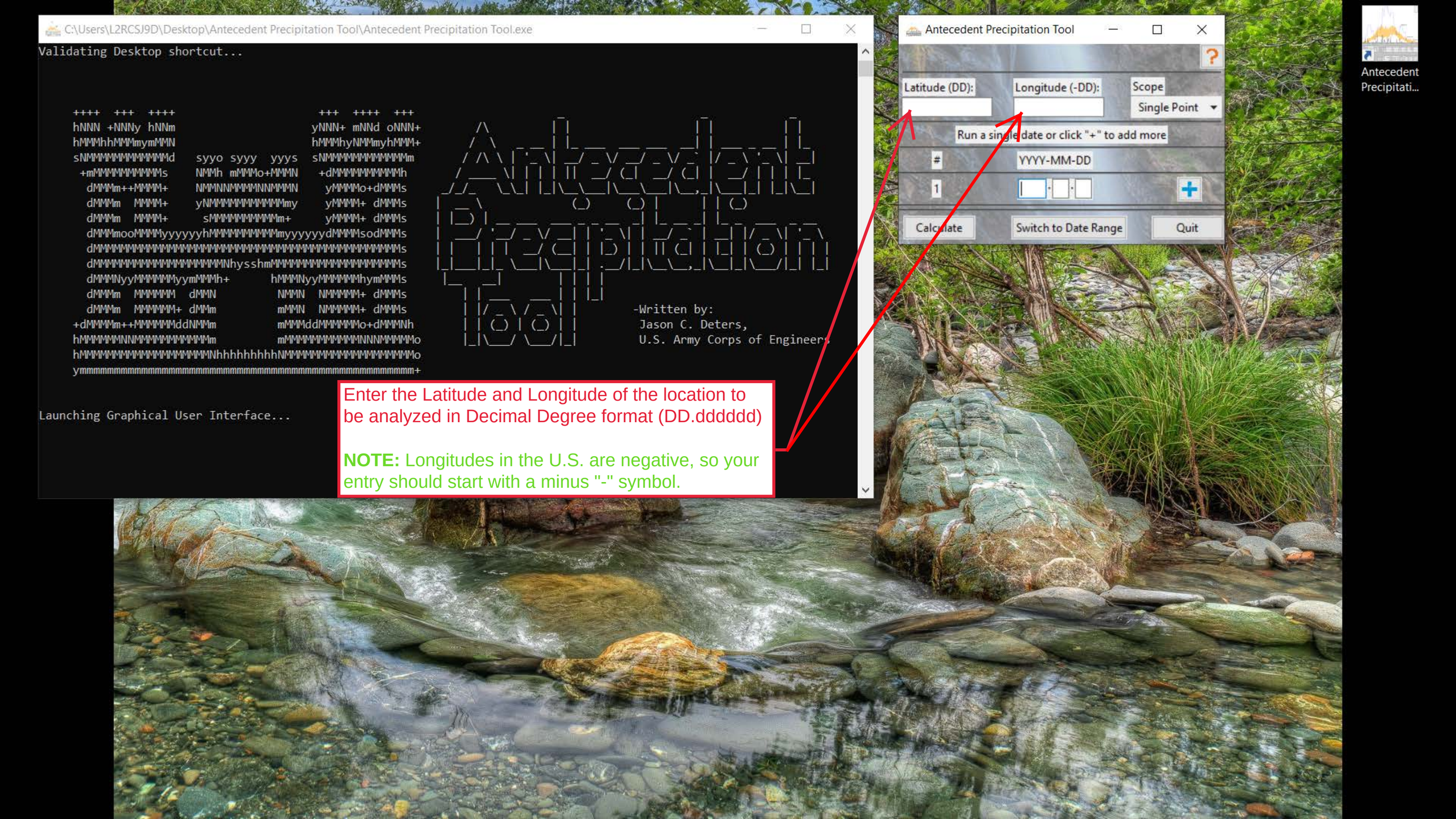
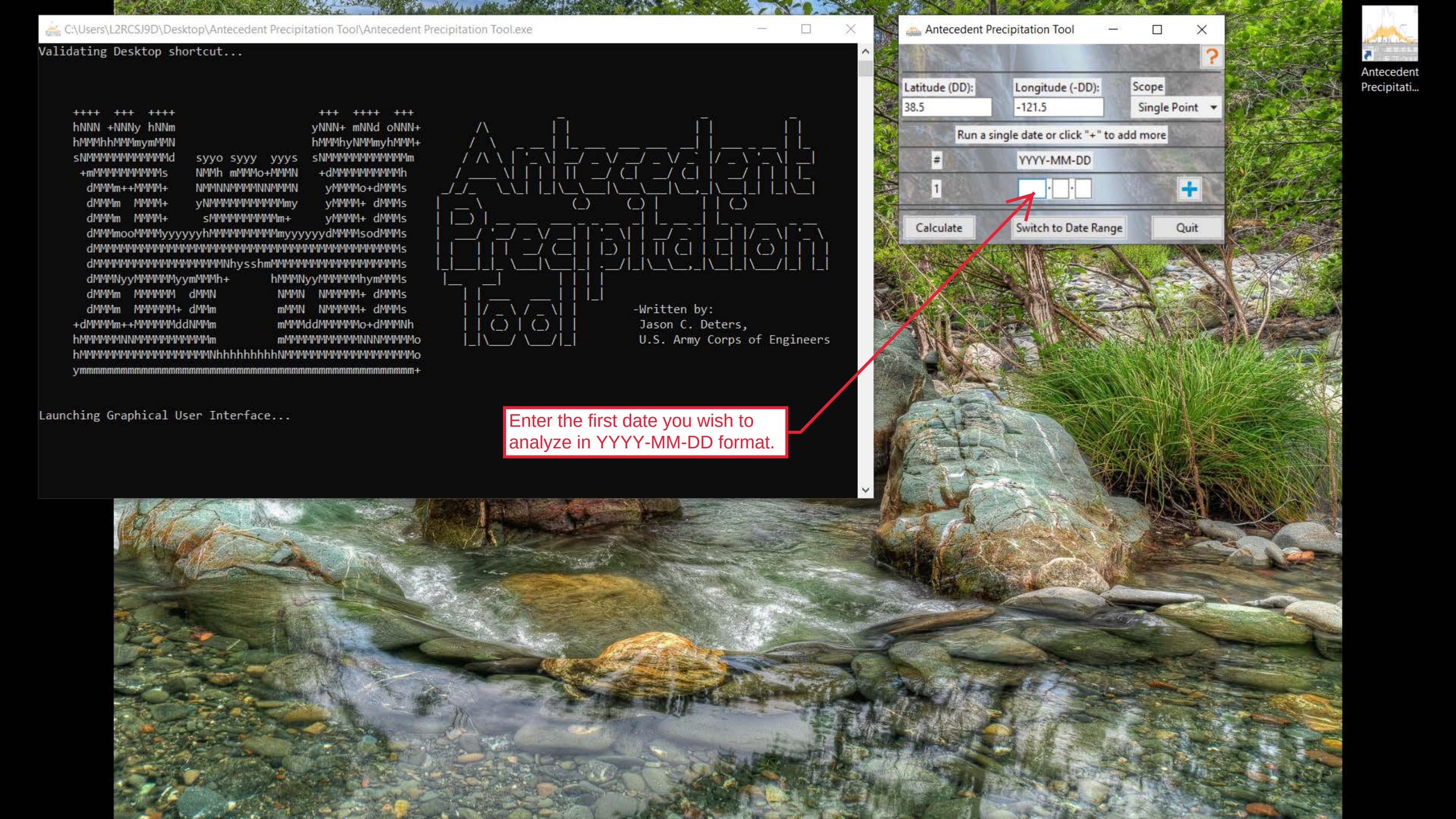
How to Generate a Single-point Analysis for Multiple Dates at Once

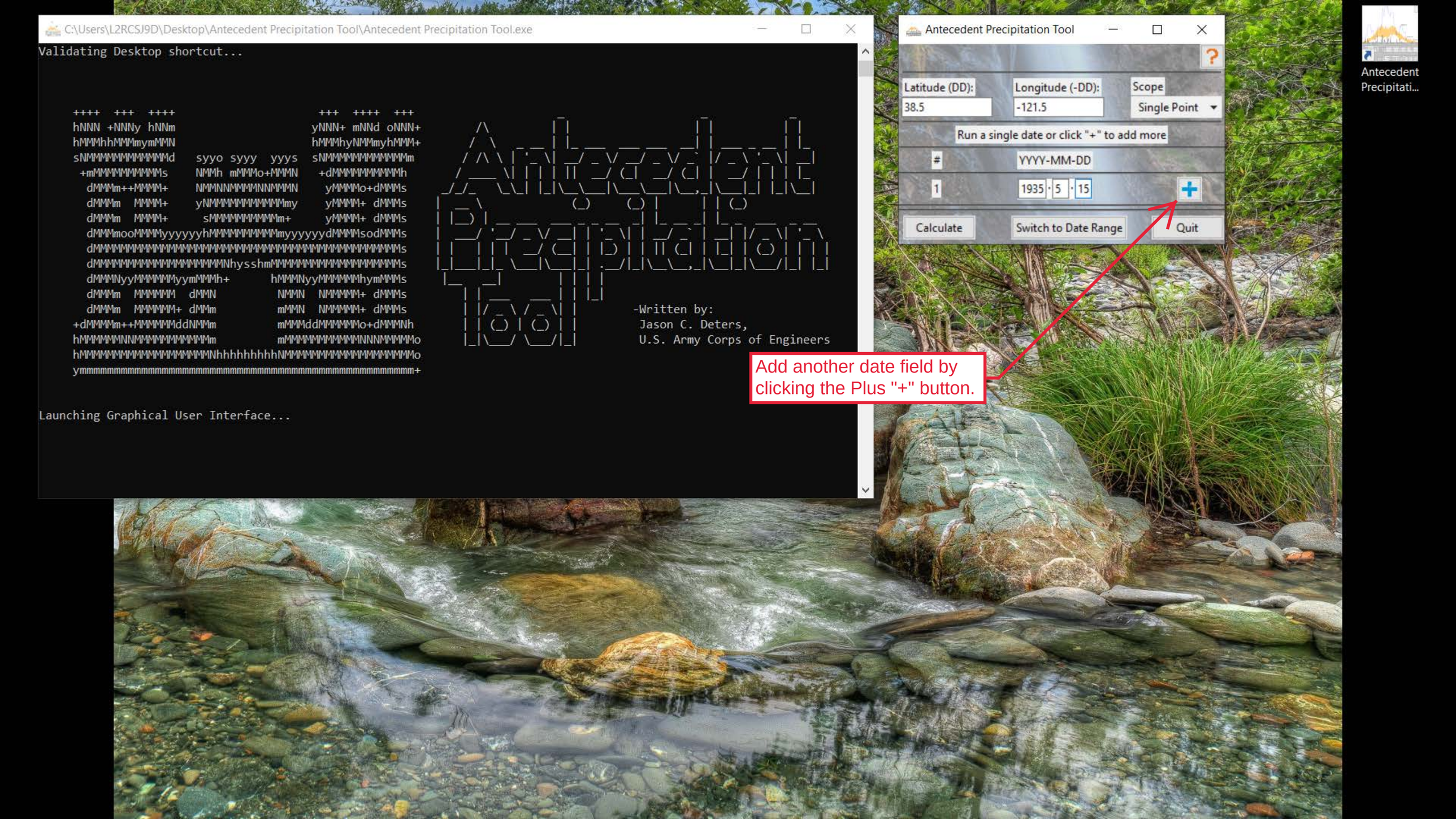
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers


