:30 – 20:45	15:30 – 16:45	14. Wildfire Smoke and Dust Storms
20:45 – 21:00	16:45 – 17:00	Third day wrap-up / questions

Note: all times are approximate

Agenda – Day 4

UTC	EDT	Agenda Item
13:00 – 13:15	09:00 – 09:15	Comments / questions from previous day
13:15 – 14:45	09:15 – 10:45	15. Radioactive Pollutants and Dose
14:45 – 15:00	10:45 – 11:00	Break
15:00 – 16:30	11:00 – 12:30	16. Volcanic Eruptions with Gravitational Settling
16:30 – 17:30	12:30 – 13:30	Break
17:30 – 18:30	13:30 – 14:30	17. Custom Simulations
18:30 – 18:45	14:30 – 14:45	Break
18:45 – 19:45	14:45 – 15:45	Questions and answer (Q & A) session with course instructor Roland Draxler
19:45 – 20:00	15:45 – 16:00	Final course wrap-up

Note: all times are approximate

Recordings

Recordings

Access recordings from the Workshop Web Page:
https://www.ready.noaa.gov/register/HYSPLIT_hyagenda.php

- Recordings of each day's on-line sessions are being created, *but processing typically takes at least 2-4 hours* -- once the video is posted on our site, the corresponding item in the list below will turn into a link you can click to view

ready.noaa.gov/register/HYSPLIT_hyagenda.php

Reading list

Handouts, Notes, and Recordings. Videos of each day's on-line sessions are being created for review by participants, e.g., for those in time zones that would make online participation difficult. Processing of the videos to make them viewable takes significant time. When the video is posted, the corresponding entry below will become a link. When you click on one of these links, you should be able to view the video directly. To download a video recording, start playing it. Then place your mouse anywhere in the video area and right click the mouse. Choose the "Save As" menu.

- **Day 1 (Tue, June 15)**
  - Workshop day 1 introduction
  - Workshop video recording day 1 (See the above paragraph on how to download the video file.)
  - Workshop day 1 wrap-up
- **Day 2 (Wed, June 16)**
  - Workshop video recording day 2 (Not available yet)
- **Day 3 (Thr, June 17)**
  - Workshop video recording day 3 (Not available yet)
- **Day 4 (Fri, June 18)**
  - Workshop video recording day 4 (Not available yet)

Which Met Data Set Should You Use?

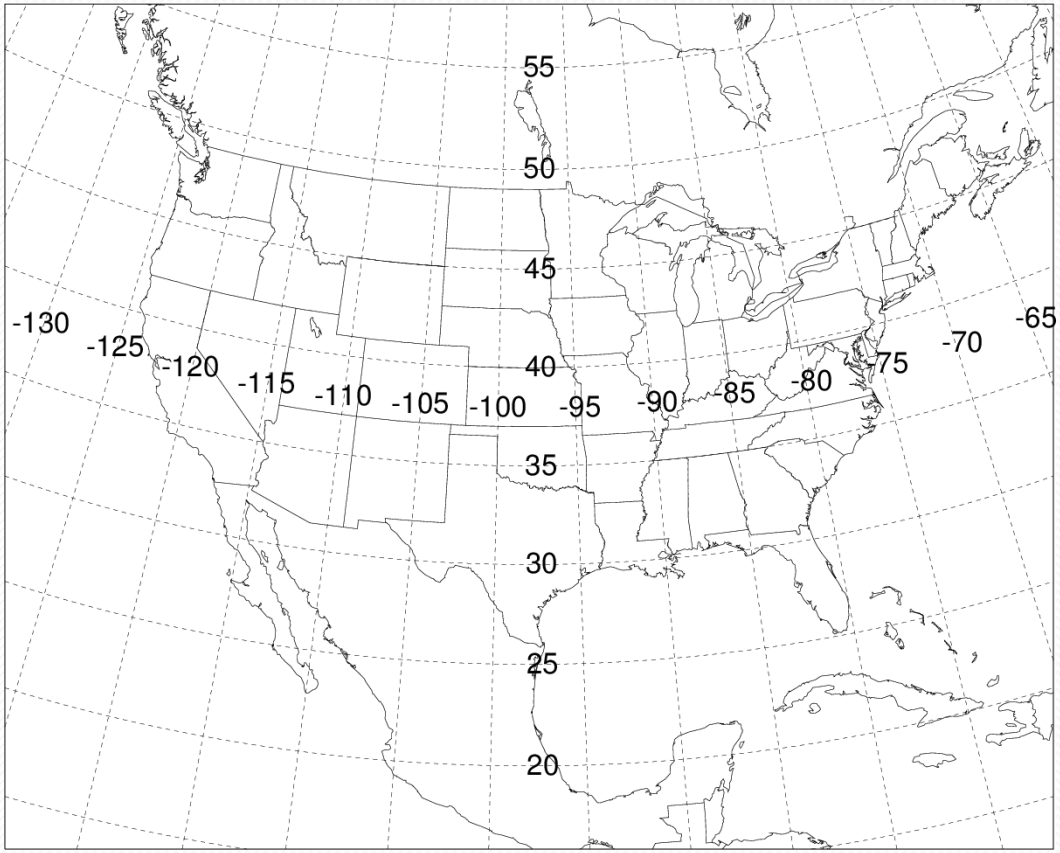
Selected Meteorological Datasets Available from NOAA ARL Archives* (~100 TB)

