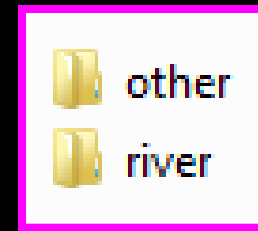


Module III: Temporal output analysis

- Discussion on how the inputs are read and how the outputs are written (where, what and how)
- Discussion and hands-on in converting hourly to daily to monthly using codes.
- Discussion on the excel sheet (as well as hands on use of the sheet)
- Discussion on how to best-fit the distribution function and derive the parameters (location, scale) using Jmp 10

For the training:

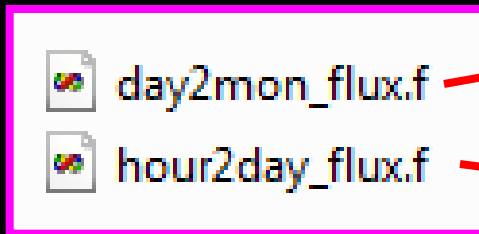
There are 2 subfolders inside the folder “step 1”:



Find this by typing:

```
cd dias/groups/dias-4-4-08/AWCI_MEMBERS_FOLDER/USER-country/country/Drought.training/output-country/other
cd dias/groups/dias-4-4-08/AWCI_MEMBERS_FOLDER/USER-country/country/Drought.training/output-country/other
```

“other parameter” folder contains conversion codes for the hydrological parameters and energy fluxes:

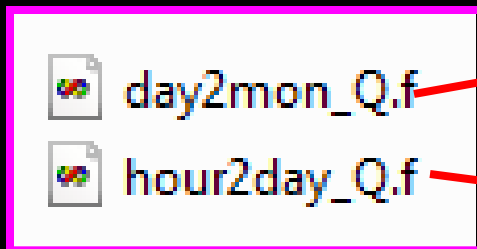


Run this by typing:

```
ifort day2mo_flux.f -o d2m.exe
./d2m.exe
```

```
ifort hour2day_flux.f -o h2d.exe
./h2d.exe
```

“for discharge” folder contains the conversion codes for the discharge parameters



Run this by typing:

```
ifort day2mo_Q.f -o d2mQ.exe
./d2m.exe
```

```
ifort hour2day_Q.f -o h2dQ.exe
./h2d.exe
```

Converting from hourly to daily to monthly discharge

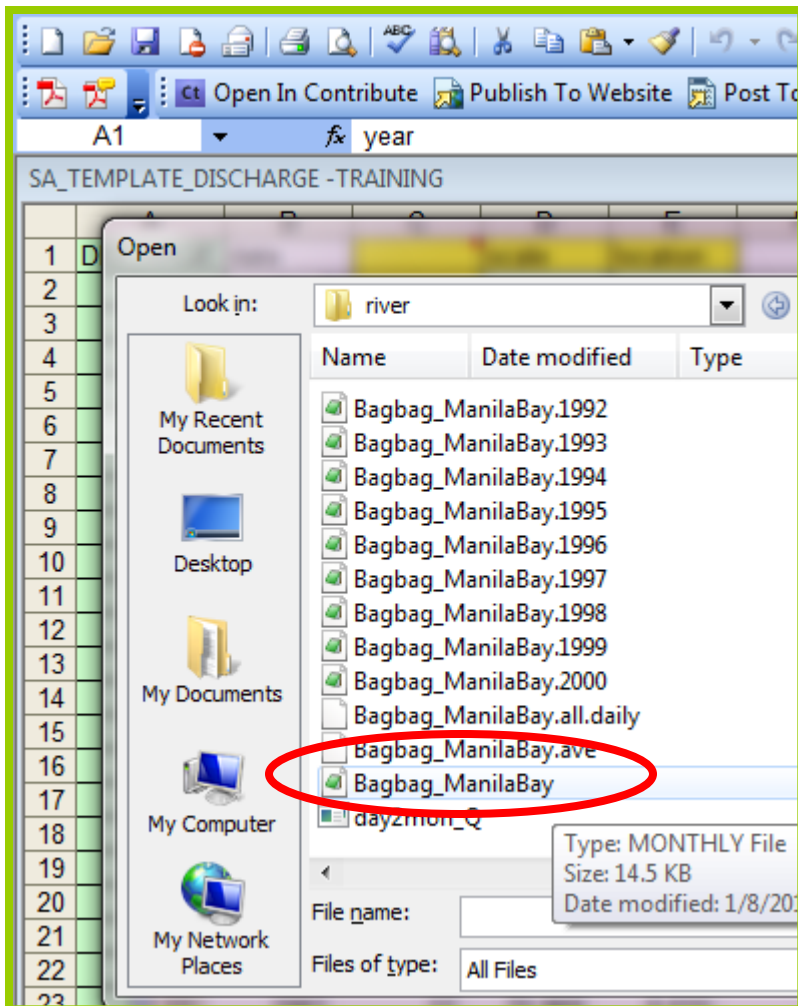
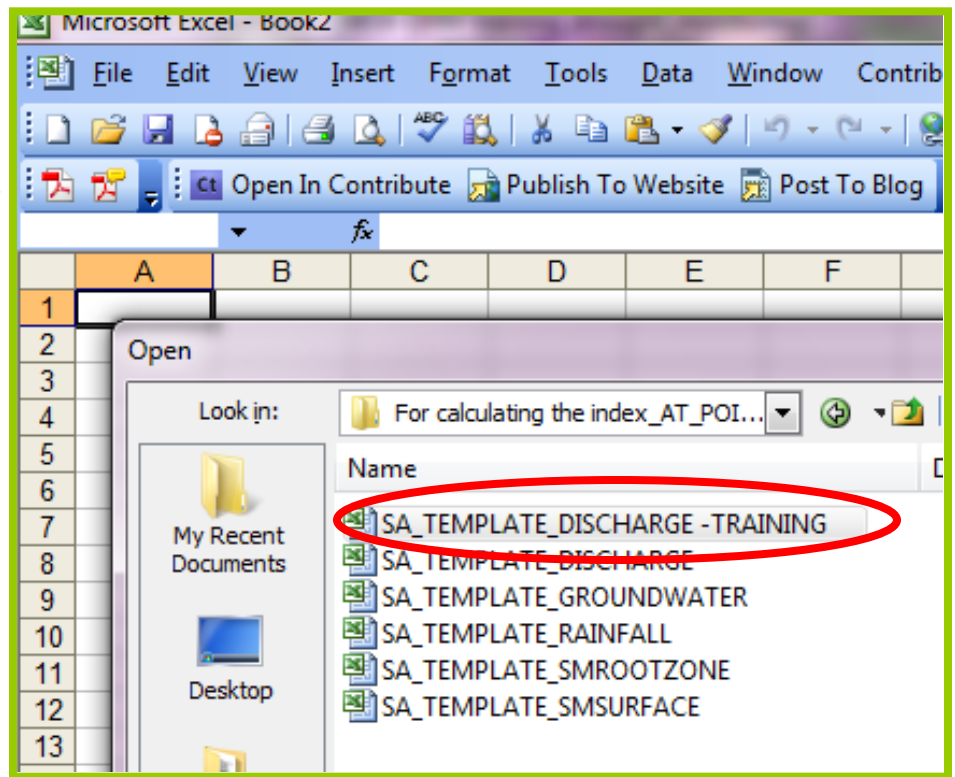
- You can do this manually if you like:
e.g. $\text{Ave}(Q_{\text{hourly}})_{(i=1 \text{ to } 24)}_{(j=1 \text{ to } 30)}$
- Or you can use fortran codes:
 - Change the year and names of the input and output files
 - For monthly conversion, change the Area of the basin considered (mm/month)
 - Or calculate for Q (m³/s)
 - Run the codes

