Welcome to the 2022 Online HYSPLIT Workshop

(pre-workshop installation day)

The broadcast is scheduled to start at:
09:00 Eastern Daylight Time (EDT) = 13:00 UTC

NOAA Air Resources Laboratory
June 13, 2022

Workshop guidance

and resources posted at

Workshop Web Page

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

We will update this page each day to include any new
materials or links that are relevant to the Workshop

2022 HYSPLIT Workshop Schedule

Subject to change, depending on the progression of the course and at the discretion of the instructors

UTC	Eastern Daylight Time	Monday June 13, 2022	Tuesday June 14, 2022	Wednesday June 15, 2022	Thursday June 16, 2021	Friday June 17, 2021
13:00 - 14:00	9:00 - 10:00	*OPTIONAL** 1a. Installing HYSPLIT on Windows PC	Introduction	Introduction	Introduction	Introduction
		Break	3. Gridded Meteorological Data Files	7. Air Concentration calculations	11. Pollutant transformations and deposition (continued)	15. Radioactive pollutants and dose
14:00 - 15:00	10:00 - 11:00	*OPTIONAL** 1b. Installing HYSPLIT on MAC	Break		Break	
		Break		Break		Break
15:00 - 16:00	11:00 - 12:00	*One-on-one virtual installation sessions, by appointment*	4. Trajectory Calculations	8. Configuring the CAPTEX simulation	12. Air Concentration Uncertainty	16. Volcanic eruptions with gravitational settling
16:00 - 17:00	12:00 - 13:00	*One-on-one virtual installation sessions, by appointment*	Break		Break	
				Break		Break
17:00 - 18:00	13:00 - 14:00	*One-on-one virtual installation sessions, by appointment*	5. Trajectory Options		13. Source Attribution Methods	17. Custom Simulations
18:00 - 19:00	14:00 - 15:00	*One-on-one virtual installation sessions, by appointment*		9. Air concentration parameter sensitivity		Break
			Break		Break	
19:00 - 20:00	15:00 - 16:00	*One-on-one virtual installation sessions, by appointment*	6. Trajectory Statistics	Break	14a. Wildfire Smoke	Final Questions and Course Wrap-Up
				10. Alternate display options		
			Day 1 Wrap-Up		14b. Dust Storms	
20:00 - 21:00	16:00 - 17:00	*One-on-one virtual installation sessions, by appointment*		**11. Pollutant transformations and deposition**	Day 3 Wrap Up	
				Day 2 Wrap Up		

3

Agenda – Day 0

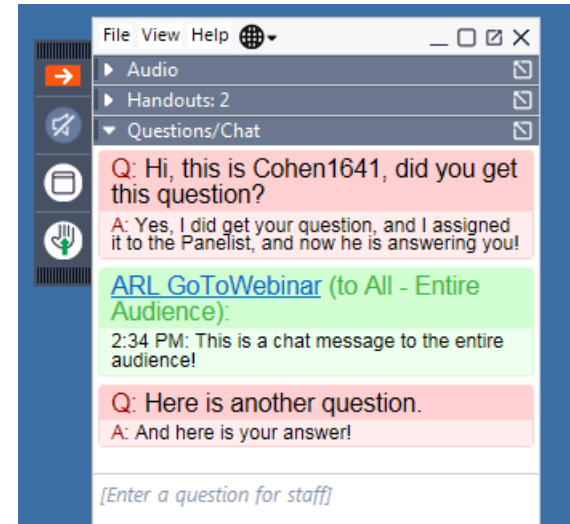| UTC	EDT	Agenda Item
13:00 – 13:45	09:00 – 09:45	1-2: Installation on Windows PC's
13:45 – 14:00	09:45 – 10:00	Break
14:00 – 14:30	10:00 – 10:30	1-2: Installation on Windows PC's
14:30 – 15:00	10:30 – 11:00	Break
15:00 – 16:00	*11:00 – 12:00*	*30-minute individual installation session as needed*
16:00 – 17:00	12:00 – 13:00	Break
17:00 – 21:00	*13:00 – 17:00*	*30-minute individual installation session as needed*

Note: all times are approximate

❑ During this short pre-workshop installation day Go-to-Webinar session, we will try to respond to questions in the Go-to-Webinar question box, although we apologize if we are unable to keep up with all questions asked.