(https://ready.arl.noaa.gov/archives.php)

	Dataset	Horizontal Resolution (km- approx.)	Full-grid dimensions	Temporal resolution (hrs)	Vertical Levels	Period of each file	Size of each file (GB)	Total size for one month of data (GB)	Availability
Continental U.S. and surrounding regions	HRRR-3km	3	1799 x 1059	1	37	¼ day	3.2	390	Jun 2015 -> present
	NAMS-12km Hybrid	CONUS - 12 Alaska - 12 Hawaii – 2		1	40	1 day	1.0 0.64 0.71	30 19 21	2010 -> present
	NAM-12km	12	614 x 428	3	27	1 day	0.395	12	May 2007 -> present
	WRF-ARW-27km	27	216 x 174	1	35	1 day	0.210	6.4	1980 -> present
	NARR-32km	32	309 x 237	3	24	1 month	2.8	2.8	1979 -> 2019
	EDAS-40km	40	185 x 129	3	27	½ month	0.6	1.2	2004 -> 2018
Global	GFS - 0.25°	27	1440 x 721	3	56	1 day	2.7	82	Jun 2019 -> present
	GDAS - 0.5°	55	720 x 361	3	56	1 day	0.468	14	Sep 2007 -> Jun 2019
	GDAS - 1°	111	360 x 181	3	24	1 week	0.571	2.5	Dec 2004 -> present
	Global Reanalysis - 2.5°	278	144 x 73	6	18	1 month	0.11	0.11	1948 -> present

Domain of WRF-ARW-27km met data set

174 grid points



216 grid points

Horizontal spacing ~27 km

35 vertical levels

Data every hour

Each file is for one day

(~210 MB per file)

What Meteorological Data Set should you use?

- There is not one right answer to this question, as it can depend on the region and the situation you are modeling.
- All things being equal, the WRF-27km dataset that we have may be the best, as it is a true "re-analysis" dataset.
- But, if you are in an area with complex terrain, and 27-km is too coarse to capture fine-scale meteorological phenomena, then you probably would want to use one of the finer-resolution datasets (e.g., HRRR-3km).
- One approach is to use different datasets and see what differences the answers result. If they are relatively different, you get an idea that there is a fair amount of uncertainty in the met data and the resulting HYSPLIT simulations. If they are similar, then chances are the results are more robust.
- Also, it can be very useful to compare the met data fields (wind direction, wind velocity, etc) with measurements in the area(s) you are interested in. To the extent that the met data matches the measurements, you can be more confident that the dataset you are using is a good one for your situation.