Open the APT
Antecedent
Precipitation
Tool


C:\Users\L2RCSJ9D\Desktop\Antecedent Precipitation Tool\Antecedent Precipitation Tool.exe
Validating Desktop shortcut...
-Written by:
Jason C. Deters,
U.S. Army Corps of Engineers
Launching Graphical User Interface...
Antecedent Precipitation Tool
Latitude (DD):
Longitude (-DD):
Scope
Single Point
Run a single date or click "+" to add more
#
YYYY-MM-DD
1
Calculate
Switch to Date Range
Quit
Enter the Latitude and Longitude of the location to be analyzed in Decimal Degree format (DD.dddddd)
NOTE: Longitudes in the U.S. are negative, so your entry should start with a minus "-" symbol.
Antecedent Precipitati...


C:\Users\L2RCSJ9D\Desktop\Antecedent Precipitation Tool\Antecedent Precipitation Tool.exe
Validating Desktop shortcut...
Launching Graphical User Interface...
-Written by:
Jason C. Deters,
U.S. Army Corps of Engineers
Antecedent Precipitation Tool
Latitude (DD):
38.5
Longitude (-DD):
-121.5
Scope
Single Point
Run a single date or click "+" to add more
#
YYYY-MM-DD
1
Calculate
Switch to Date Range
Quit
Enter the first date you wish to analyze in YYYY-MM-DD format.
Antecedent Precipitati...


C:\Users\L2RCSJ9D\Desktop\Antecedent Precipitation Tool\Antecedent Precipitation Tool.exe
Validating Desktop shortcut...
Launching Graphical User Interface...
-Written by:
Jason C. Deters,
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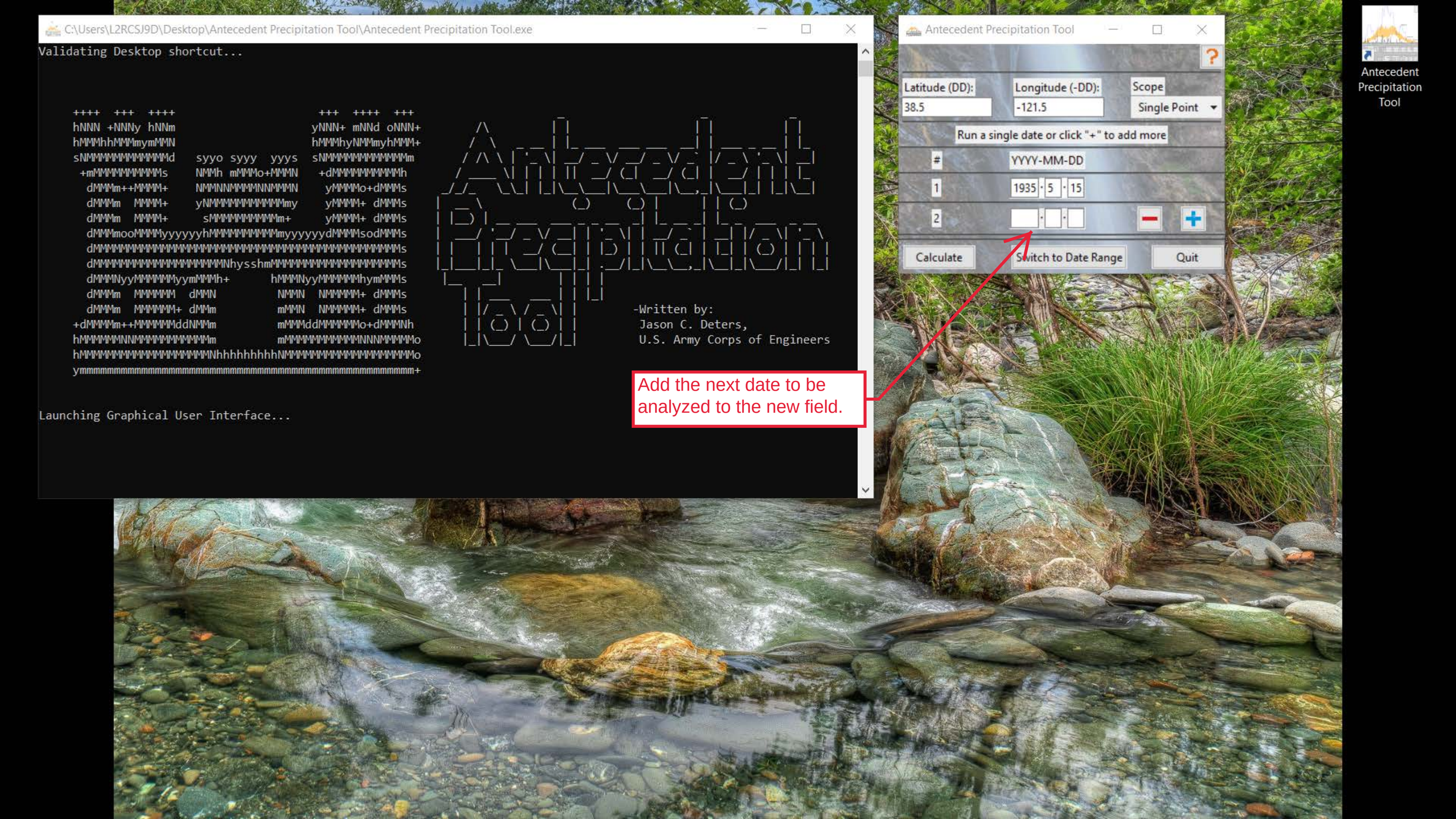
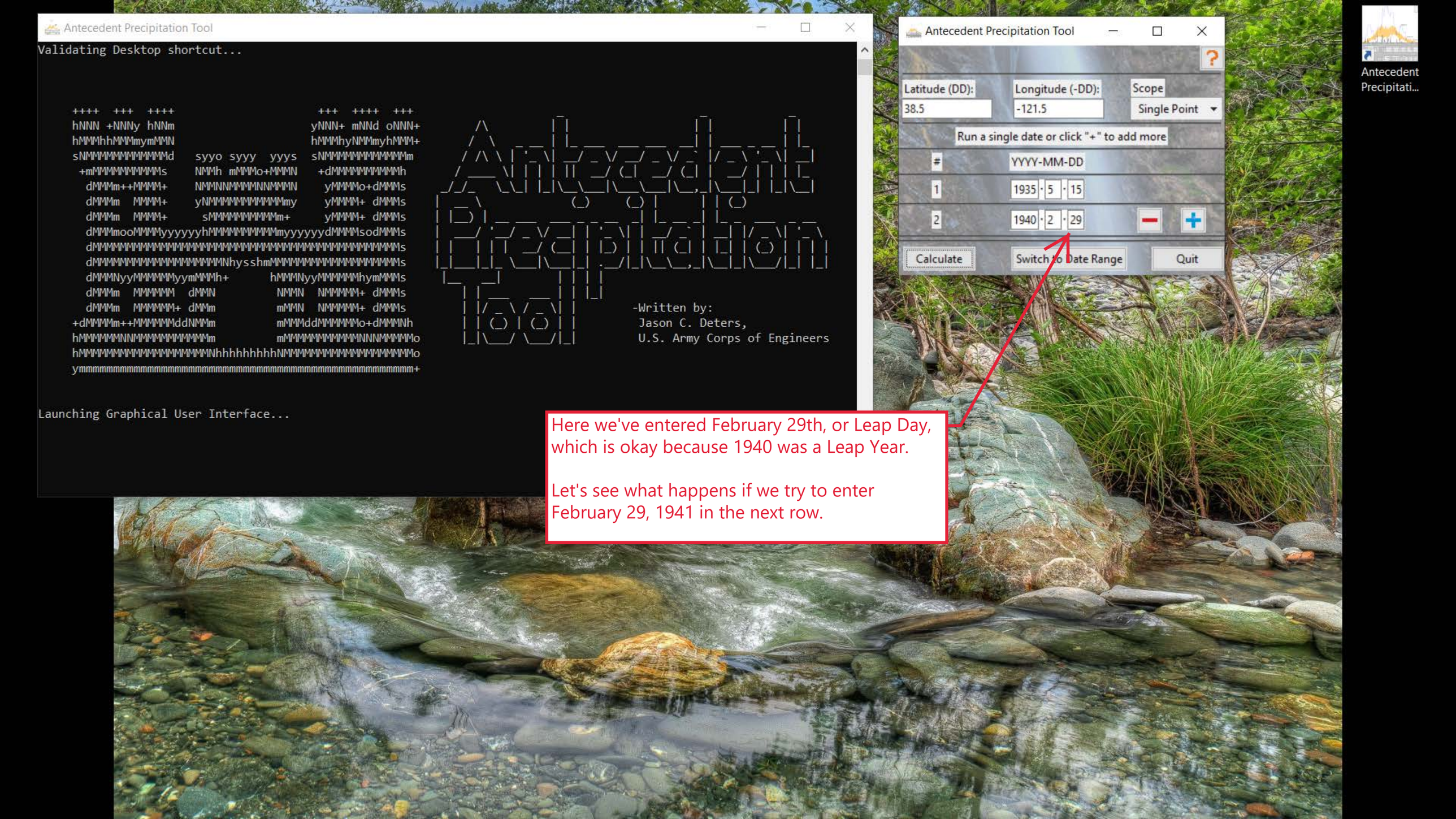
Antecedent Precipitation Tool
Latitude (DD):
38.5
Longitude (-DD):
-121.5
Scope
Single Point
Run a single date or click "+" to add more
#
YYYY-MM-DD
1
1935 · 5 · 15
Calculate
Switch to Date Range
Quit
Add another date field by clicking the Plus "+" button.
Antecedent Precipitati...