Converting from hourly to daily to monthly values of the other hydrological parameters

- Same as for discharge but be careful on averaging or summing up the variables when converting to daily as well as for hourly
- Change the years, inputs and output files
- Check and make sure that the number of variables in the codes are the same as in your inputs

Calculating SA using simple excel sheets

Step 1: open excel sheet for calculating SA at point scale



Step 2: Also open in excel the *file.monthly* file (e.g. Bagbag_ManilaBay.monthly or outlet.monthly in model/output/river folder)

Microsoft Excel - Bagbag_ManilaBay

File Edit View Insert Format Tools Data

Open In Contribute Publish To Website

	A	B	C	D
1	year	month	Qsim	Qobs
2	1981	1	69.046	0.016
3	1981	2	36.988	0.014
4	1981	3	28.869	0.017
5	1981	4	21.377	0.011
6	1981	5	133.689	0.011
7	1981	6	484.852	0.015
8	1981	7	372.644	0.081
9	1981	8	714.118	0.113
10	1981	9	489.347	0.086
11	1981	10	211.773	0.047
12	1981	11	249.962	0.017
13	1981	12	70.969	0.015
14	1982	1	44.286	0.016

Step 3: copy and paste Qsim row (omit header) into the blue green blank spaces of the excel sheet 1 with a header named discharge (start in line 2)

