

# HYSPLIT

With NOAA's HYSPLIT service, trajectories can be calculated online. You can find instructions on how to do this below:

## Instructions

Click on the pictures to enlarge them.

### 1. Step

The following link will take you to the entry form: <https://www.ready.noaa.gov/hypub-bin/trajtype.pl>

The screenshot shows the NOAA Air Resources Laboratory HYSPLIT Trajectory Model entry form. The header includes the NOAA logo and the text "Air Resources Laboratory Advancing Atmospheric Science and Technology through Research". Below the header is a navigation bar with links: "ARL Home", "READY", "Transport & Dispersion Modeling", "HYSPLIT", and "HYSPLIT Trajectory Model". A small "READY" logo is also present. The main content area is titled "Type of Trajectory(ies)" and contains a form with the following options:

- Number of Trajectory Starting Locations:** Radio buttons for 1, 2, and 3. A note states: "Note: By choosing just one source location, more options for selecting the location will be presented on the next page, such as choosing by latitude/longitude, by WMO ID, or by plant location. Multiple source locations limit the input to just latitude/longitude positions. This option is ignored for trajectory ensemble and frequency."
- Type of Trajectory:** Radio buttons for Normal, Matrix, Ensemble, and Frequency. The "Normal" option is selected.

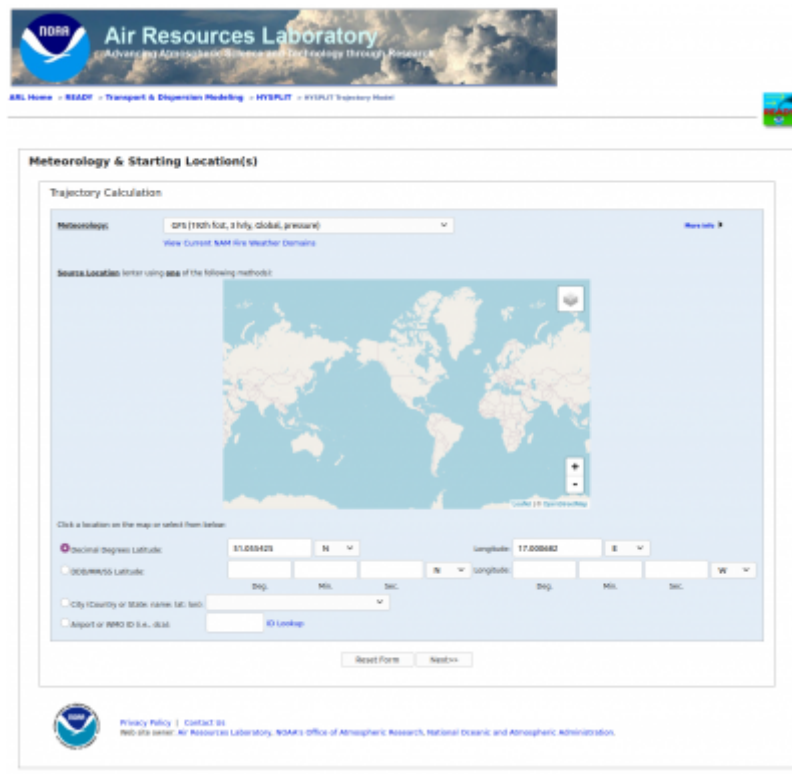
A "Next>>" button is located below the form. The "Details" section provides information about the selected options:

- Trajectory Matrix:** The trajectory matrix option will run a grid of trajectories bounded by the first 2 source locations (trajectory 1 is the lower left grid point and trajectory 2 is the upper right grid point) and evenly spaced with a grid increment given by the distance between the lower left grid point (trajectory 1) and trajectory 3. Only one height is allowed.
- Trajectory Ensemble:** The trajectory ensemble option will start multiple trajectories from the first selected starting location. Each member of the trajectory ensemble is calculated by offsetting the meteorological data by a fixed grid factor (one grid meteorological grid point in the horizontal and 0.6 sigma units in the vertical). This results in 27 members for all-possible offsets in X, Y, and Z. Note: the starting height should be greater than 250 m for optimal configuration of the ensemble.
- Trajectory Frequency:** The trajectory frequency option will start a trajectory from a single location and height every 6 hours and then sum the frequency that the trajectory passed over a grid cell and then normalize by either the total number of trajectories or endpoints. A trajectory may intersect a grid cell once or multiple times (with residence time options 1, 2 or 3).

The footer includes the NOAA logo, a "Privacy Policy | Contact Us" link, and the text: "Web site owner: Air Resources Laboratory, NOAA's Office of Atmospheric Research, National Oceanic and Atmospheric Administration."