❑ Alternatively, during this session or later in the day, you can post your questions **[Forum > 2022 HYSPLIT Workshop Questions > Installation]**, and we will assist you as soon as possible.

  ❖ A separate registration is required to post to the Forum. If you are not already registered for the HYSPLIT Forum, create a free account at https://hysplitbbs.arl.noaa.gov/, by clicking on the Register link near the top right of the page. Questions before the Workshop, e.g., about installation, can be posted here. *The Forum will also be the primary way that participants will be able to ask questions during the Workshop itself.*

❑ For all remaining installation issues:

  ❖ we will try to provide assistance by appointment on Monday June 13 (today), between the hours of 11 AM and 5 PM U.S. Eastern Daylight Time.

  ❖ To make an appointment, please use our web application for scheduling at https://apps.arl.noaa.gov/pickurtm. (Link is also on Workshop Web Page)

  ❖ Your email address used for the workshop registration will be required.

Asking Questions

❑ **During this short installation day Webinar, you can ask questions in the Go-to-Webinar Questions box – we will do our best to keep up with the questions.**

❑ **Or you can ask questions in the HYSPLIT Forum**

https://hysplitbbs.arl.noaa.gov/viewforum.php?f=76

Asking Questions in the HYSPLIT Forum

https://hysplitbbs.arl.noaa.gov/viewforum.php?f=76

- **You can ask more detailed questions, e.g., can attach screen shots**

- **We can provide more detailed answers**

- **There can be an exchange back and forth, if needed**

- **Can see other questions – in case you have a similar question**

- **We can give you a link to the answer to a similar question**

- **Accessible to people just viewing the recordings**

https://hysplitbbs.arl.noaa.gov/viewforum.php?f=77

Notes on Installation

Installation

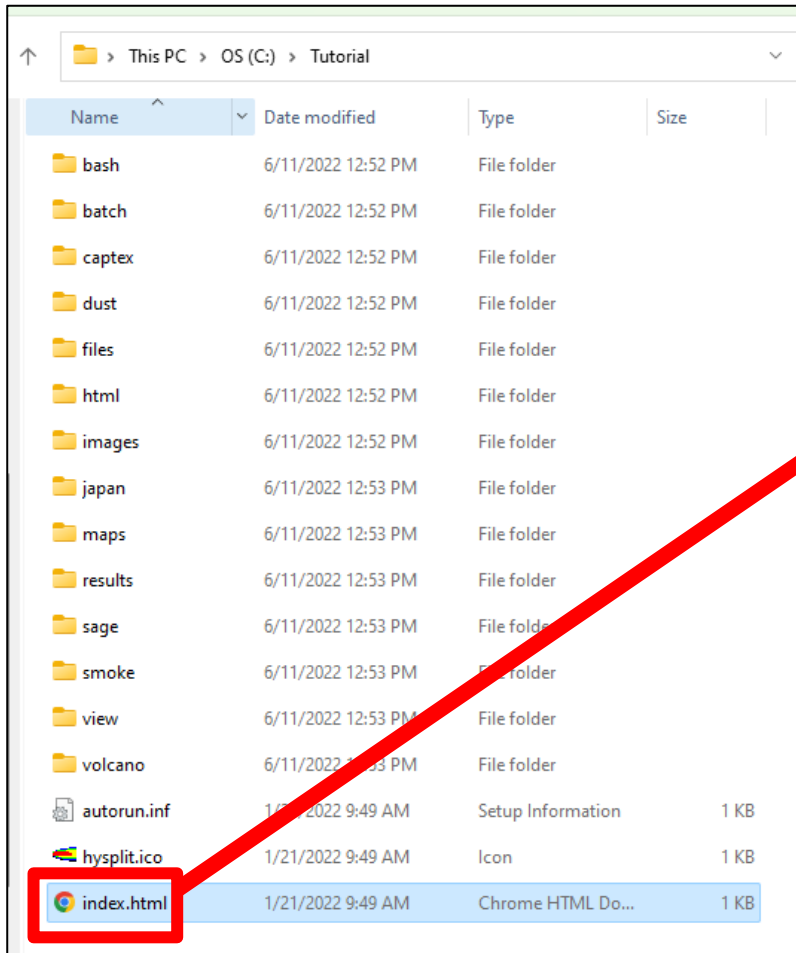## Key Steps to Take *Before* the Workshop