Microsoft Excel - SA_TEMPLATE_DISCHARGE -TRAINING

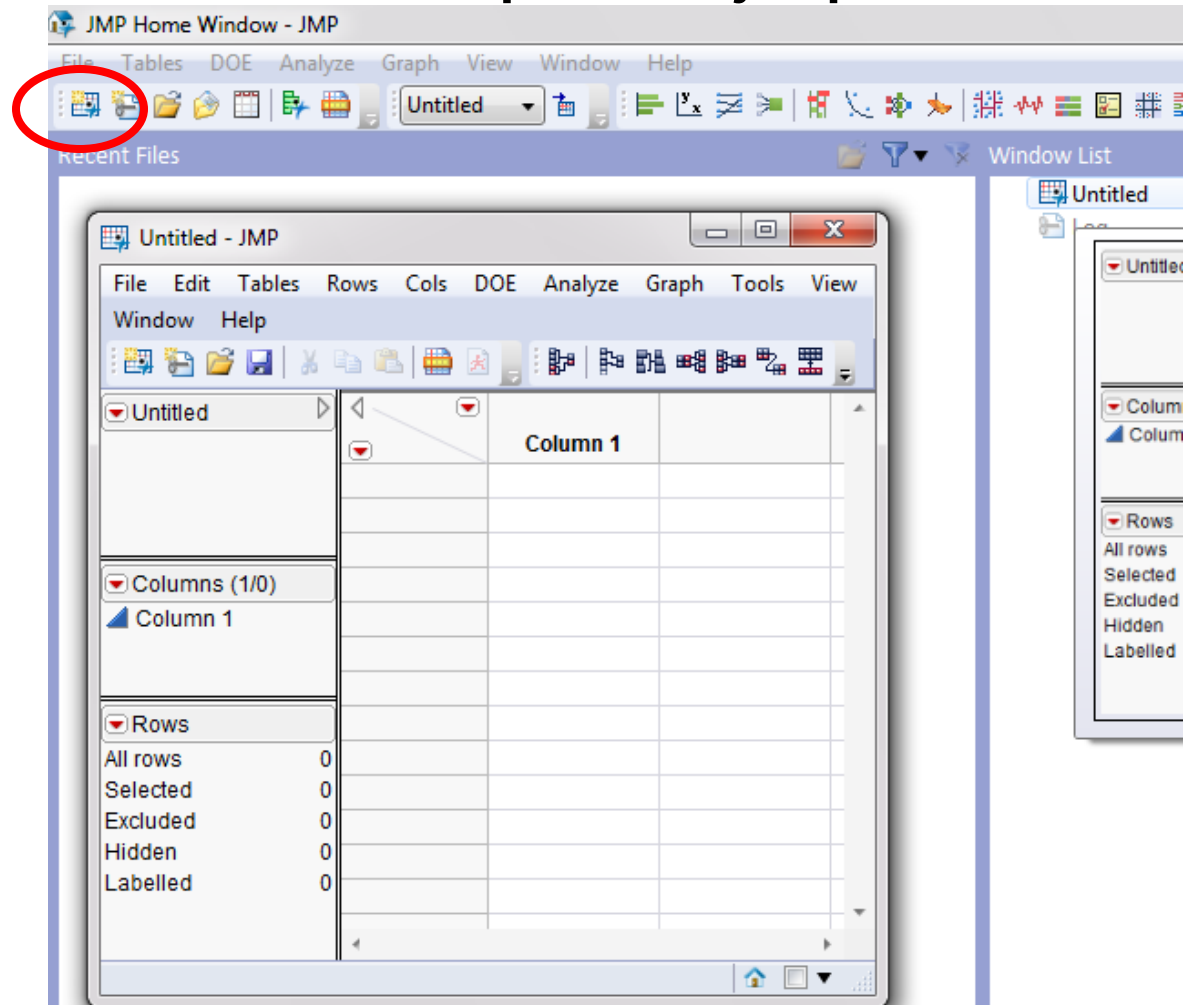
File Edit View Insert Format Tools Data Window Contribute Help

Open In Contribute Publish To Website Post To Blog

	A	B	C	D	E	F	G
1	DISCHARGE	date		scale	location		JANUARY
2		Jan-81	jan				1981
3		Feb-81	feb				1982
4		Mar-81	mar				1983
5		Apr-81	apr				1984
6		May-81	may				1985
7		Jun-81	jun				1986
8		Jul-81	jul				1987
9		Aug-81	aug				1988
10		Sep-81	sep				1989
11		Oct-81	oct				1990
12		Nov-81	nov				1991
13		Dec-81	dec				1992
14		Jan-82					1993
15		Feb-82					1994
16		Mar-82					1995