C:\Users\L2RCSJ9D\Desktop\Antecedent Precipitation Tool\Antecedent Precipitation Tool.exe
Validating Desktop shortcut...
-Written by:
Jason C. Deters,
U.S. Army Corps of Engineers
Launching Graphical User Interface...
Antecedent Precipitation Tool
Latitude (DD):
38.5
Longitude (-DD):
-121.5
Scope
Single Point
Run a single date or click "+" to add more
#
YYYY-MM-DD
1
1935 · 5 · 15
2
Calculate
Switch to Date Range
Quit
Add the next date to be analyzed to the new field.
Antecedent Precipitation Tool


Antecedent Precipitation Tool
Validating Desktop shortcut...
-Written by:
Jason C. Deters,
U.S. Army Corps of Engineers
Launching Graphical User Interface...
Antecedent Precipitation Tool
Latitude (DD):
38.5
Longitude (-DD):
-121.5
Scope
Single Point
Run a single date or click "+" to add more
#
YYYY-MM-DD
1
1935 · 5 · 15
2
1940 · 2 · 29
Calculate
Switch to Date Range
Quit
Here we've entered February 29th, or Leap Day, which is okay because 1940 was a Leap Year.
Let's see what happens if we try to enter February 29, 1941 in the next row.
Antecedent Precipitati...


Antecedent Precipitation Tool
Validating Desktop shortcut...
-Written by:
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Launching Graphical User Interface...
DAY IS OUT OF RANGE FOR MONTH!
Antecedent Precipitation Tool
Latitude (DD):
38.5
Longitude (-DD):
-121.5
Scope
Single Point
Run a single date or click "+" to add more
#
YYYY-MM-DD
1
1935 - 5 - 15
2
1940 - 2 - 29
3
1941 - 2 - 29
Calculate
Switch to Date Range
Quit
If the date entered is not a valid calendar date, the date box will turn red and the console will provide an explanation.
Antecedent Precipitation Tool