1. Download the primary course materials - Tutorial.zip - and unzip the conte
   consistent with preconfigured input files, but placing the file elsewhere is a
   the Home directory. On any operating system, if unzipping to a different di
   HYSPLIT system use the space as a file name delimiter.

2. Navigate to the Tutorial directory and open Index.html in a browser window
   screenshot at right.

3. Click on the link in section 1. Installing HYSPLIT to the instructions for you
   MAC OSX, or UNIX-LINUX) and follow the instructions there to install HYS
   computer. As described in the Installation instructions, graphical utilities sh
   for Windows installations, Tcl/Tk, and ImageMagick should be installed pri

   ▶ For Windows users only: Two legacy executables included in versions
     were found to have an issue. They are txt2dbf.exe and dbf2txt.exe. Th

Key Steps to Take *Before* the Workshop

1. Download the primary course materials - Tutorial.zip - and unzip the contents. For Windows users, unzipping to `c:\Tutorial` is recommended, to be most fully consistent with preconfigured input files, but placing the file elsewhere is also possible, e.g., `c:\users\your_name\Tutorial`. For MAC users, the file can be unzipped to the Home directory. On any operating system, if unzipping to a different directory name, avoid directories with embedded spaces because many programs in the HYSPLIT system use the space as a file name delimiter.

2. Navigate to the Tutorial directory and open Index.html in a browser window. You should see something like the screenshot at right.

3. Click on the link in section `1. Installing HYSPLIT` to the instructions for your operating system (Windows PC, Apple MAC OSX, or UNIX-LINUX) and follow the instructions there to install HYSPLIT and associated software on your computer. As described in the Installation instructions, graphical utilities should be installed prior to HYSPLIT. E.g., for Windows installations, Tcl/Tk, and ImageMagick should be installed prior to installing HYSPLIT.

   ▶ For Windows users only: Two legacy executables included in versions 5.2.0 and 5.2.1 (and earlier releases) were found to have an issue. They are txt2dbf.exe and dbf2txt.exe. They create and check DBF files for Geographic Information System (GIS). Please download and unzip the dbf_util.zip file and place the executables in the hysplit exec directory to overwrite the existing.

4. Installation may require administrative privileges, and we urge you to work with your IT colleagues to successfully complete this installation process if necessary. The Workshop is intended to be hands-on, i.e., the participants will be following along and will be carrying out the steps in the Tutorial themselves.

   ▶ Due to the large number of participants, it will be difficult for us to provide significant installation help *once the Workshop starts*. We will try to answer questions, but installation issues can be difficult to efficiently resolve remotely. Thus, we strongly encourage all participants to make every effort to complete the installation before the Workshop starts.

   ▶ If you encounter any installation issues *prior to the Workshop*, please post your questions **[Forum > 2022 HYSPLIT Workshop Questions > Installation]**, and we will assist you. A separate registration is required to post to the Forum (see item 6 below).

   ▶ For all remaining installation issues, we will attempt to provide assistance by appointment on Monday June 13, between the hours of 11 AM and 5 PM Eastern Daylight Time. To make an appointment, please use our web application for scheduling at https://apps.arl.noaa.gov/pickurtm. Your email address used for the workshop registration will be required.

5. If possible, try "test" the installation by following instructions in section 2 of the Tutorial, "Test trajectory calculation" and "Test air concentration calculation". If you can successfully reproduce the steps outlined in these sections on your computer, the installation process has most likely been successful.