Choosing the best-fit distribution pattern

- Open Jmp 10 software, open a jmp sheet

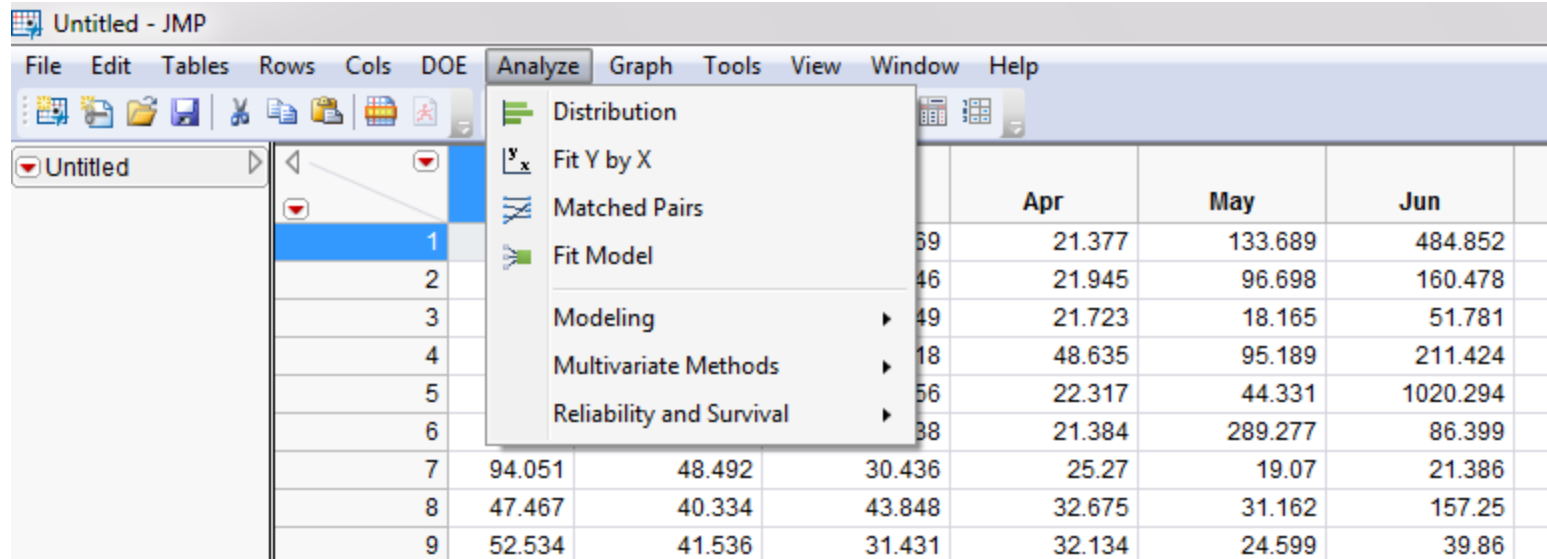


For this training, we will do only for discharge (open SA_DISCHARGE_training) and soil moisture at the surface (open SA_SOILMOISTURE_training)

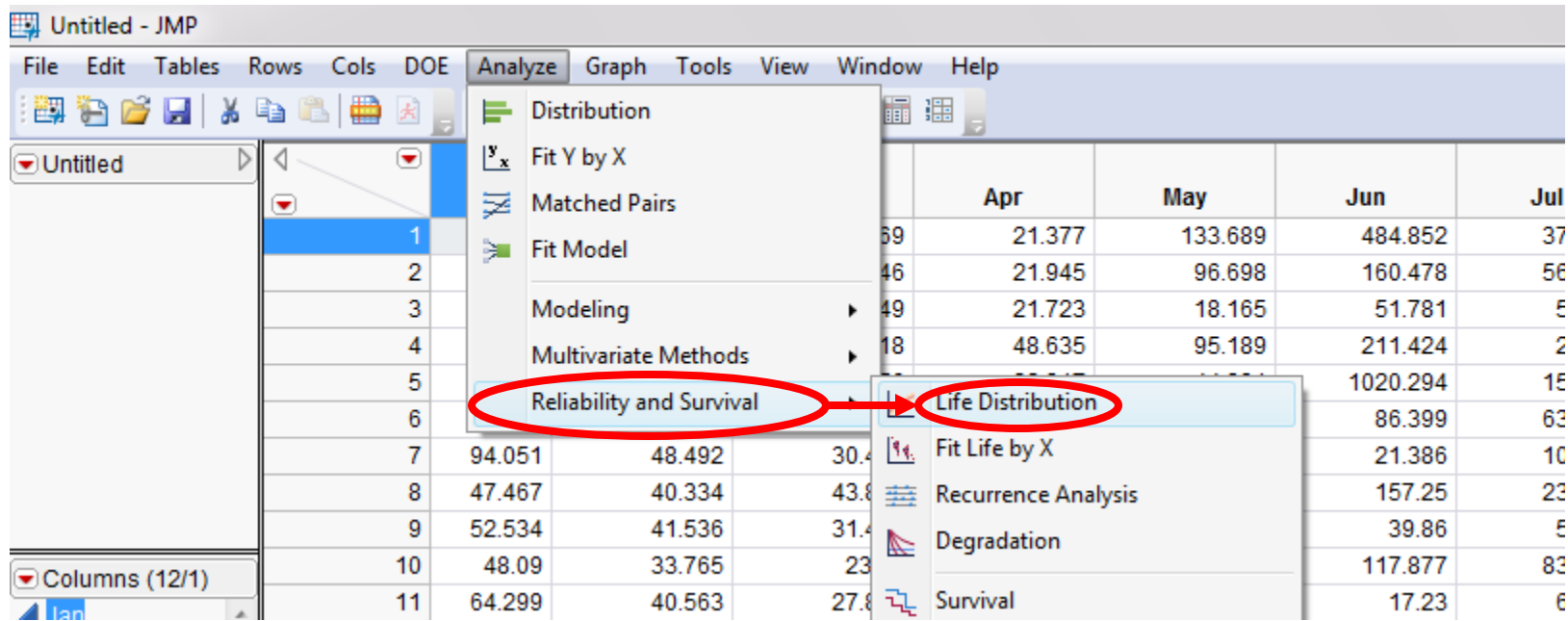
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	DISCHARGE	date		scale	location		JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPT
2	69.046	Jan-81	jan	4.508243	0.847367	1981	69.046	36.988	28.869	21.377	133.689	484.852	372.644	714.118	
3	36.988	Feb-81	feb	4.46778	0.455677	1982	44.286	27.955	24.146	21.945	96.698	160.478	564.483	522.769	
4	28.869	Mar-81	mar	4.98382	0.48694	1983	64.629	37.828	29.949	21.723	18.165	51.781	51.892	484.796	
5	21.377	Apr-81	apr	5.33914	0.21037	1984	32.45	23.71	20.518	48.635	95.189	211.424	283.02	1042.284	
6	133.689	May-81	may	5.44237	0.49886	1985	38.443	26.41	22.456	22.317	44.331	1020.294	150.315	1199.272	
7	484.852	Jun-81	jun	6.0667	0.8294	1986	43.772	33.521	28.238	21.384	289.277	86.399	634.326	1180.682	
8	372.644	Jul-81	jul	6.1397	0.876	1987	94.051	48.492	30.436	25.27	19.07	21.386	100.395	45.885	
9	714.118	Aug-81	aug	6.01213	0.29334	1988	47.467	40.334	43.848	32.675	31.162	157.25	238.161	440.933	
10	489.347	Sep-81	sep	6.54053	0.49854	1989	52.534	41.536	31.431	32.134	24.599	39.86	58.769	1224.615	
11	211.773	Oct-81	oct	5.90428	0.56646	1990	48.09	33.765	23.74	20.943	16.933	117.877	838.737	376.518	
12	249.962	Nov-81	nov	5.46794	0.63672	1991	64.299	40.563	27.872	24.106	19.656	17.23	62.458	496.019	
13	70.969	Dec-81	dec	4.83637	0.58463	1992	58.679	40.838	29.009	23.867	34.843	156.914	211.784	189.625	
14	44.286	Jan-82				1993	51.909	35.333	24.076	21.112	17.474	15.348	138.824	267.416	
15	27.955	Feb-82				1994	106.035	61.743	35.36	28.481	26.158	122.396	218.553	1038.782	
16	24.146	Mar-82				1995	38.842	28.511	20.611	18.439	14.498	36.437	35.179	359.339	
17	21.945	Apr-82				1996	147.715	57.679	35.33	27.703	28.7	112.456	149.271	1056.835	
18	96.698	May-82	*note: modify parts in blue green			1997	67.442	41.637	27.607	24.142	19.186	73.552	207.555	167.052	
19	160.478	Jun-82				1998	62.224	36.78	23.877	20.468	16.738	46.199	27.23	72.112	
20	564.483	Jul-82				1999	182.329	74.635	39.666	37.131	36.834	95.492	308.797	357.229	
21	522.769	Aug-82				2000	186.368	61.198	44.23	36.845	33.721	357.314	183.479	504.167	
22	395.694	Sep-82													
23	198.624	Oct-82					JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPT
24	120.423	Nov-82				1981	76.1626981	71.36682343	49.05158746	76.23644056	257.0794	577.2671	418.3839	2413.942422	968
25	99.568	Dec-82				1982	46.94277332	51.54357143	39.35224052	78.93644531	182.9283	186.1723	637.3782	1761.631111	780
26	64.629	Jan-83				1983	70.95008066	73.21023444	51.26951986	77.88116176	25.50341	55.11731	52.22865	1632.180644	607
27	37.828	Feb-83				1984	32.97479959	42.22776221	31.90163059	205.8081475	179.9034	247.5974	316.0734	3532.664724	207
28	29.949	Mar-83				1985	40.04729592	48.15301189	35.88158705	80.70475828	77.955	1222.845	164.5837	4067.838924	5
29	21.723	Apr-83				1986	46.33618845	63.75836393	47.75573993	76.26971526	568.9665	96.85592	717.1076	4004.465364	154
30	18.165	May-83				1987	105.6717538	96.61277616	52.26964308	94.74193088	27.31754	18.47034	107.5974	135.9271494	248
31	51.781	Jun-83				1988	50.69675477	78.70974396	79.81307759	129.9418168	51.55681	182.2803	264.8645	1482.651087	578