Antecedent Precipitation Tool
Validating Desktop shortcut...
-Written by:
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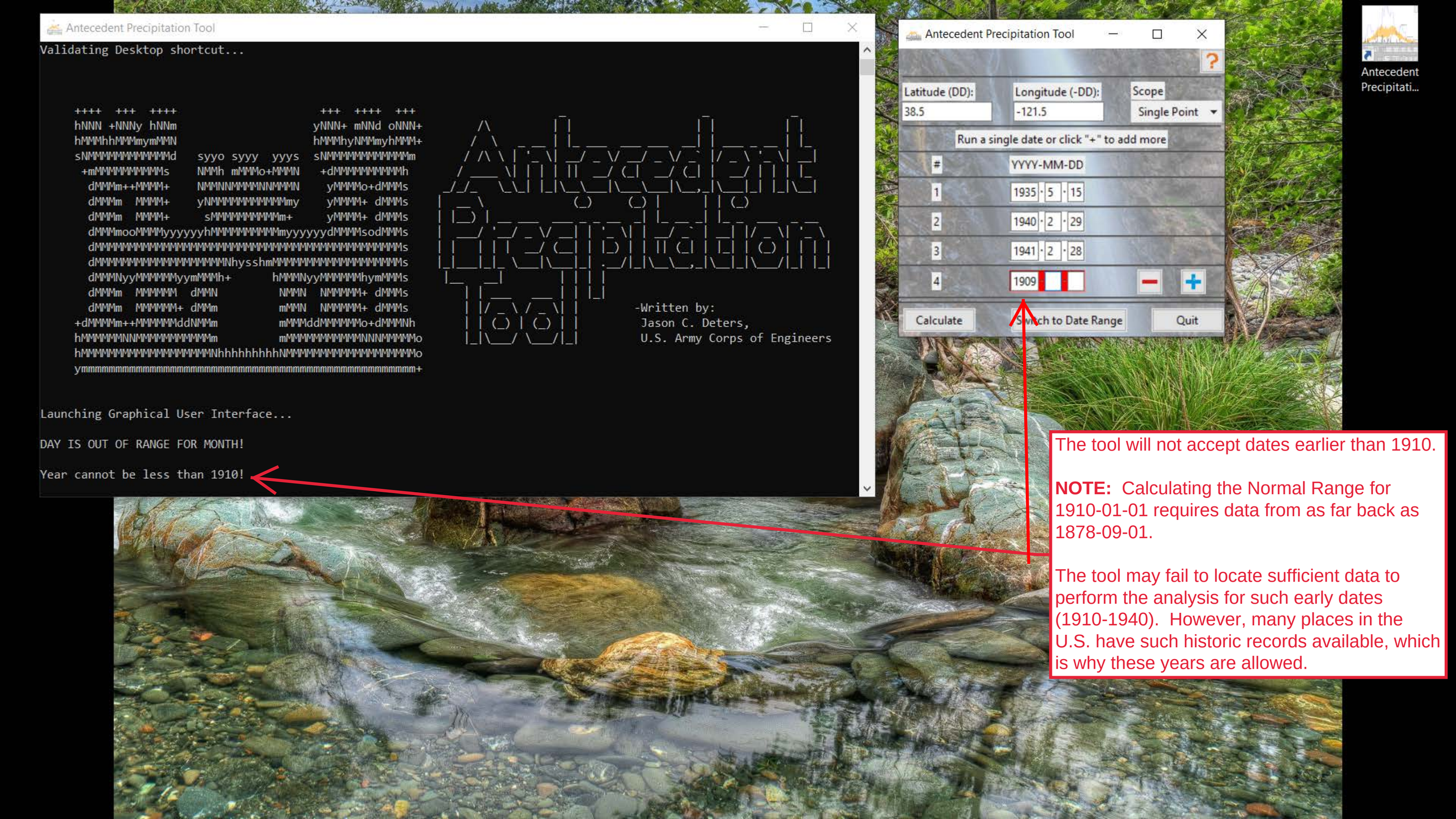
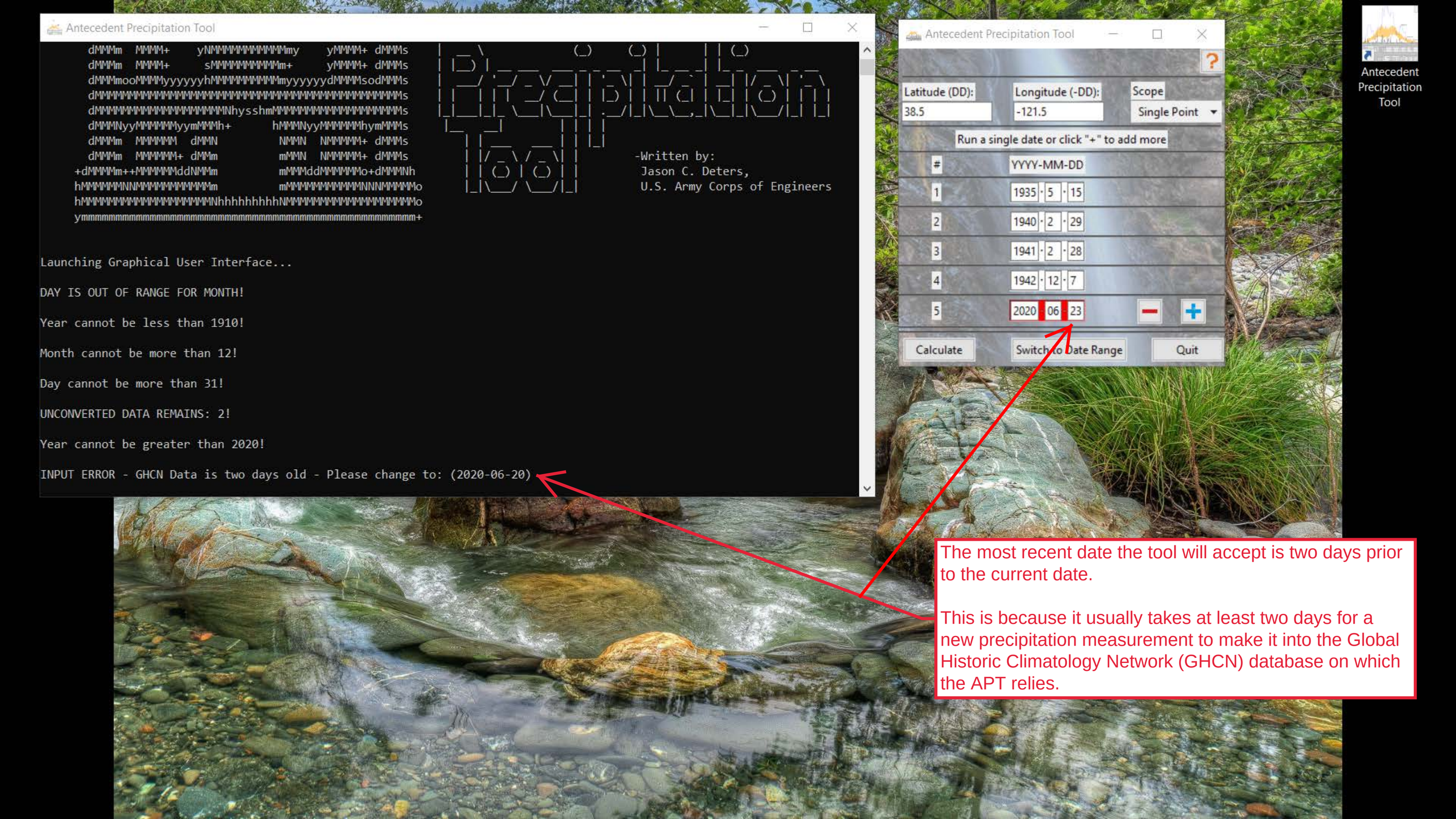
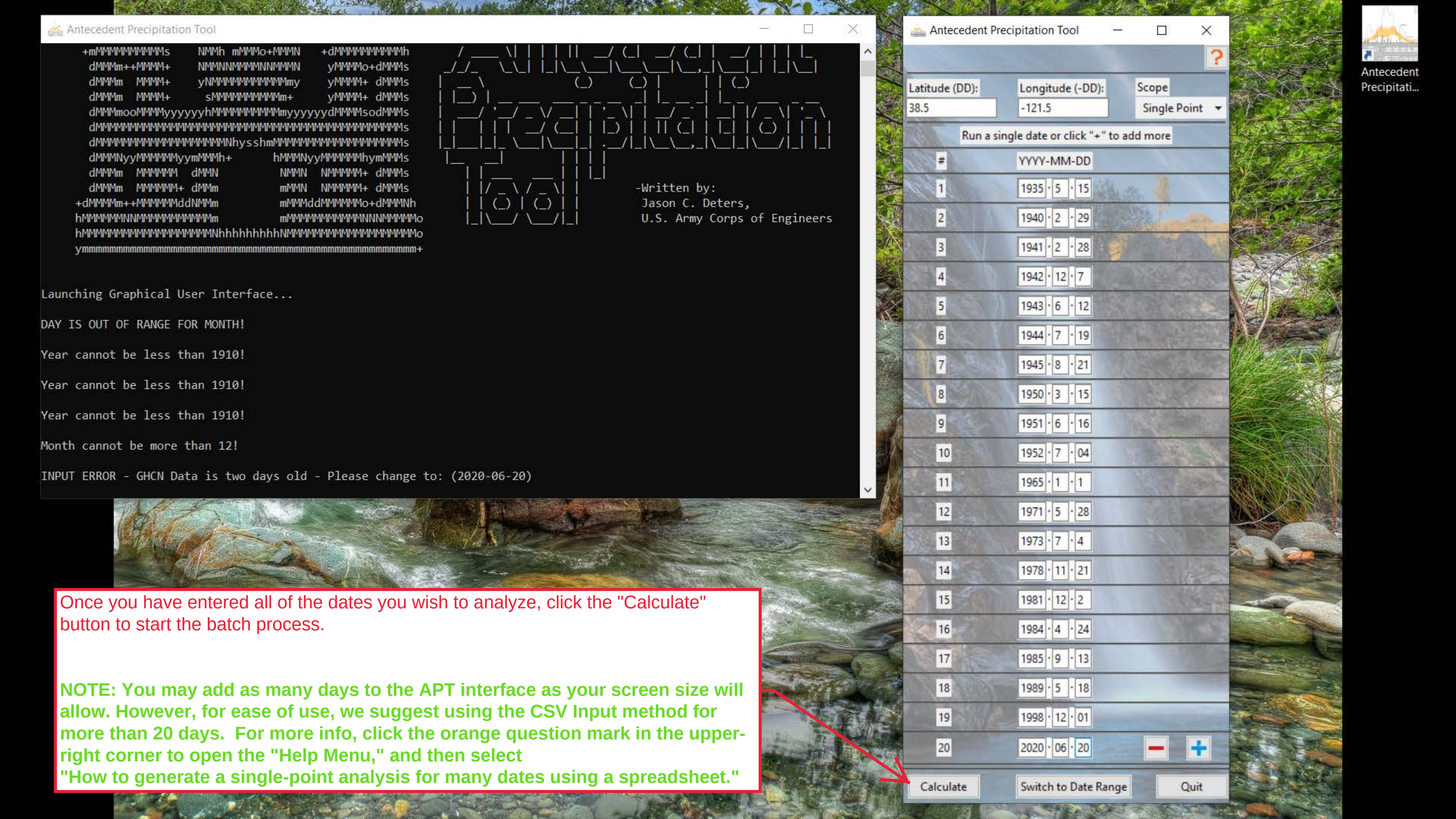
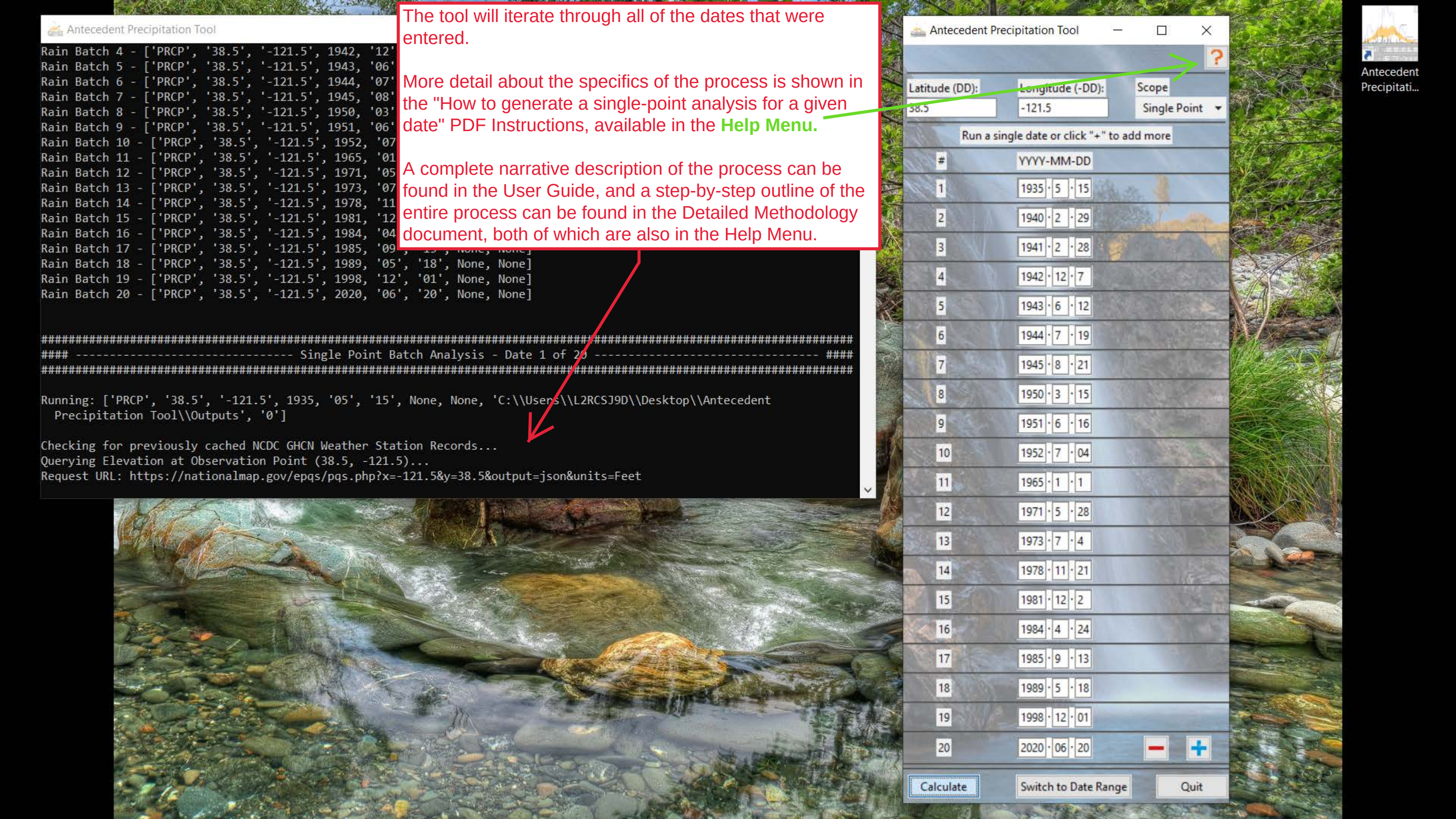
Launching Graphical User Interface...
DAY IS OUT OF RANGE FOR MONTH!
Antecedent Precipitation Tool
Latitude (DD):
38.5
Longitude (-DD):
-121.5
Scope
Single Point
Run a single date or click "+" to add more
#
YYYY-MM-DD
1
1935 · 5 · 15
2
1940 · 2 · 29
3
1941 · 2 · 28
Calculate
Switch to Date Range
Quit
The entry box will turn white once a valid entry is provided.
Let's look at a few other invalid cases.
Antecedent Precipitati...