Choose **1** Trajectory Starting Location and **NORMAL** for the Type of Trajectory.

### 2. Step



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ARL Home > READY > Transport & Dispersion Modeling > HYSPLIT > HYSPLIT Trajectory Model

**Meteorology & Starting Location(s)**

Trajectory Calculation

Meteorology: GFS (10th fix, 3 fully global, pressure) [More info](#)

View Current NAM Air Weather Domains

Source Location: Enter using one of the following methods:

Click a location on the map or select from below:

☒ Decimal degree Latitude: 51.055425 N Longitude: 17.000682 E

☐ DECIMINETS Latitude: Deg. Min. Sec. Longitude: Deg. Min. Sec. W

☐ City (Country or State name, lat, lon)

☐ Airport or ICAO ID (lat, lon) [ID Lookup](#)

[Reset Form](#) [Next>>](#)

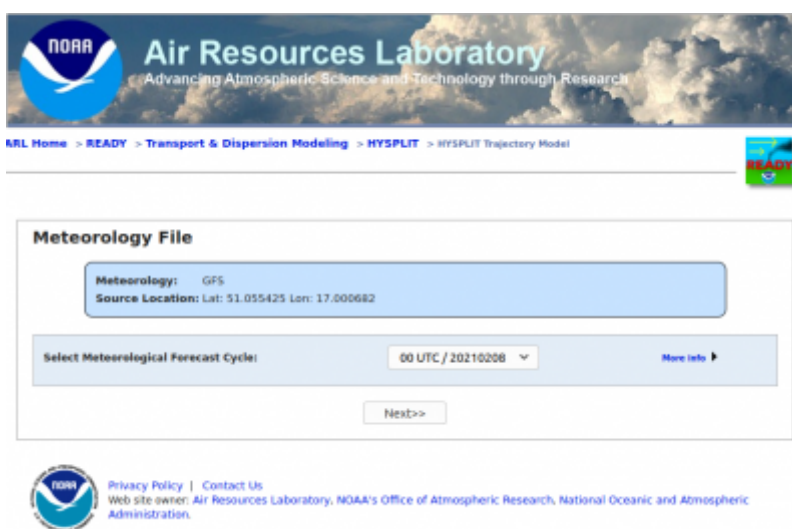
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Here you have to select the weather model and the location where the trajectories start. In the example, we have selected the starting location of the [Gordon Bennett Race 2021](#), Wrocław, Racecourse – Partynice, Poland. (Koordinates: 51.055425 N and 17.000682 E)

Attention: Not all weather models cover the whole world, therefore we choose the GFS model.

### 3. Step

Select Meteorological Forecast Circle.



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ARL Home > READY > Transport & Dispersion Modeling > HYSPLIT > HYSPLIT Trajectory Model

**Meteorology File**

Meteorology: GFS  
Source Location: Lat: 51.055425 Lon: 17.000682

Select Meteorological Forecast Cycle: 00 UTC / 20210208 [More info](#)


[Next>>](#)

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Normally, the last calculation run is suggested, and it is a good idea to select this. If you perform several calculations with different runs, you can see whether the forecast is stable or not.

## 4. Step


## Model Run Details



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Advancing Atmospheric Science and Technology through Research

ARL Home > READY > Transport & Dispersion Modeling > HYSPLIT > HYSPLIT Trajectory Model



## Model Run Details

Request trajectory

The current GPS model has archive data beginning at 01/01/01 0000 UTC and 180 hours of forecast data beginning at 02/01/01 0000 UTC.

### Model Parameters

Trajectory direction:  
☒ Forward  
☐ Backward (Change the default start time)

Vertical Motion:  
☐ Model vertical velocity  
☒ Isobaric  
☐ Isentropic

Start time (UTC):  
Current time: 08:04  
year: 21 month: 02 day: 08 hour: 8

Total run time (hours): 26

Start a new trajectory every: 0 hrs Maximum number of trajectories: 24

Start 1 latitude (degrees): 51.055425

Start 1 longitude (degrees): 17.000682

Start 2 latitude (degrees):

Start 2 longitude (degrees):

Start 3 latitude (degrees):

Start 3 longitude (degrees):

Automatic mid-boundary layer height?  
Will override selections below.  
☐ Yes ☒ No

Level 1 height: 500 meters AGL meters AMSL

Level 2 height: 1500

Level 3 height: 2500

### Display Options

GIS output of contours? ☐ None ☒ Google Earth (kmz) ☐ GIS Shapefile

The following options apply only to the GIF, PDF, and PS results (not Google Earth)