- Copy and paste the first table (monthly data) from sheet 1 to a sheet in Jmp 10 as you would copy a sheet in excel (exclude the header)
- In jmp sheet, click on a cell, press ctrl+v (right click, paste), you can type in the header manually if you like

Click Analyze



Click Reliability Survival then click Life Distribution



Untitled - JMP

File Edit Tables Rows Cols DOE Analyze Graph Tools View Window Help

Columns (12/1)

- Jan
- Feb
- Mar
- Apr
- May
- Jun
- Jul
- Aug
- Sep
- Oct

Rows

- All rows
- Selected
- Excluded
- Hidden
- Labelled

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
1	69.046	36.988	28.869	21.377	133.689	484.852	372.644	714.118	489.347	211.773	249.962
2							564.483	522.769	395.694	198.624	120.423
3							51.892	484.796	307.07	148.37	70.477
4							283.02	1042.284	107.395	132.521	87.885
5							150.315	1199.272	261.513	362.843	114.978
6							634.326	1180.682	777.673	241.215	207.662
7							100.395	45.885	130.198	345.05	473.299
8							238.161	440.933	295.09	274.735	212.265
9							58.769	1224.615	537.643	1634.781	325.827
10							838.737	376.518	922.432	540.076	117.716
11							62.458	496.019	593.696	386.939	720.396
12							211.784	189.625	1021.465	1715.494	177.034
13							138.824	267.416	494.069	658.503	397.545
14							218.553	1038.782	616.42	486.745	136.855
15							35.179	359.339	495.512	350.98	188.152
16							149.271	1056.835	539.713	434.628	306.083
17							207.555	167.052	444.547	119.16	161.527
18							27.23	72.112	176.436	432.088	716.142
19							308.797	357.229	518.233	349.729	374.251
20							183.479	504.167	388.168	458.878	483.364