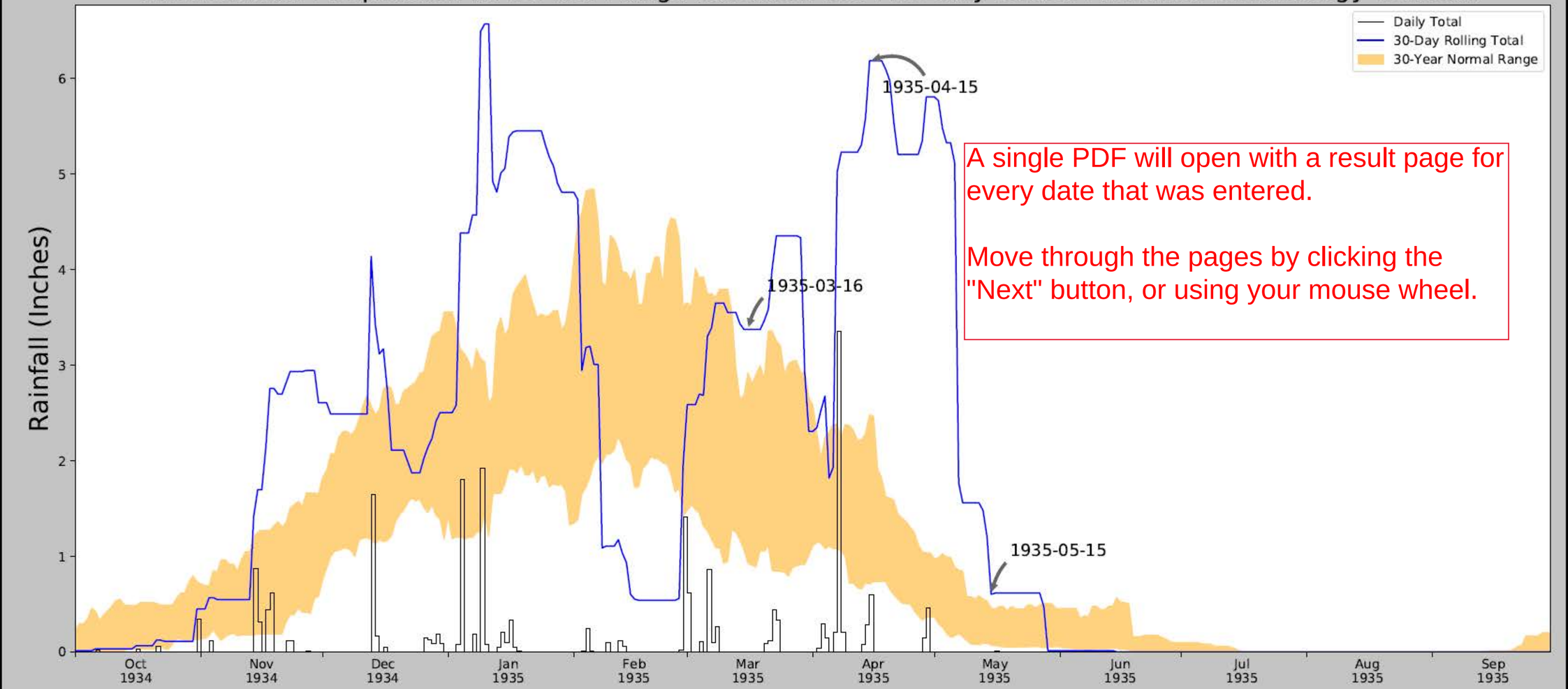

Antecedent Precipitation Tool
Validating Desktop shortcut...
-Written by:
Jason C. Deters,
U.S. Army Corps of Engineers
Launching Graphical User Interface...
DAY IS OUT OF RANGE FOR MONTH!
Year cannot be less than 1910!
Antecedent Precipitation Tool
Latitude (DD):
38.5
Longitude (-DD):
-121.5
Scope
Single Point
Run a single date or click "+" to add more
#
YYYY-MM-DD
1
1935 · 5 · 15
2
1940 · 2 · 29
3
1941 · 2 · 28
4
1909
Calculate
Switch to Date Range
Quit
Antecedent Precipitati...
The tool will not accept dates earlier than 1910.
NOTE: Calculating the Normal Range for 1910-01-01 requires data from as far back as 1878-09-01.
The tool may fail to locate sufficient data to perform the analysis for such early dates (1910-1940). However, many places in the U.S. have such historic records available, which is why these years are allowed.


Antecedent Precipitation Tool
-Written by:
Jason C. Deters,
U.S. Army Corps of Engineers
Launching Graphical User Interface...
DAY IS OUT OF RANGE FOR MONTH!
Year cannot be less than 1910!
Month cannot be more than 12!
Day cannot be more than 31!
UNCONVERTED DATA REMAINS: 2!
Year cannot be greater than 2020!
INPUT ERROR - GHCN Data is two days old - Please change to: (2020-06-20)
Antecedent Precipitation Tool
Latitude (DD):
38.5
Longitude (-DD):
-121.5
Scope
Single Point
Run a single date or click "+" to add more
#
YYYY-MM-DD
1 1935 5 15
2 1940 2 29
3 1941 2 28
4 1942 12 7
5 2020 06 23
Calculate
Switch to Date Range
Quit
The most recent date the tool will accept is two days prior to the current date.
This is because it usually takes at least two days for a new precipitation measurement to make it into the Global Historic Climatology Network (GHCN) database on which the APT relies.
Antecedent Precipitation Tool


Antecedent Precipitation Tool
-Written by:
Jason C. Deters,
U.S. Army Corps of Engineers
Launching Graphical User Interface...
DAY IS OUT OF RANGE FOR MONTH!
Year cannot be less than 1910!
Year cannot be less than 1910!
Year cannot be less than 1910!
Month cannot be more than 12!
INPUT ERROR - GHCN Data is two days old - Please change to: (2020-06-20)
Antecedent Precipitation Tool
Latitude (DD):
38.5
Longitude (-DD):
-121.5
Scope
Single Point
Run a single date or click "+" to add more
YYYY-MM-DD
1 1935-5-15
2 1940-2-29
3 1941-2-28
4 1942-12-7
5 1943-6-12
6 1944-7-19
7 1945-8-21
8 1950-3-15
9 1951-6-16
10 1952-7-04
11 1965-1-1
12 1971-5-28
13 1973-7-4
14 1978-11-21
15 1981-12-2
16 1984-4-24
17 1985-9-13
18 1989-5-18
19 1998-12-01
20 2020-06-20
Calculate
Switch to Date Range
Quit
Once you have entered all of the dates you wish to analyze, click the "Calculate" button to start the batch process.
NOTE: You may add as many days to the APT interface as your screen size will allow. However, for ease of use, we suggest using the CSV Input method for more than 20 days. For more info, click the orange question mark in the upper-right corner to open the "Help Menu," and then select "How to generate a single-point analysis for many dates using a spreadsheet."
Antecedent Precipitati...


Antecedent Precipitation Tool
Rain Batch 4 - ['PRCP', '38.5', '-121.5', 1942, '12'
Rain Batch 5 - ['PRCP', '38.5', '-121.5', 1943, '06'
Rain Batch 6 - ['PRCP', '38.5', '-121.5', 1944, '07'
Rain Batch 7 - ['PRCP', '38.5', '-121.5', 1945, '08'
Rain Batch 8 - ['PRCP', '38.5', '-121.5', 1950, '03'
Rain Batch 9 - ['PRCP', '38.5', '-121.5', 1951, '06'
Rain Batch 10 - ['PRCP', '38.5', '-121.5', 1952, '07
Rain Batch 11 - ['PRCP', '38.5', '-121.5', 1965, '01
Rain Batch 12 - ['PRCP', '38.5', '-121.5', 1971, '05
Rain Batch 13 - ['PRCP', '38.5', '-121.5', 1973, '07
Rain Batch 14 - ['PRCP', '38.5', '-121.5', 1978, '11
Rain Batch 15 - ['PRCP', '38.5', '-121.5', 1981, '12
Rain Batch 16 - ['PRCP', '38.5', '-121.5', 1984, '04
Rain Batch 17 - ['PRCP', '38.5', '-121.5', 1985, '09
Rain Batch 18 - ['PRCP', '38.5', '-121.5', 1989, '05', '18', None, None]
Rain Batch 19 - ['PRCP', '38.5', '-121.5', 1998, '12', '01', None, None]
Rain Batch 20 - ['PRCP', '38.5', '-121.5', 2020, '06', '20', None, None]
Single Point Batch Analysis - Date 1 of 20
Running: ['PRCP', '38.5', '-121.5', 1935, '05', '15', None, None, 'C:\\Users\\L2RCSJ9D\\Desktop\\Antecedent
Precipitation Tool\\Outputs', '0']
Checking for previously cached NCDC GHCN Weather Station Records...
Querying Elevation at Observation Point (38.5, -121.5)...
Request URL: https://nationalmap.gov/epqs/pqs.php?x=-121.5&y=38.5&output=json&units=Feet
The tool will iterate through all of the dates that were entered.
More detail about the specifics of the process is shown in the "How to generate a single-point analysis for a given date" PDF Instructions, available in the Help Menu.
A complete narrative description of the process can be found in the User Guide, and a step-by-step outline of the entire process can be found in the Detailed Methodology document, both of which are also in the Help Menu.
Antecedent Precipitation Tool
Latitude (DD):
38.5
Longitude (-DD):
-121.5
Scope
Single Point
Run a single date or click "+" to add more
YYYY-MM-DD
1 1935-5-15
2 1940-2-29
3 1941-2-28
4 1942-12-7
5 1943-6-12
6 1944-7-19
7 1945-8-21
8 1950-3-15
9 1951-6-16
10 1952-7-04
11 1965-1-1
12 1971-5-28
13 1973-7-4
14 1978-11-21
15 1981-12-2
16 1984-4-24
17 1985-9-13
18 1989-5-18
19 1998-12-01
20 2020-06-20
Calculate
Switch to Date Range
Quit
Antecedent Precipitati...

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



A single PDF will open with a result page for every date that was entered.

Move through the pages by clicking the "Next" button, or using your mouse wheel.