6. If you are not already registered for the HYSPLIT Forum, create a free account at https://hysplitbbs.arl.noaa.gov/, by clicking on the Register link near the top right of the page. Questions before the Workshop, e.g., about installation, can be posted here. *The Forum will also be the primary way that participants will be able to ask questions during the Workshop itself.*

1. Download and unzip Tutorial.zip to somewhere on your computer

1.1 Windows PC HYSPLIT Install

The public-unregistered or registered versions of HYSPLIT should be downloaded as noted below. The installation contains all the executables, documentation, and some test meteorological data. Starting with HYSPLIT v5.2.0, the graphical user interface only requires Tcl/Tk because the Postscript graphics have been replaced by Scalable Vector Graphics (SVG) which can be displayed through any browser. Ghostscript and Ghostview are no longer needed. ImageMagick should also be installed if SVG is to be conveted to other formats. Other optional programs such as Google Earth and ArcExplorer may be installed if desired. Each software component must be downloaded from its own vendor or distributor web page, unless noted below. For some programs, selections exist for either a 32-bit or 64-bit download. HYSPLIT is provided only for a 64-bit OS. If you are unsure of which system is installed on your computer, check the control panel system tab for the operating system.

1. Tcl/Tk Graphical User Interface

   Version 8.5 or later is required.

   A Tcl/Tk script interpreter is required to run the HYSPLIT GUI. Further, various computations can be automated through the use of Tcl scripts. The standard HYSPLIT installation includes all the GUI scripts, but the Tcl/Tk interpreter is not part of the distribution. You can download and compile the source code, use one of the precompiled binaries available from the Tcl/Tk web site, or download and unzip the ARL compiled version (tcl.zip) to a directory on your computer (C:\tcl for example) which will contain the Windows executable (tcl\bin\wish86t.exe). For other versions, install the software to the suggested default directory prior to installing HYSPLIT.

   - ARL pre-compiled Tcl/Tk 8.6 executable
   - Tcl/Tk Developers Home Page

2. ImageMagick File Converter

   Tested versions include up to 7.0.7.

   The GUI has a built in link that permits the conversion of the SVG output to most other

1.2 Apple MAC OSX HYSPLIT install

The HYSPLIT Mac installation is similar to a Windows PC. Starting with HYSPLIT v5.2.0, the graphical user interface only requires Tcl/Tk because the Postscript graphics have been replaced by Scalable Vector Graphics (SVG) which can be displayed through any browser.

1. Tcl/Tk Graphical User Interface

   Version 8.5 or later is required.

   Although not required to run HYSPLIT, a GUI composed of multiple Tcl/Tk scripts is provided with HYSPLIT. The model can also be run using a command line interface. However, it is easier for novice users to use the Tcl/Tk interface. The HYSPLIT installation includes all the GUI scripts, but the Tcl/Tk interpreter is not part of the distribution. Most Unix / Linux operating system distributions, as well as Mac OS X, include Tcl/Tk. If not already installed, you can download Tcl/Tk from the Tcl/Tk web site. Install the software to the suggested default directory prior to installing HYSPLIT.

   - Tcl/Tk Home Page

2. ImageMagick Converter

   Tested versions include up to 7.0.7.

   The capability to convert SVG to other graphical formats is enabled within the GUI through ImageMagick. However, on MAC systems the *Preview* function can also be used to export

1.3 UNIX - LINUX HYSPLIT install

Like the Windows and Mac distributions, pre-compiled LINUX distributions come with all executables. However, for installation on a UNIX or some LINUX systems, the code must be compiled locally. See the HYSPLIT web page for more information about how to obtain either LINUX version. The remainder of this section discusses (1) how to install a pre-compiled LINUX distribution and (2) how to obtain and compile the source code from the repository.

Installing pre-compiled Linux distribution

1. Similar to all pre-compiled versions, Windows, Mac, and LINUX, the prerequisite software should be installed prior to installing HYSPLIT. The graphical user interface requires Tcl/Tk version 8.5 or later. The default graphical format for HYSPLIT is now SVG, which can be viewed using any browser. The GUI and tutorial scripts search for the installation location of **Firefox**. You may need to change the browser if Firefox is not found on your system.

2. SVG can be converted to other formats using ImageMagick. If not already available on your system, they may be easily installed using **yum**, **apt**, or **brew**. For some systems, just entering one of the commands, for instance **wish** for Tcl, or **convert** for ImageMagick will prompt the system to download and install the required libraries and software.