High-Altitude

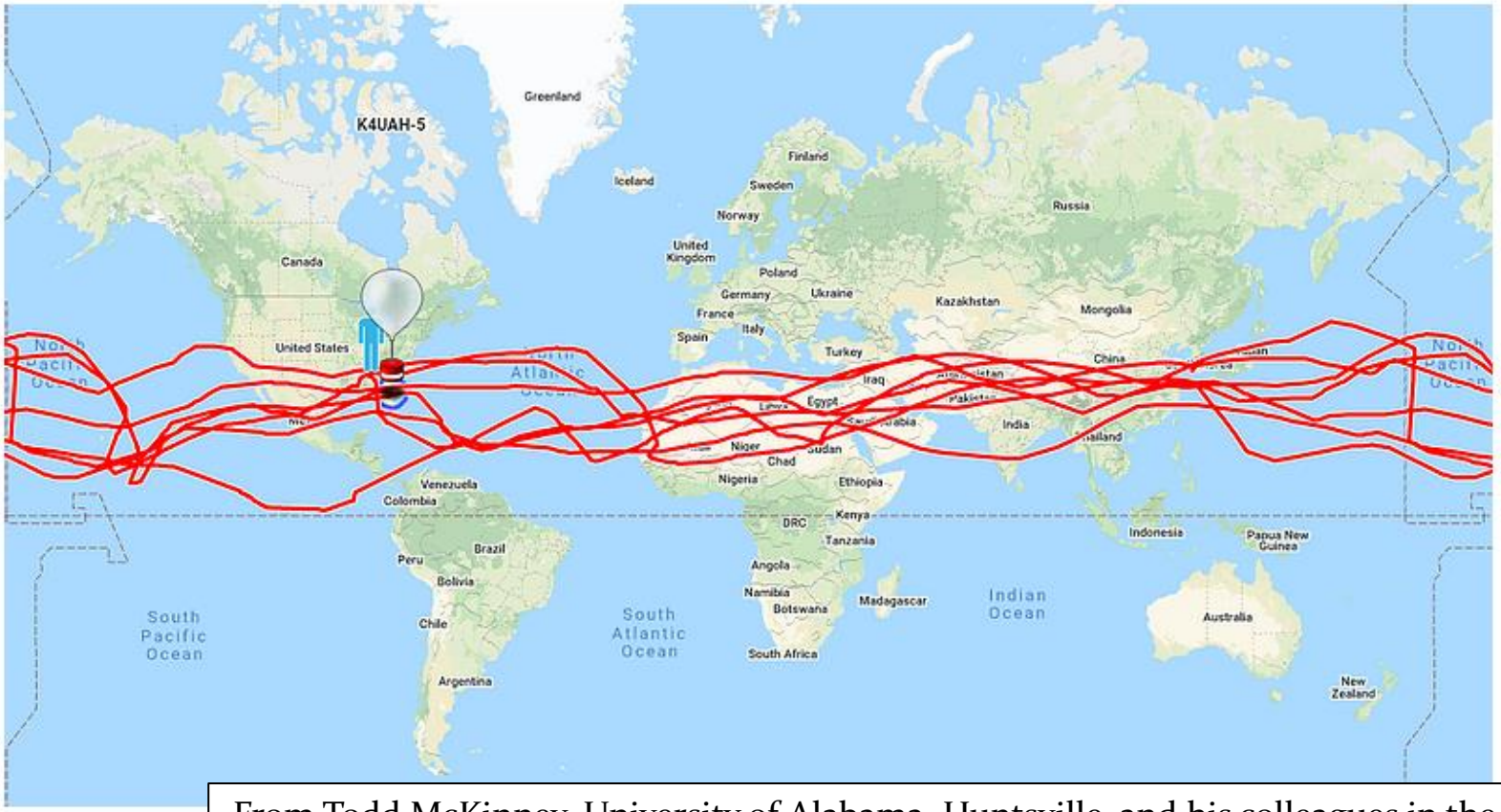
Balloon Research

to evaluate trajectories

From Todd McKinney, University of Alabama, Huntsville, and his colleagues in the Space Hardware Club (https://www.ashballoon.info/missioncontrol)

K4UAH-5 has Landed 6/8/2021 - Day 115

K4UAH-5 has finally gone down! Late evening on 6/7/2021, K4UAH-5 appeared to have developed a leak off the coast of Flordia, where it dropped a few hundred meters. It did not wake up on 6/8/2021. K4UAH-5 had an amazing adventure, where it made seven total circumnavigations. It traveled thousands of kilometers and made contacts with every continent. Congratulations K4UAH-5, gone but not forgotten!