Plot resolution (dpi): 300

Zoom factor: 70

Plot projection: ☒ Default ☐ Polar ☐ Lambert ☐ Mercator

Vertical plot height units: ☒ Pressure ☐ Meters AGL ☐ Theta

Label interval: ☐ No labels ☒ 1 hour ☐ 6 hours ☐ 12 hours ☐ 24 hours

Plot color trajectories? ☒ Yes ☐ No

Use same colors for each source location? ☒ Yes ☐ No

Plot source location symbol? ☒ Yes ☐ No

Distance circle overlay: ☒ None ☐ Auto

U.S. county borders? ☐ Yes ☒ No

Postscript file? ☐ Yes ☒ No


PDF file? ☒ Yes ☐ No

Plot meteorological field along trajectory?  
☐ Terrain Height (m)  
☐ Potential Temperature (K)  
☐ Ambient Temperature (K)  
☐ Rainfall (mm per hr)  
☐ Mixed Layer Depth (m)  
☐ Relative Humidity (%)  
☐ Downward Solar Radiation Flux (W/m\*\*2)

Dump meteorological data along trajectory:

Note: Only choose one meteorological variable from below to plot

Request trajectory (only press once!)



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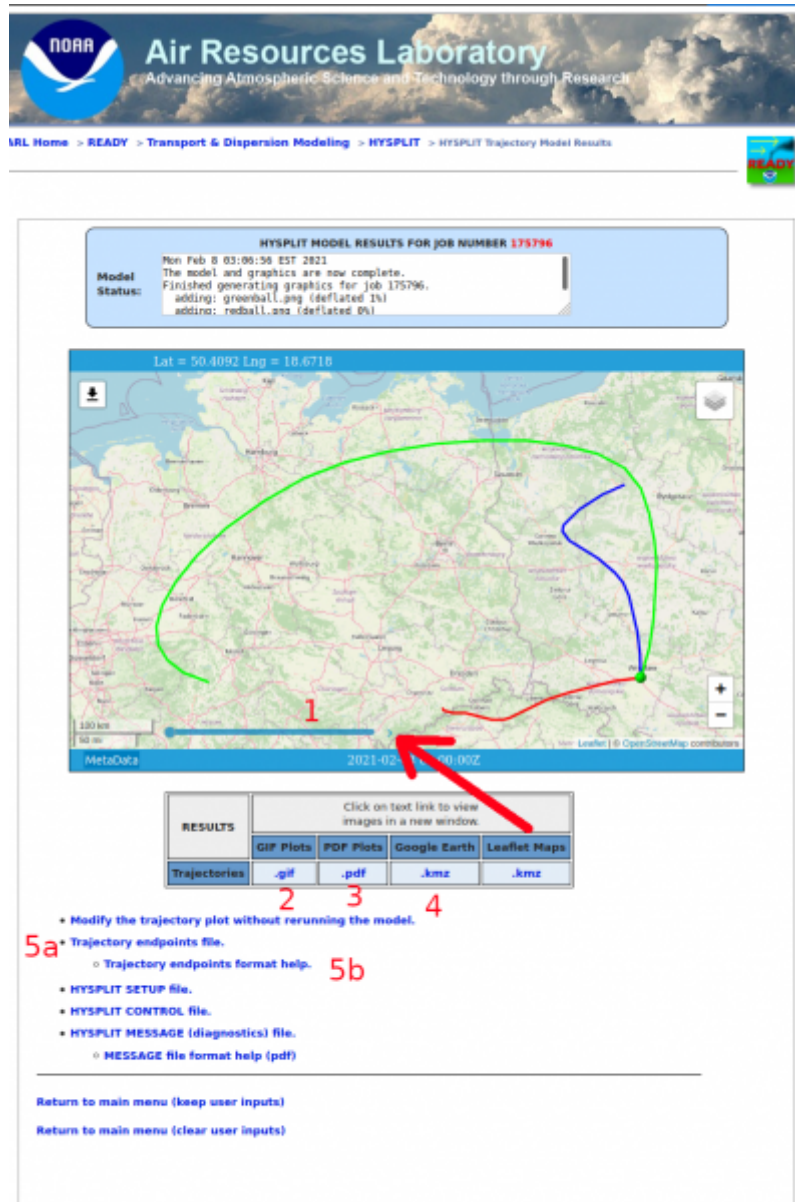
- ### 1. Trajectory direction: **Forward**

2. Vertical Motion: **Isobaric**
3. Start time (UTC): Your choice
4. Your time for this flight altitude
5. Here you can specify how often a new trajectory should be started at intervals. First select 0 so that only one is calculated. Later you can experiment with these options.
6. Coordinates of the starting point.
7. Here you can select up to three heights for which trajectories are calculated.
8. Select **Google Earth (kmz)**
9. Here you can choose the resolution of the graphics.
10. You can first select the other fields as in the example.