3. A pre-compiled LINUX distribution is a compressed tarball named **hysplit.vX.Y.Z_OS.tar.gz** where X.Y.Z and OS denote a HYSPLIT version and an operating system, respectively.

		Windows	MacOS	Linux
Tutorial		Download and unzip Tutorial.zip		
Graphical Utilities	**Tcl/Tk** ** Required to run Graphical User Interface (GUI)	➤ Install from Tcl/Tk website ➤ Or -- Download pre-compiled executable from ARL website	Already installed on most MacOS systems	Already installed on most Linux systems
	ImageMagick	*Optional – can do almost everything in Workshop except create animation or convert graphics to other formats*		
	Python	*Optional – not required for Workshop*		
	HYSPLIT	➤ Download and run self-extracting executable ➤ Or -- Download and unzip model files	➤ Download hysplit_v5.2.1.dmg and then run Install_hysplit.app	➤ Precompiled executables ➤ Or -- Compile locally

What does a successful installation look like?

Sometimes this "yellow" window is behind the "Menus of Hysplit" window

Menu

What does a successful installation look like?

If you are getting these types of things on your screen, then you have likely installed HYSPLIT successfully, and, that Tcl/Tk interpreter has been installed and is working properly on your computer.

What does a successful installation look like?

Desktop shortcut if TCL installed in default location and your computer knows how to open *.tcl files.

HYSPLIT.5.2.1 Properties

General | Shortcut | Security | Details | Previous Ve

HYSPLIT.5.2.1

Target type: TCL File
Target location: guicode
Target: C:\HYSPLIT\guicode\hysplit.tcl

---

hysplit tcl from users Properties

Security | Details | Previous
General | Shortcut | Com

hysplit tcl from users

Target type: Application
Target location: bin
Target: C:\Users\Mark\OneDrive\Documents
Start in: C:\Users\Mark\OneDrive\Documents

Desktop shortcut if you downloaded pre-compiled TCL executable and placed it in a directory of your choosing (in this example, it was in my Users directory)

Target: | C:\Users\Mark\OneDrive\Documents\tcl\tcl\bin\wish86t.exe
C:\hysplit\guicode\hysplit.tcl

Working with the Tutorial

2. Double-click or "open" `index.html` in Tutorial main directory to open the Tutorial in a browser.

File | C:/Tutorial/html/index.html

1. Download and unzip Tutorial.zip to somewhere on your computer

HYSPLIT Basic Tutorial Contents

Last Revised May 2022	**Index**	Next

HYSPLIT consists of a series of programs that read meteorological data files to compute trajectories, particle dispersion, and air concentrations. A very brief overview is provided here for those not familiar with the terminology.

Follow the HYSPLIT tutorial sections in the sequence shown below, working through each example. GUI menu screen images will be shown as needed. However, not all of the GUI options will be exercised with each example. Additional menu options will be introduced as needed. The GUI just creates the required input files needed to run HYSPLIT. Although the operation of the GUI is similar on Linux and Mac platforms, not all of the functions are available on all systems.

Some sections have a zoom button to show the required data entry values in a larger font. The tutorial is focused toward running HYSPLIT on a Windows PC. However, most sections have a link to a LINUX 🐧 script or a Windows 🪟 batch file that can be used to reproduce the example. The time at the bottom left of most pages shows the wall-clock time for that example. For some of the more computationally intense sections, the model output files can be found in the *results* directory of the tutorial.

The tutorial has been tested with HYSPLIT version 5.2.0 (see what's new). The GUI is continuously evolving and some the images of the GUI show here may reflect earlier versions if the particular option under discussion has not changed. The output examples may differ slightly from your results due to various operating systems, compilers, and CPU types in use.