Balloons launched and then tracked as they fly around the earth. They are designed to fly at a constant pressure, in this case about 13 km above the ground.

We will be comparing HYSPLIT trajectories with the balloon paths. This work is ongoing.

From Todd McKinney, University of Alabama, Huntsville, and his colleagues in the Space Hardware Club (https://www.ashballoon.info/missioncontrol)

Movie showing a weather balloon launch, with a camera attached to the weather balloon instrumentation

From Todd McKinney, University of Alabama, Huntsville, and his colleagues in the Space Hardware Club (https://www.ashballoon.info/missioncontrol)

NOAA Air Resources Laboratory

High-Altitude Balloon Launch with HYSPLIT Logo

Launched from University of Alabama in Huntsville on May 29th, 2021

Depolyed on a Kaymont 1000 gram Balloon
Filmed with a GoPro HERO7

From Todd McKinney, University of Alabama, Huntsville, and his colleagues in the Space Hardware Club (https://www.ashballoon.info/missioncontrol)

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HYSPLIT Documentation and Learning Resources

- HYSPLIT Tutorial: detailed instructions on using the GUI + example scripts; can be run online or downloaded to local computer
- The GUI is a great way to learn HYSPLIT
  - even experienced users use it when trying something new
  - can create a run in the GUI, and then look at associated input/output files to tell you how to to create a script to do similar simulations
  - you can do some relatively complicated procedures (e.g., trajectory clustering)
- HYSPLIT Users Guide: online (and also in hysplit/documents directory)
- Download HYSPLIT and other resources: https://www.ready.noaa.gov/HYSPLIT.php
- HYSPLIT Cheat Sheet
- Model Overview: https://www.arl.noaa.gov/hysplit/hysplit/
- Equations: https://www.arl.noaa.gov/wp_arl/wp-content/uploads/documents/reports/arl-224.pdf
- HYSPLIT Forum: https://hysplitbbs.arl.noaa.gov/
- HYSPLIT FAQ's: https://www.arl.noaa.gov/hysplit/hysplit-frequently-asked-questions-faqs/
- HYSPLIT Training Workshop: https://www.ready.noaa.gov/register/HYSPLIT_hyagenda.php
- Stein et al., 2015: NOAA's HYSPLIT atmospheric transport and dispersion modeling system, *Bull. Amer. Meteor. Soc.*, 96, 2059-2077, http://dx.doi.org/10.1175/BAMS-D-14-00110.1
- Rolph et al., 2017: Real-time Environmental Applications and Display sYstem: READY. *Environmental Modelling & Software*, 95, 210-228, https://doi.org/10.1016/j.envsoft.2017.06.025

Agenda – Day 3

UTC	EDT	Agenda Item
13:00 – 13:15	09:00 – 09:15	Comments / questions from previous day
13:15 – 14:15	09:15 – 10:15	11. Pollutant Transformations and deposition *(start today or continue from yesterday)*
14:15 – 14:30	10:15 – 10:30	Break
14:30 – 16:00	10:30 – 12:00	12. Air Concentration Uncertainty
16:00 – 17:00	12:00 – 13:00	Break
17:00 – 18:00	13:00 – 14:00	13. Source Attribution Methods
18:00 – 18:15	14:00 – 14:15	Break
18:15 – 19:15	14:15 – 15:15	13. Source Attribution Methods *(continued)*
19:15 – 19:30	15:15 – 15:30	Break
19:30 – 20:45	15:30 – 16:45	14. Wildfire Smoke and Dust Storms
20:45 – 21:00	16:45 – 17:00	Third day wrap-up / questions

Note: all times are approximate