Life Distribution - JMP

Select Columns

- Jan
- Feb
- Mar
- Apr
- May
- Jun
- Jul
- Aug
- Sep
- Oct
- Nov
- Dec

Censor Code: 1

Select Confidence Interval Method: Wald

Cast Selected Columns into Roles

- Y, Time to Event (required numeric)
- optional numeric
- Censor (optional)
- Failure Cause (optional)
- Freq (optional numeric)
- Label (optional)
- By (optional)

Action

- OK
- Cancel
- Remove
- Recall
- Help

Select all the columns (click on all)

Click on Y, Time to event

Click ok

5:35 AM 1/9/2012

Click on Life distribution

Untitled - JMP

File Edit Tables Rows Cols

Untitled

Columns (12/1)

- Jan
- Feb
- Mar
- Apr
- May
- Jun
- Jul
- Aug

Rows

- All rows 20
- Selected 1
- Excluded 0
- Hidden 0
- Labelled 0

Untitled - Life Distribution of Dec - JMP

Menus are available in the auto-hide menu strip above. Click, hover or use the Alt key to access the menu. You can turn off auto-hiding in Preferences. [Open Preferences](#)

Life Distribution

Event Plot

Compare Distributions

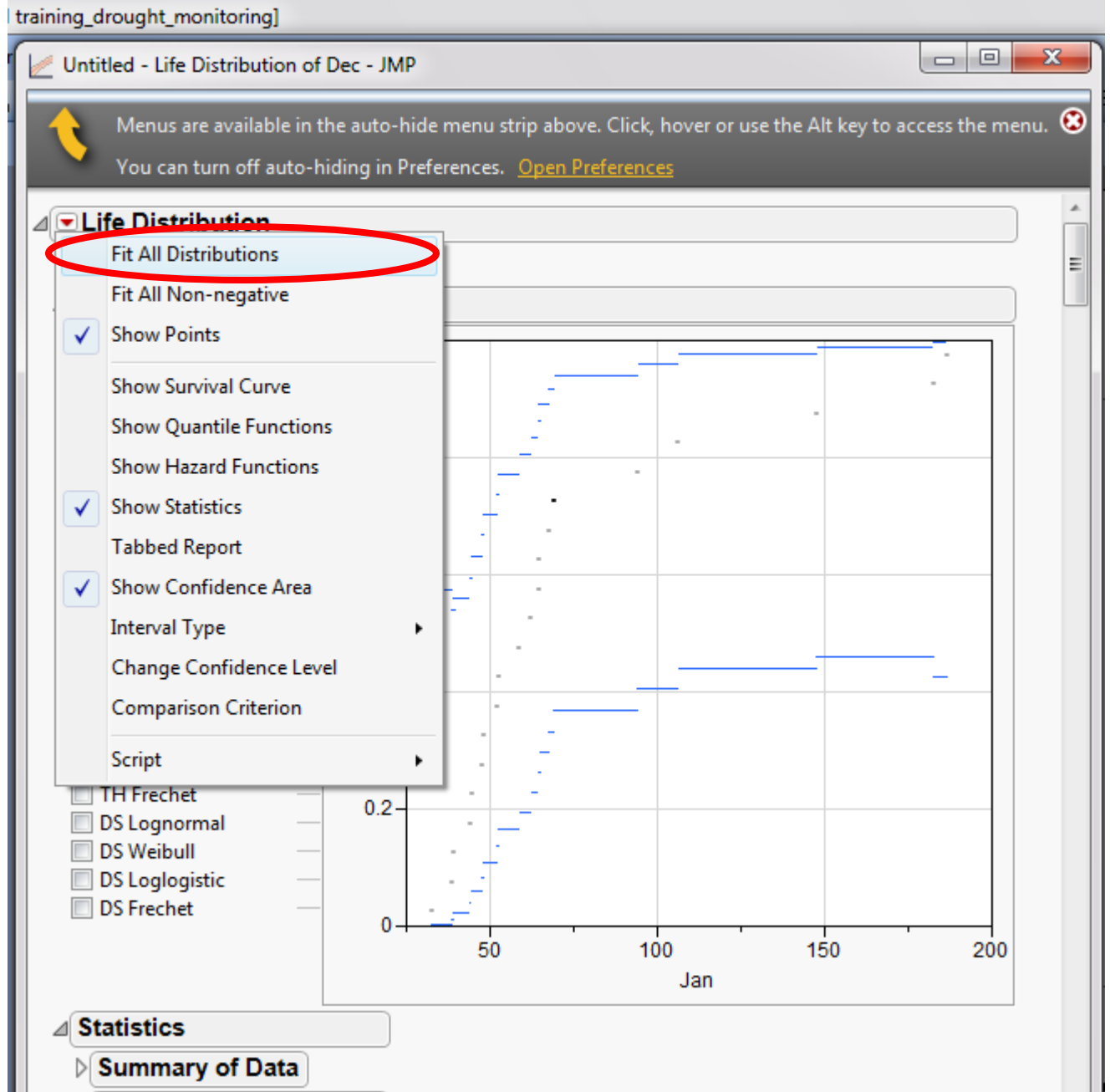
Distribution	Scale
<input checked="" type="checkbox"/> Nonparametric	<input checked="" type="radio"/>
<input type="checkbox"/> Lognormal	<input type="radio"/>
<input type="checkbox"/> Weibull	<input type="radio"/>
<input type="checkbox"/> Loglogistic	<input type="radio"/>
<input type="checkbox"/> Frechet	<input type="radio"/>
<input type="checkbox"/> Normal	<input type="radio"/>
<input type="checkbox"/> SEV	<input type="radio"/>
<input type="checkbox"/> Logistic	<input type="radio"/>
<input type="checkbox"/> LEV	<input type="radio"/>
<input type="checkbox"/> Exponential	<input type="radio"/>
<input type="checkbox"/> LogGenGamma	<input type="radio"/>
<input type="checkbox"/> GenGamma	<input type="radio"/>
<input type="checkbox"/> TH Lognormal	<input type="radio"/>
<input type="checkbox"/> TH Weibull	<input type="radio"/>
<input type="checkbox"/> TH Loglogistic	<input type="radio"/>
<input type="checkbox"/> TH Frechet	<input type="radio"/>
<input type="checkbox"/> DS Lognormal	<input type="radio"/>
<input type="checkbox"/> DS Weibull	<input type="radio"/>
<input type="checkbox"/> DS Loglogistic	<input type="radio"/>
<input type="checkbox"/> DS Frechet	<input type="radio"/>