1. **Installing HYSPLIT**
   1. Windows PC
   2. Apple MAC OSX
   3. UNIX or LINUX
   4. HYSPLIT directories
   5. Exercise #1

2. **Testing the installation**
   1. Graphical user interface operation
   2. Test trajectory calculation
   3. Test air concentration calculation
   4. Batch file scripting
   5. Using CAPTEX data in this tutorial
   6. Exercise #2

3.1 Tutorial Meteorological Data

← Previous | 🔍 | **HOME** | | → Next

Most of the CAPTEX example calculations in the following tutorial sections use one or more of the eight meteorological data files provided in the Tutorial\captex directory. Additional meteorological files are provided for the *Customized Concentration Simulations* section at the end of this Tutorial in their own directories (Japan, Smoke, Dust, Sage). All meteorological files contain the data (u,v component wind speeds, temperature, and several other variables) on a regular grid at multiple levels and time periods. These files are already in a format that can be read by HYSPLIT directly. Converting data in other formats for use by HYSPLIT will be discussed in the next section. There are several programs available through the GUI that can be used to examine the contents of the meteorological data files.

If the tutorial contents have been downloaded, then all the meteorological data files are provided. If the tutorial is being run through the web, these files need to be downloaded. Insure that the data transfer is binary.

1. To start, select the *Meteorology / Display Data / Grid Domain* menu tab to open the grid domain menu and set the file name to each of the meteorological files to see the spatial domain covered:

   - Weather Research Forecast Model (27 km) UW version: captex2_wrf27uw.bin
   - Weather Research Forecast Model (27 km): captex2_wrf27mc.bin
   - Weather Research Forecast Model (27 km): captex2_wrf27.bin

21

On each Tutorial page, when you click on the "+" sign
(or the magnifying glass)
you can see more information

3.1 Tutorial Meteorological Data

Previous | ⊕ | **HOME** | | Next

Most of the CAPTEX example calculations in the following tutorial sections use one or more of the eight meteorological data files provided in the Tutorial\captex directory. Additional meteorological files are provided for the *Customized Concentration* in their own directories (Japan, Smoke, Dust, Sage) component wind speeds, temperature, and several levels and time periods. These files are already in a Converting data in other formats for use by HYSPLIT are several programs available through the GUI that meteorological data files.

If the tutorial contents have been downloaded, then
If the tutorial is being run through the web, these file
transfer is binary.

1. To start, select the *Meteorology / Display Data* domain menu and set the file name to each of domain covered:

   ○ Weather Research Forecast Model (27 k
   ○ Weather Research Forecast Model (27 k
   ○ Weather Research Forecast Model (27 k

And the links on the page also show you images or data relevant to this section of the Tutorial

Gridded Meteorological Data

NOAA HYSPLIT MODEL
Forward trajectory starting at 1700 UTC 25 Sep 83
NARR Meteorological Data

NOAA HYSPLIT MODEL
Concentration (pg/m3) averaged between 0 m and 100 m
Integrated from 0600 27 Sep to 0900 27 Sep 83 (UTC)
PMCH Release started at 1700 25 Sep 83 (UTC)

>3000 pg/m3
>1000 pg/m3
>300 pg/m3
>100 pg/m3
>30 pg/m3
>10 pg/m3
Maximum: 6.1E+03 pg/m3
Minimum: 7.9E-03 pg/m3

0600 26 Sep 83 AWRF FORECAST INITIALIZATION

- A file contains data for one or more time periods

- Each time period consists of two types of fixed-length records
   ○ The header record: information about the grids and variables
   ○ The data records: are one per variable and level

Using the Go-to-Webinar Interface

...relevant if you are live-streaming the Workshop, but not if you are just viewing a recording...

Using the Go-to-Webinar Interface

With the Go-to-Webinar Desktop Application

Or can join through an internet browser (Google Chrome or Microsoft Edge)

https://support.goto.com/webinar/help/
how-do-i-join-a-webinar-from-the-
instant-join-app

Using the Go-to-Webinar Browser Interface

Toggle presenting team's webcam view to create more room on your screen

Materials, e.g., handouts

Questions

Settings

Take a screenshot

Using the Go-to-Webinar Browser Interface

https://support.goto.com/webinar/help/how-do-i-join-a-webinar-from-the-instant-join-app

1. Make sure you meet the browser requirements.
   - Linux or Google Chrome OS
   - Microsoft Edge (most recent 3 versions)
   - Google Chrome (most recent 3 versions)

2. Go back to the confirmation email or You're Registered! page.
   - Copy the join links.
   - If you have the confirmation email open, right-click Join Webinar then select Copy Hyperlink.
   - If you are on the You're Registered! page, right-click join this webinar then select Copy link address.