Coordinates	38.5, -121.5
Observation Date	1935-05-15
Elevation (ft)	7.14
Drought Index (PDSI)	Normal
WebWIMP H_2O Balance	Dry Season

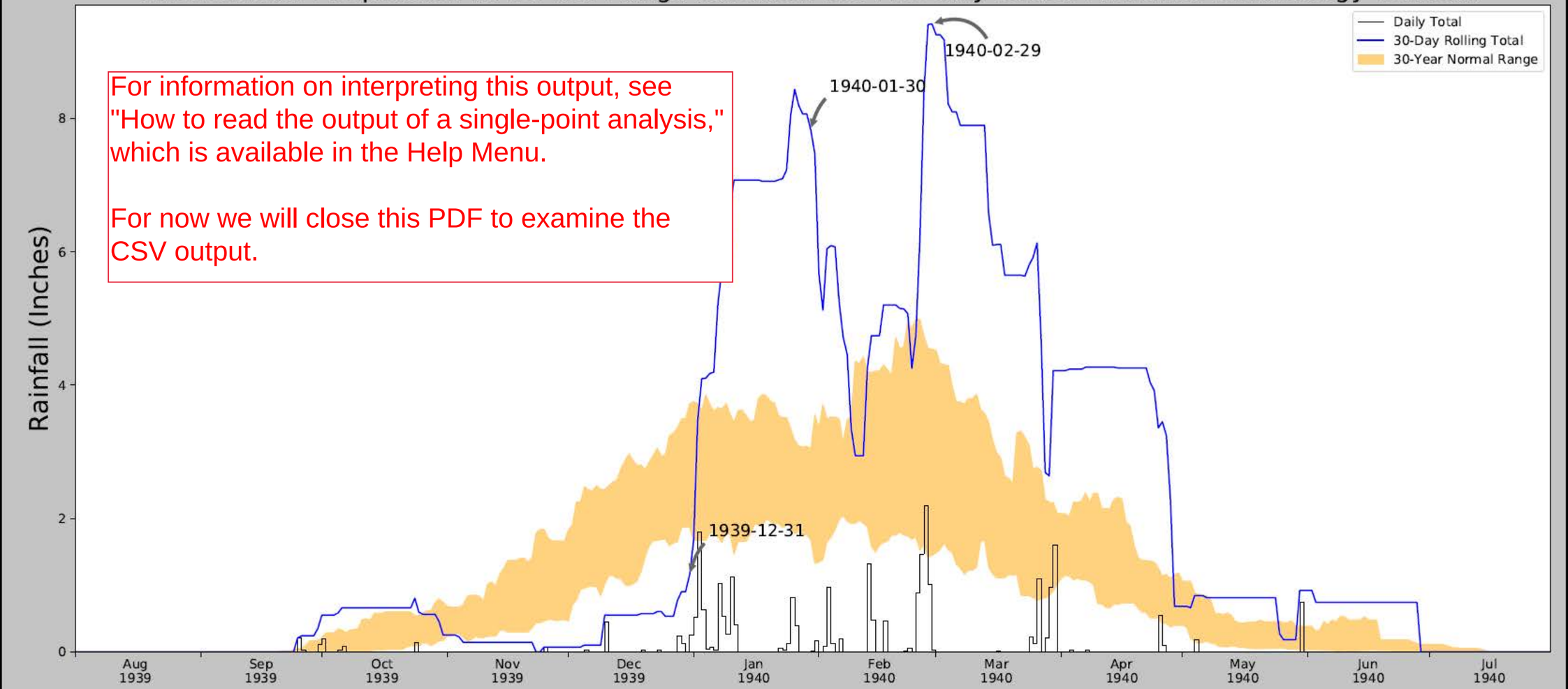
30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
1935-05-15	0.066142	0.459055	0.602362	Wet	3	3	9
1935-04-15	0.711024	2.482677	6.18504	Wet	3	2	6
1935-03-16	0.926378	2.920866	3.374016	Wet	3	1	3
Result							Wetter than Normal - 18

Figure and tables made by the **Antecedent Precipitation Tool** Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days (Normal)	Days (Antecedent)
SACRAMENTO 5 ESE	38.5556, -121.4169	38.058	5.91	30.918	2.842	11289	90
DAVIS 2 WSW EXP FARM	38.535, -121.7761	60.039	15.121	52.899	7.604	64	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



For information on interpreting this output, see "How to read the output of a single-point analysis," which is available in the Help Menu.

For now we will close this PDF to examine the CSV output.

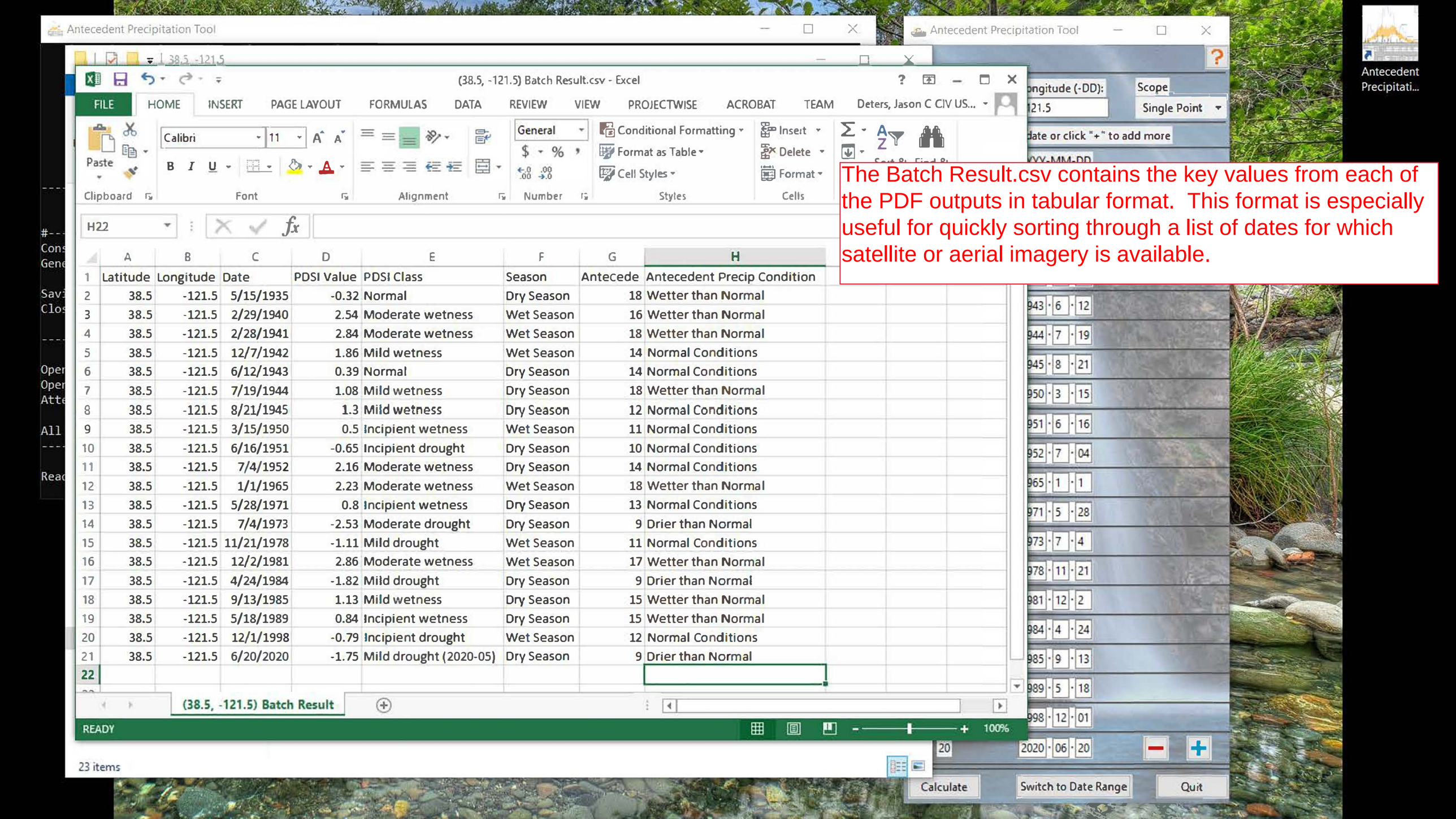
Coordinates	38.5, -121.5
Observation Date	1940-02-29
Elevation (ft)	7.14
Drought Index (PDSI)	Moderate wetness
WebWIMP H_2O Balance	Wet Season

30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
1940-02-29	1.450197	4.535827	9.413386	Wet	3	3	9
1940-01-30	1.677165	3.046063	7.822835	Wet	3	2	6
1939-12-31	1.875591	3.710236	1.153543	Dry	1	1	1
Result							Wetter than Normal - 16

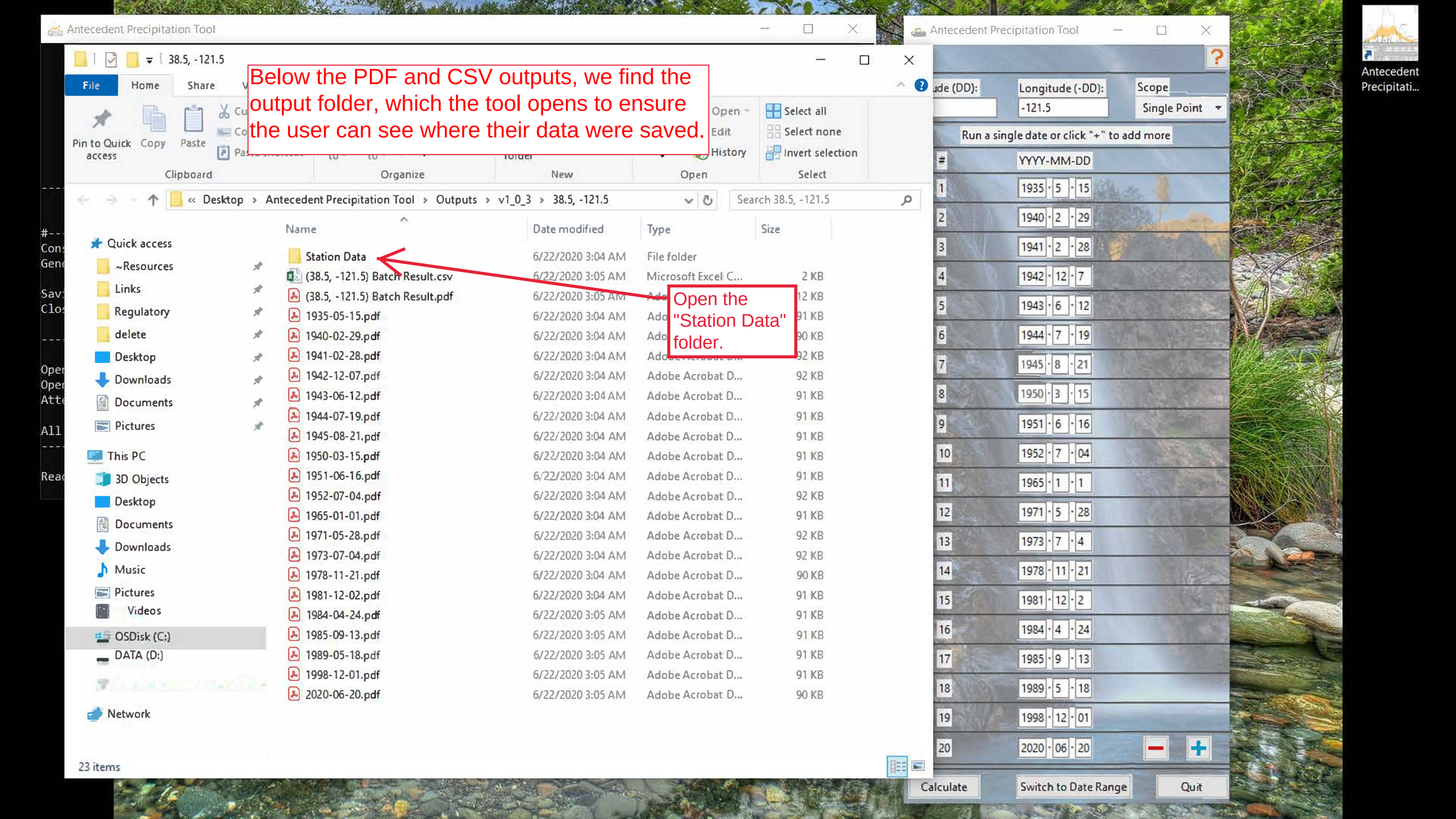
Figure and tables made by the **Antecedent Precipitation Tool** Version 1.0