If you click on **Request trajectory**, you can start the calculation.

## 5. Results

Now you have to be patient until the calculation and the creation of the graphics are finished.

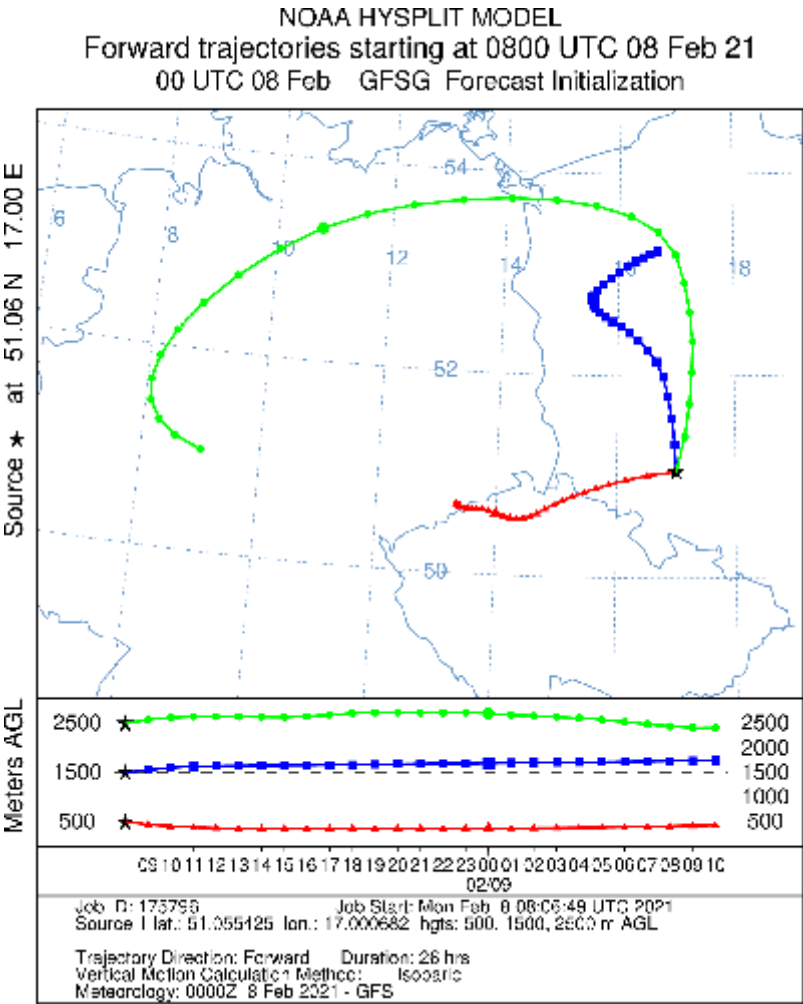


## 1 Interactive map

Here you can see when the balloon will be where on the trajectory.

## 2 GIF

Here you can display the trajectory as a gif.



3 PDF

[hysplit5step2.pdf](#)

4 KMZ Google Earth



[hysplit5step3.kmz](#)

5

a. Trajectory endpoints file.

[hysplit5step4.txt](#)

b. Trajectory endpoints format help.



### Trajectory output file format (ASCII)

NOTE: Changes made to the endpoints file format on July 15, 2005 are reflected in bold red.

**Record #1**  
i6 - Number of meteorological grids used in calculation  
i6 - A missing variable here indicates old format specification


Loop Records #2 ==> number of grids  
A6 - Meteorological Model identification  
S16 - Data file starting Year, Month, Day, Hour, Forecast Hour

**Record #3**  
i6 - number of different trajectories in file  
1X A6 - direction of trajectory calculation (FORWARD/BACKWARD)  
1X A6 - vertical motion calculation method (OMEGA,THETA,...)

Loop Record #4 ==> number of different trajectories in file  
4i6 - starting year, month, day, hour  
2F9.3 - starting latitude, longitude  
F8.1 - starting level above ground (meters)

**Record #5**  
i6 - number of diagnostic output variables  
n1XAB - label identification of each variable (PRESSURE,THETA,...)

Loop Record #6 ==> through end of all endpoints  
i6 - trajectory number  
i6 - meteorological grid number  
S16 - time of point: year month day hour minute  
i6 - forecast hour at point  
F8.1 - age of the trajectory in hours  
2F9.3 - position latitude and longitude  
F8.1 - position height in meters above ground  
n1XFB.1 - n diagnostic output variables (1st output is always pressure)

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This is just one example. Of course, you could experiment with different inputs.

Your comments? Contact [Volker Löschhorn](#).

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