3. In a Google Chrome or Microsoft Edge browser, paste the join link.

   At the end of the URL, type in **?clientType=html5** then press Enter.

   The Join link will look similar to
   https://global.gotowebinar.com/join/2057328506534099723/930505186?clientType=html5.
   This link is not a real webinar but an example…

Using the Go-to-Webinar Desktop App Interface

Click the red arrow to toggle between hidden and not-hidden

If the Go-to-Webinar Control Panel is hidden (minimized) it will look like this

If not hidden, the Go-to-Webinar Control Panel will look something like this

Using the Go-to-Webinar Desktop App Interface

Use the View drop-down menu, for example:

- ✓ **to autohide control panel or not**

- ✓ **to restore the basic default layout if something disappears**

Using the Go-to-Webinar Desktop App Interface

By toggling the little triangle by each Control Panel section, you can expand it or contract it

We will put important handouts in this section

When you ask questions of the staff, your questions and answers will be shown in this section

Or when the staff sends the audience a message, you will also see it here

Using the Go-to-Webinar Desktop App Interface

By toggling the little box in the upper right-hand corner of a given section, you can undock it or redock it

Using the Go-to-Webinar Desktop App Interface

To ask a question, you type in the empty box, and then hit "send"

The question you asked should then show up in *your* Control Panel

When we answer it, the answer will show up in *your* Control Panel

Using the Go-to-Webinar Desktop App Interface

Sometimes we will ask for a show of hands on a particular question. You click the little hand icon to raise your hand

To lower your hand, you click again on the same icon.

Normally, after we get the answers, we will automatically lower everyone's hand

You are in listen-only mode, so you don't raise your hand to <u>ask</u> a question.

Using the Go-to-Webinar Desktop App Interface

You can click on the "globe" icon to change the language of the Control Panel.

Although Questions and Answers will be in English

Asking Questions

Asking Questions

❑ **Ask general or logistical questions about the Webinar or Go-to-Webinar in the Control Panel that was just discussed**

> *...if viewing a recording, can ask <u>general</u> questions by emailing* `arl.webmaster@noaa.gov`

❑ **Ask questions about HYSPLIT and the Tutorial in the HYSPLIT Forum**

https://hysplitbbs.arl.noaa.gov/viewforum.php?f=76

HYSPLIT Forum: hysplitbbs.arl.noaa.gov
A Forum for HYSPLIT Dispersion Model Users to Communicate Questions, Problems, and Ideas for Upgrades, etc.

Search...

☰ Quick links ❓ FAQ   ✏ Register ⏻ Login

🏠 Board index ‹ HYSPLIT Workshop ‹ 2022 HYSPLIT Workshop Questions

2022 HYSPLIT Workshop Questions

FORUM	TOPICS	POSTS	LAST POST
1. Installing HYSPLIT	1	4	**Re: GUI screen is black** by **sonny.zinn** ☑ June 8th, 2022, 6:44 am
2. Testing the installation	0	0	No posts
3. Gridded meteorological data files	0	0	No posts
4. Trajectory calculations	0	0	No posts

Asking Questions

If you have not already registered for the HYSPLIT Forum, you can do so easily by clicking on the "Register" icon at
https://hysplitbbs.arl.noaa.gov/

Asking Questions

CONFIRMATION OF REGISTRATION

Can you put the following famous cities to their respective country?
Please drag the options to the correct list, to avoid automated registrations.

Other Countries	United States of America
Vancouver	Phoenix
Kuala Lumpur	Chicago
Beijing	Boston

❑ Registration process asks you to place a series of cities either in the
   o United States of America
   o Other Countries

❑ Think of the biggest most important version of the city…

❑ E.g., even though there is a "Rome" in the U.S. and a "Paris" in the U.S., the correct answer is that they are in "Other Countries"

❑ One ambiguous one is "San Jose", and for this purpose, identify it as being in the "United States of America" *(even though it is also the Capital of Costa Rica)*

Asking Questions

Asking Questions

Asking Questions

https://hysplitbbs.arl.noaa.gov/viewforum.php?f=57

You can post your question in the appropriate section, based on where in the Tutorial your question refers to.