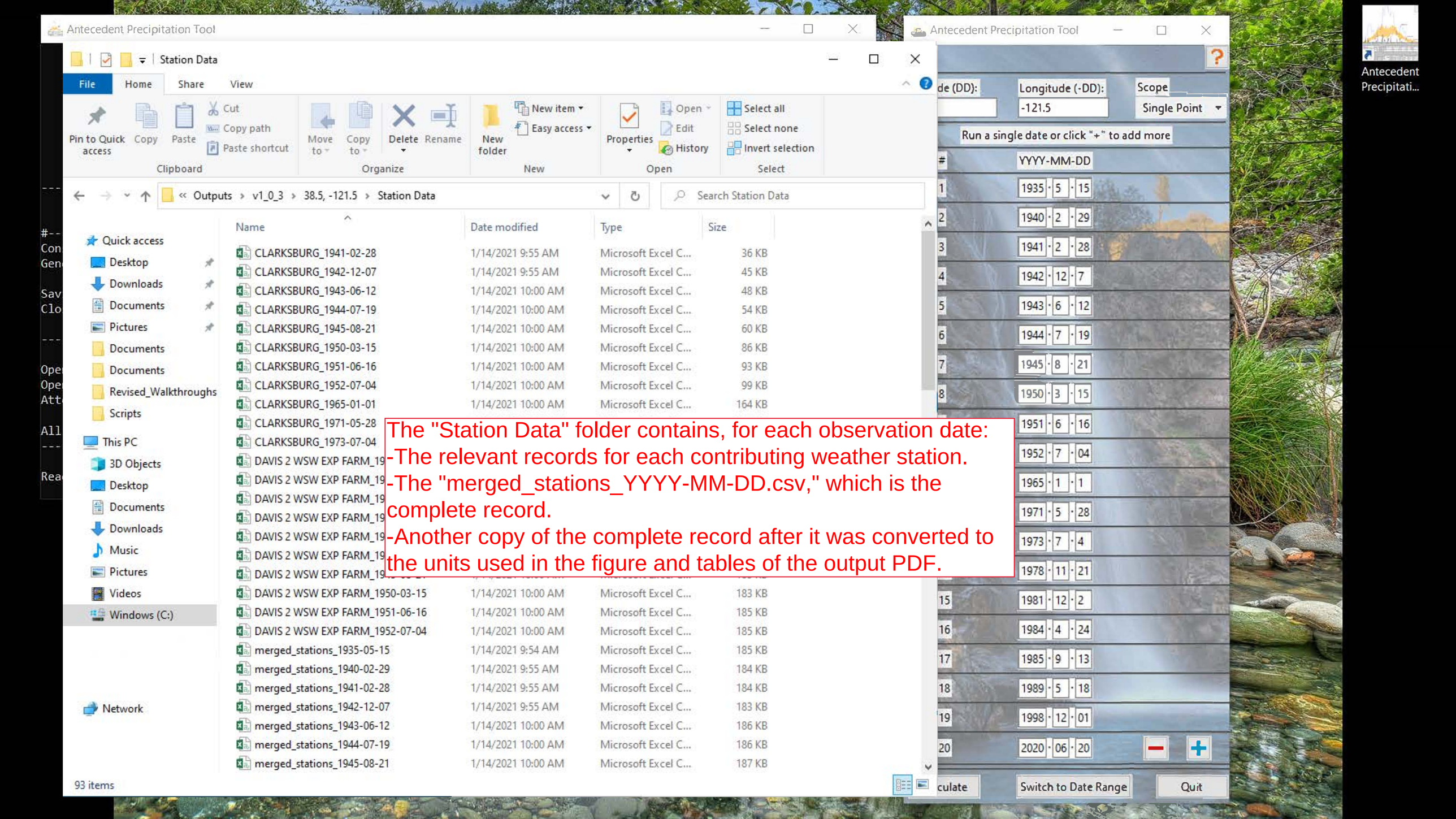
Written by Jason Deters
U.S. Army Corps of Engineers

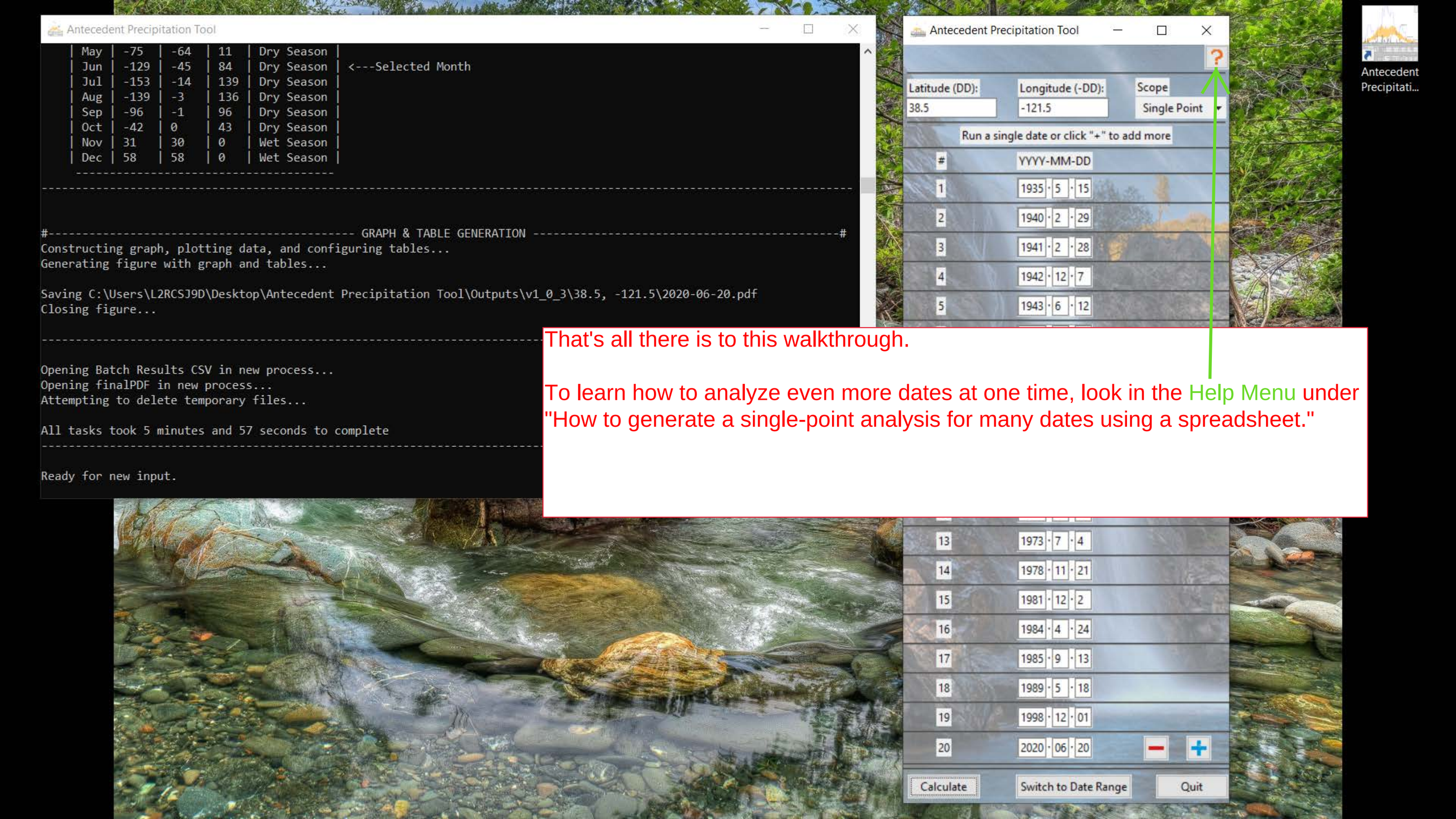
Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days (Normal)	Days (Antecedent)
SACRAMENTO 5 ESE	38.5556, -121.4169	38.058	5.91	30.918	2.842	11289	90
DAVIS 2 WSW EXP FARM	38.535, -121.7761	60.039	15.121	52.899	7.604	63	0



