

# HEC-HMS Lab 2: Running a single basin model with multiple rainfall inputs

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## Learning outcomes

The objective of this lab is to learn how to input multiple rainfall events into HEC-HMS, and evaluate how rainfall distribution affects the discharge or streamflow hydrograph. By the end of this exercise, you will:

- 1) Know how to input multiple rainfall hyetographs into HEC-HMS
- 2) Understand how to read peak value, time to peak and base time of run-off hydrograph in HEC-HMS
- 3) Assess how temporal distribution of rainfall affects the peak value, time to peak and the base time of hydrograph

**Student Time Required:** 50 minutes

## Data Inputs

### Numerical Inputs

Rainfall: Two hourly Rainfall Hyetograph in mm

Text Inputs: None

Model: HEC-HMS 4.1 (Note: You should be able to do this exercise by using any version of HEC-HMS, but the images in this document may not match exactly with what you see on your screen)

## Instructions

### Step 1:

- 1) Open the HEC-HMS model from last week and save it by giving a new name (Lab 2). It would be good to save Lab2 in separate folder so you do not mix-up all the input and output files.
- 2) Before you change anything, run the model and copy the hydrograph (columns that contain time and the final outflow/streamflow values) from the time series table into an Excel file. Save this Excel file in your working directory.
- 3) Create a new Precipitation Gage like you did in Lab 1. Name it as Gage 2. Use the information in the table below to input data for Gage 2. Create a new Meteorologic Model (Met 2), and link this new meteorologic model with Gage 2. In Lab 1, you had linked Gage 1 with the Meteorologic model (Met 1). Make sure that the Replace Missing option is "Set to Default" for Met 2.

Date	Time	Precipitation (mm)
9/1/2013	10:00	0.00
9/1/2013	11:00	2.00
9/1/2013	12:00	3.08
9/1/2013	13:00	5.16
9/1/2013	14:00	5.00
9/1/2013	15:00	2.54
9/1/2013	16:00	2.00
9/1/2013	17:00	1.00
9/1/2013	18:00	0.00

- 4) If the rainfall start time is different from previous lab, you will need to modify the control specification file to reflect this change.
- 5) Run the model by creating a new run (e.g., Run 2) using the basin model, Met 2 meteorologic model and the control specification file.
- 6) Using the data from the time-series table of the output, copy this new hydrograph in to the same excel file where you have the hydrograph from Lab 1.

**Step 2:**

- 7) Perform one more run by using the data from Gage 3 shown in the Table below. To do this, you will have to create a new precipitation gage (Gage 3), link it to the new meteorologic model (Met 3), and create a new run (e.g., Run 3).

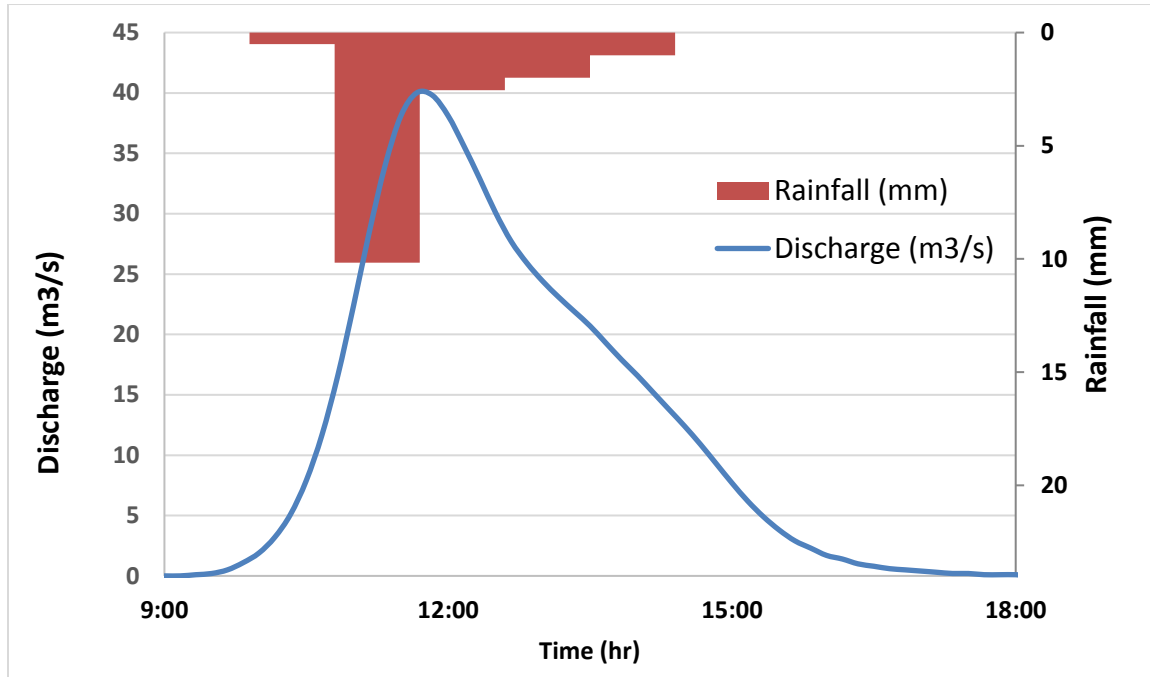
Date	Time	Precipitation (mm)
9/1/2013	10:00	0.00
9/1/2013	11:00	1.50
9/1/2013	12:00	2.50
9/1/2013	13:00	3.54
9/1/2013	14:00	4.00
9/1/2013	15:00	4.16
9/1/2013	16:00	3.08
9/1/2013	17:00	2.00
9/1/2013	18:00	0.00

- 8) Using the data from the time-series table of the output, copy this new hydrograph in to the same excel file where you have the hydrograph from Lab 1.

**Step 3 (Turn-in):**

- 9) By using rainfall and discharge data for each event (one event in Lab 1 and two events in this lab) create a presentation quality graph to show the rainfall hyetograph and hydrograph in one plot for each event as shown below. Make sure you include legend, axes titles and chart title. If you have

never created a plot like this before, here are some keywords: secondary axis, reverse order, chart type.



- 10) For each event, report the total amount of rainfall in mm, peak discharge value in m<sup>3</sup>/s, time to peak in hours, basin lag (time from rainfall peak to hydrograph peak) in hours and base time in hours of the output hydrograph.
- 11) Write few sentences (at least 50 words) on how the rainfall distribution is affecting the streamflow hydrograph. Specifically, I want you to look at the total amount of rainfall for each event, the shape of the rainfall hyetograph and the discharge hydrograph, and how the time to peak, basin time and base time varies for these events.