Asking Questions

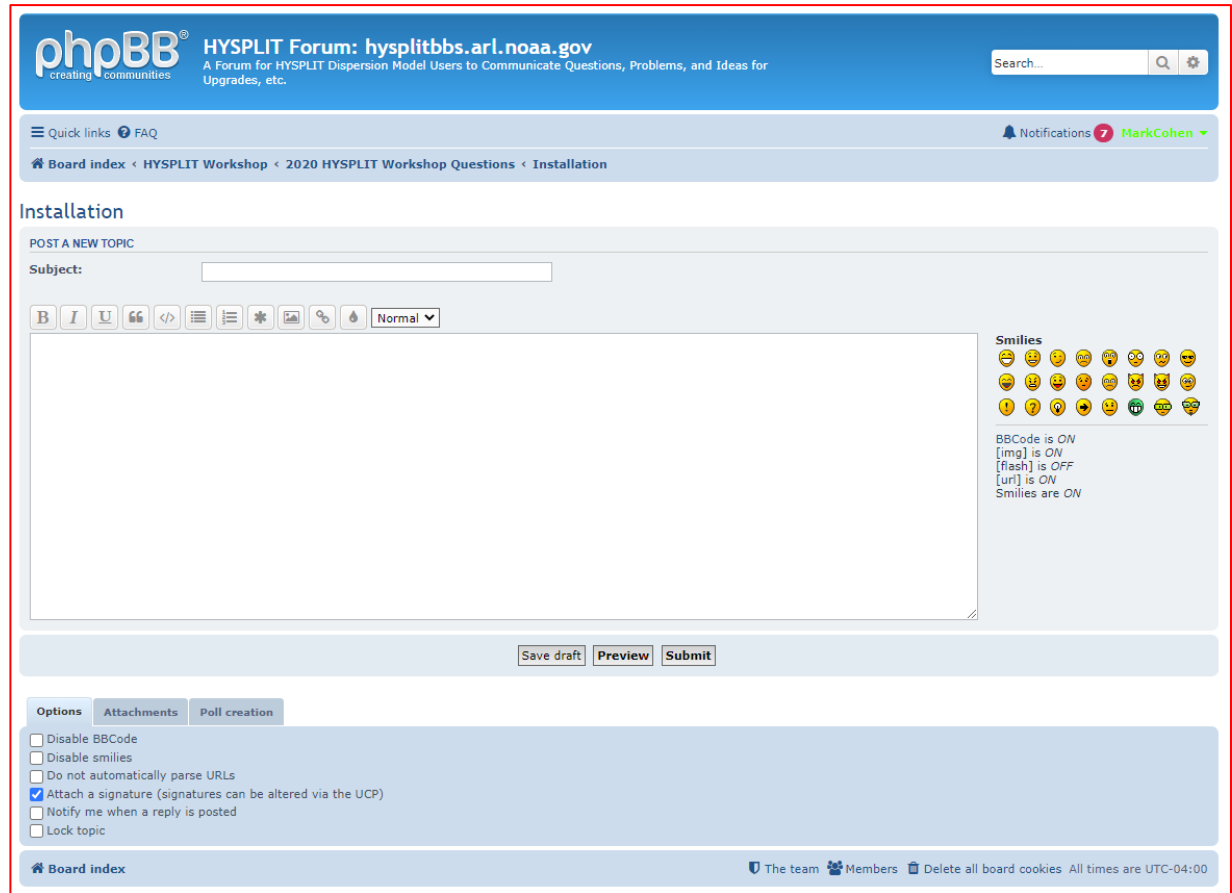**You can look to see if there already is a similar question, and if not, you can create a New Topic**

Asking Questions

Asking Questions

- **You can ask more detailed questions, e.g., can attach screen shots**

- **We can provide more detailed answers**

- **There can be an exchange back and forth, if needed**

- **Can see other questions – in case you have a similar question**

- **We can give you a link to the answer to a similar question**

- **Accessible to people just viewing the recordings**