Probability

Jan

Statistics

Summary of Data



Click on
Fit All-Distributions

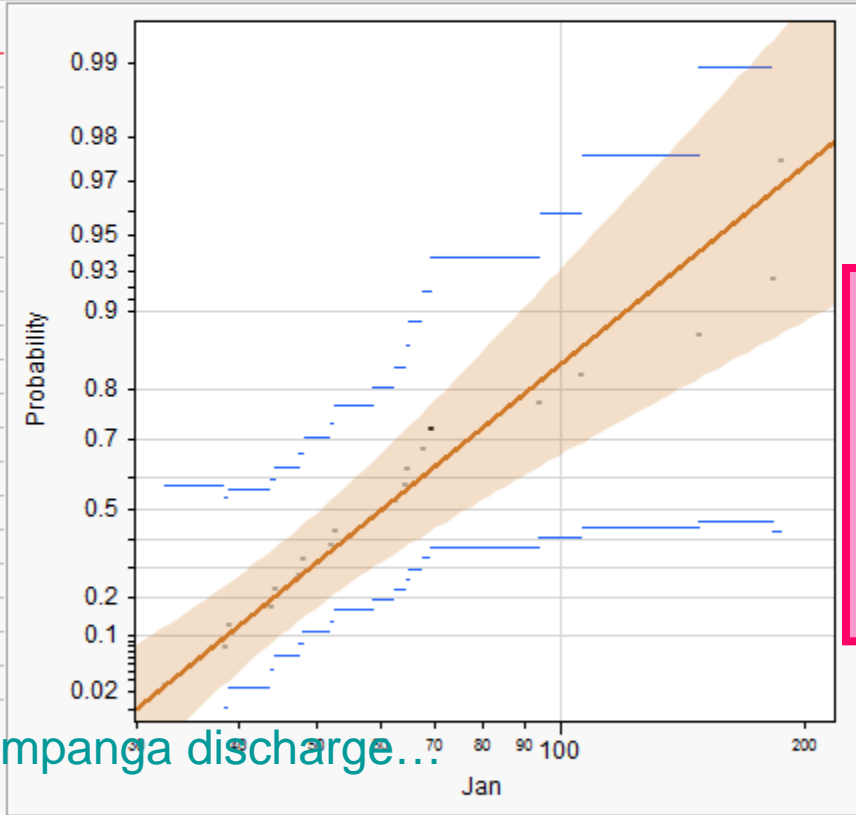
Menus are available in the auto-hide menu strip above. Click, hover or use the Alt key to access the menu.
 You can turn off auto-hiding in Preferences. [Open Preferences](#)

Life Distribution

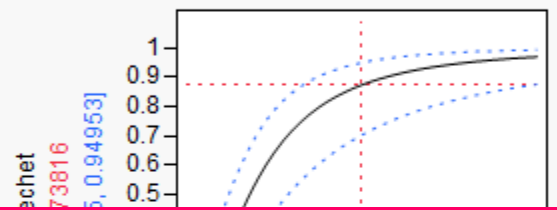
Event Plot

Compare Distributions

- | Distribution | Scale |
|---|----------------------------------|
| <input checked="" type="checkbox"/> Nonparametric | <input type="radio"/> |
| <input type="checkbox"/> Lognormal | <input type="radio"/> |
| <input type="checkbox"/> Weibull | <input type="radio"/> |
| <input type="checkbox"/> Loglogistic | <input type="radio"/> |
| <input checked="" type="checkbox"/> Frechet | <input checked="" type="radio"/> |
| <input type="checkbox"/> Normal | <input type="radio"/> |
| <input type="checkbox"/> SEV | <input type="radio"/> |
| <input type="checkbox"/> Logistic | <input type="radio"/> |
| <input type="checkbox"/> LEV | <input type="radio"/> |
| <input type="checkbox"/> Exponential | <input type="radio"/> |
| <input type="checkbox"/> LogGenGamma | <input type="radio"/> |
| <input type="checkbox"/> GenGamma | <input type="radio"/> |
| <input type="checkbox"/> TH Lognormal | <input type="radio"/> |
| <input type="checkbox"/> TH Weibull | <input type="radio"/> |
| <input type="checkbox"/> TH Loglogistic | <input type="radio"/> |
| <input type="checkbox"/> TH Frechet | <input type="radio"/> |
| <input type="checkbox"/> DS Lognormal | <input type="radio"/> |
| <input type="checkbox"/> DS Weibull | <input type="radio"/> |
| <input type="checkbox"/> DS Loglogistic | <input type="radio"/> |
| <input type="checkbox"/> DS Frechet | <input type="radio"/> |



Distribution Profiler



The program automatically selects the best-fit distribution. Do for all the months and select the most commonly occurring distribution function

This is for pampanga discharge...