	A	B	C	D	E	F	G	H
1	Latitude	Longitude	Date	PDSI Value	PDSI Class	Season	Antecede	Antecedent Precip Condition
2	38.5	-121.5	5/15/1935	-0.32	Normal	Dry Season	18	Wetter than Normal
3	38.5	-121.5	2/29/1940	2.54	Moderate wetness	Wet Season	16	Wetter than Normal
4	38.5	-121.5	2/28/1941	2.84	Moderate wetness	Wet Season	18	Wetter than Normal
5	38.5	-121.5	12/7/1942	1.86	Mild wetness	Wet Season	14	Normal Conditions
6	38.5	-121.5	6/12/1943	0.39	Normal	Dry Season	14	Normal Conditions
7	38.5	-121.5	7/19/1944	1.08	Mild wetness	Dry Season	18	Wetter than Normal
8	38.5	-121.5	8/21/1945	1.3	Mild wetness	Dry Season	12	Normal Conditions
9	38.5	-121.5	3/15/1950	0.5	Incipient wetness	Wet Season	11	Normal Conditions
10	38.5	-121.5	6/16/1951	-0.65	Incipient drought	Dry Season	10	Normal Conditions
11	38.5	-121.5	7/4/1952	2.16	Moderate wetness	Dry Season	14	Normal Conditions
12	38.5	-121.5	1/1/1965	2.23	Moderate wetness	Wet Season	18	Wetter than Normal
13	38.5	-121.5	5/28/1971	0.8	Incipient wetness	Dry Season	13	Normal Conditions
14	38.5	-121.5	7/4/1973	-2.53	Moderate drought	Dry Season	9	Drier than Normal
15	38.5	-121.5	11/21/1978	-1.11	Mild drought	Wet Season	11	Normal Conditions
16	38.5	-121.5	12/2/1981	2.86	Moderate wetness	Wet Season	17	Wetter than Normal
17	38.5	-121.5	4/24/1984	-1.82	Mild drought	Dry Season	9	Drier than Normal
18	38.5	-121.5	9/13/1985	1.13	Mild wetness	Dry Season	15	Wetter than Normal
19	38.5	-121.5	5/18/1989	0.84	Incipient wetness	Dry Season	15	Wetter than Normal
20	38.5	-121.5	12/1/1998	-0.79	Incipient drought	Wet Season	12	Normal Conditions
21	38.5	-121.5	6/20/2020	-1.75	Mild drought (2020-05)	Dry Season	9	Drier than Normal
22								


Antecedent Precipitation Tool
38.5, -121.5
Below the PDF and CSV outputs, we find the output folder, which the tool opens to ensure the user can see where their data were saved.
File
Home
Share
Pin to Quick access
Copy
Paste
Clipboard
Organize
New
Open
Edit
History
Select all
Select none
Invert selection
Select
« Desktop › Antecedent Precipitation Tool › Outputs › v1_0_3 › 38.5, -121.5
Search 38.5, -121.5
Quick access
~Resources
Links
Regulatory
delete
Desktop
Downloads
Documents
Pictures
This PC
3D Objects
Desktop
Documents
Downloads
Music
Pictures
Videos
OSDisk (C:)
DATA (D:)
Network
Name
Date modified
Type
Size
Station Data
6/22/2020 3:04 AM
File folder
(38.5, -121.5) Batch Result.csv
6/22/2020 3:05 AM
Microsoft Excel C...
2 KB
(38.5, -121.5) Batch Result.pdf
1935-05-15.pdf
1940-02-29.pdf
1941-02-28.pdf
1942-12-07.pdf
1943-06-12.pdf
1944-07-19.pdf
1945-08-21.pdf
1950-03-15.pdf
1951-06-16.pdf
1952-07-04.pdf
1965-01-01.pdf
1971-05-28.pdf
1973-07-04.pdf
1978-11-21.pdf
1981-12-02.pdf
1984-04-24.pdf
1985-09-13.pdf
1989-05-18.pdf
1998-12-01.pdf
2020-06-20.pdf
6/22/2020 3:04 AM
Adobe Acrobat D...
92 KB
91 KB
90 KB
23 items
Open the "Station Data" folder.
Antecedent Precipitation Tool
Longitude (-DD):
-121.5
Scope
Single Point
Run a single date or click "+" to add more
#
YYYY-MM-DD
1 1935 5 15
2 1940 2 29
3 1941 2 28
4 1942 12 7
5 1943 6 12
6 1944 7 19
7 1945 8 21
8 1950 3 15
9 1951 6 16
10 1952 7 04
11 1965 1 1
12 1971 5 28
13 1973 7 4
14 1978 11 21
15 1981 12 2
16 1984 4 24
17 1985 9 13
18 1989 5 18
19 1998 12 01
20 2020 06 20
Calculate
Switch to Date Range
Quit
Antecedent Precipitati...


Antecedent Precipitation Tool
Station Data
File
Home
Share
View
Pin to Quick access
Copy
Paste
Cut
Copy path
Paste shortcut
Clipboard
Move to
Copy to
Delete
Rename
Organize
New folder
New item
Easy access
New
Properties
Open
Edit
History
Open
Select all
Select none
Invert selection
Select
Outputs › v1_0_3 › 38.5, -121.5 › Station Data
Search Station Data
Quick access
Desktop
Downloads
Documents
Pictures
Documents
Documents
Revised_Walkthroughs
Scripts
This PC
3D Objects
Desktop
Documents
Downloads
Music
Pictures
Videos
Windows (C:)
Network
Name
Date modified
Type
Size
CLARKSBURG_1941-02-28 1/14/2021 9:55 AM Microsoft Excel C... 36 KB
CLARKSBURG_1942-12-07 1/14/2021 9:55 AM Microsoft Excel C... 45 KB
CLARKSBURG_1943-06-12 1/14/2021 10:00 AM Microsoft Excel C... 48 KB
CLARKSBURG_1944-07-19 1/14/2021 10:00 AM Microsoft Excel C... 54 KB
CLARKSBURG_1945-08-21 1/14/2021 10:00 AM Microsoft Excel C... 60 KB
CLARKSBURG_1950-03-15 1/14/2021 10:00 AM Microsoft Excel C... 86 KB
CLARKSBURG_1951-06-16 1/14/2021 10:00 AM Microsoft Excel C... 93 KB
CLARKSBURG_1952-07-04 1/14/2021 10:00 AM Microsoft Excel C... 99 KB
CLARKSBURG_1965-01-01 1/14/2021 10:00 AM Microsoft Excel C... 164 KB
CLARKSBURG_1971-05-28
CLARKSBURG_1973-07-04
DAVIS 2 WSW EXP FARM_19
DAVIS 2 WSW EXP FARM_19
DAVIS 2 WSW EXP FARM_19
DAVIS 2 WSW EXP FARM_19
DAVIS 2 WSW EXP FARM_19
DAVIS 2 WSW EXP FARM_19
DAVIS 2 WSW EXP FARM_1950-03-15 1/14/2021 10:00 AM Microsoft Excel C... 183 KB
DAVIS 2 WSW EXP FARM_1951-06-16 1/14/2021 10:00 AM Microsoft Excel C... 185 KB
DAVIS 2 WSW EXP FARM_1952-07-04 1/14/2021 10:00 AM Microsoft Excel C... 185 KB
merged_stations_1935-05-15 1/14/2021 9:54 AM Microsoft Excel C... 185 KB
merged_stations_1940-02-29 1/14/2021 9:55 AM Microsoft Excel C... 184 KB
merged_stations_1941-02-28 1/14/2021 9:55 AM Microsoft Excel C... 184 KB
merged_stations_1942-12-07 1/14/2021 9:55 AM Microsoft Excel C... 183 KB
merged_stations_1943-06-12 1/14/2021 10:00 AM Microsoft Excel C... 186 KB
merged_stations_1944-07-19 1/14/2021 10:00 AM Microsoft Excel C... 186 KB
merged_stations_1945-08-21 1/14/2021 10:00 AM Microsoft Excel C... 187 KB
93 items
The "Station Data" folder contains, for each observation date:
-The relevant records for each contributing weather station.
-The "merged_stations_YYYY-MM-DD.csv," which is the complete record.
-Another copy of the complete record after it was converted to the units used in the figure and tables of the output PDF.
Antecedent Precipitation Tool
de (DD):
Longitude (-DD):
-121.5
Scope
Single Point
Run a single date or click "+" to add more
#
YYYY-MM-DD
1 1935 5 15
2 1940 2 29
3 1941 2 28
4 1942 12 7
5 1943 6 12
6 1944 7 19
7 1945 8 21
8 1950 3 15
1951 6 16
1952 7 04
1965 1 1
1971 5 28
1973 7 4
1978 11 21
15 1981 12 2
16 1984 4 24
17 1985 9 13
18 1989 5 18
19 1998 12 01
20 2020 06 20
culate
Switch to Date Range
Quit
Antecedent Precipitati...


Antecedent Precipitation Tool
| May | -75 | -64 | 11 | Dry Season |
| Jun | -129 | -45 | 84 | Dry Season | <---Selected Month
Jul	-153	-14	139	Dry Season
Aug	-139	-3	136	Dry Season
Sep	-96	-1	96	Dry Season
Oct	-42	0	43	Dry Season
Nov	31	30	0	Wet Season
Dec	58	58	0	Wet Season
#---------- GRAPH & TABLE GENERATION ----------#
Constructing graph, plotting data, and configuring tables...
Generating figure with graph and tables...
Saving C:\Users\L2RCSJ9D\Desktop\Antecedent Precipitation Tool\Outputs\v1_0_3\38.5, -121.5\2020-06-20.pdf
Closing figure...
Opening Batch Results CSV in new process...
Opening finalPDF in new process...
Attempting to delete temporary files...
All tasks took 5 minutes and 57 seconds to complete
Ready for new input.
Antecedent Precipitation Tool
Latitude (DD):
38.5
Longitude (-DD):
-121.5
Scope
Single Point
Run a single date or click "+" to add more
YYYY-MM-DD
1 1935 5 15
2 1940 2 29
3 1941 2 28
4 1942 12 7
5 1943 6 12
13 1973 7 4
14 1978 11 21
15 1981 12 2
16 1984 4 24
17 1985 9 13
18 1989 5 18
19 1998 12 01
20 2020 06 20
Calculate
Switch to Date Range
Quit
That's all there is to this walkthrough.
To learn how to analyze even more dates at one time, look in the Help Menu under "How to generate a single-point analysis for many dates using a spreadsheet."
Antecedent Precipitati...