Statistics

Model Comparisons

Distribution	AICc	-2Loglikelihood	BIC	Convergence
Threshold Weibull				Failed: Cannot Decrease Objective Function
Frechet	196.11198	191.40610	197.39756	
Threshold Lognormal	198.10754	190.60754	199.59474	

Menus are available in the auto-hide menu strip above. Click, hover or use the Alt key to access the menu.
You can turn off auto-hiding in Preferences. [Open Preferences](#)

Life Distribution

Statistics

Model Comparisons

Distribution	AICc	-2Loglikelihood	BIC	Convergence
Lognormal	200.37793	195.67205	201.66351	
Loglogistic	200.45147	195.74558	201.73705	
LEV	203.09575	198.38986	204.38133	
DS Lognormal	203.17205	195.67205	204.65924	
DS Loglogistic	203.24558	195.74558	204.73278	
Weibull	207.08135	202.37547	208.36693	
DS Weibull	209.87547	202.37547	211.36267	
Logistic	211.39742	206.69154	212.68300	
Normal	213.56786	208.86197	214.85344	
Exponential	214.93801	212.71579	215.71152	
SEV	223.35934	218.65346	224.64493	

Scroll down and copy the estimated location and scale for the particular distribution function

Summary of Data

Nonparametric Estimate

Parametric Estimate - Lognormal

Parametric Estimate - Weibull

Parametric Estimate - Loglogistic

Parametric Estimate - Frechet

For day 2 training please try on at least one month and see what you get ...

Parameter	Estimate	Std Error	Lower 95%	Upper 95%	Criterion	
location	3.9586172	0.08630803	3.7894565	4.1277778	-2*LogLikelihood	191.40610
scale	0.3676257	0.06655685	0.2371766	0.4980747	AICc	196.11198
					BIC	197.39756

Covariance Matrix

Profilers

Distribution Profiler

Quantile Profiler

Hazard Profiler

Density Profiler

Write the values on the table for sheet and location in calculation sheet

The screenshot shows a Microsoft Excel spreadsheet titled "SA_TEMPLATE_DISCHARGE". The spreadsheet contains a table with the following data:

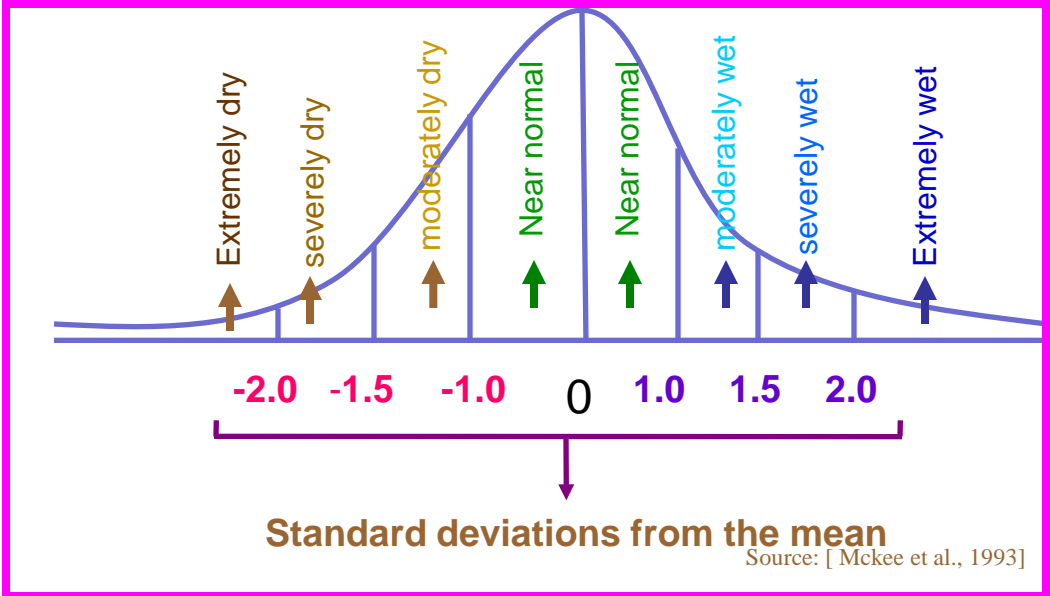
	A	B	C	D	E	F
1	DISCHARGE	date		scale	location	
2	69.046	Jan-81	jan	4.508243	0.847367	1981
3	36.988	Feb-81	feb	4.46778	0.455677	1982
4	28.869	Mar-81	mar	4.98382	0.48694	1983
5	21.377	Apr-81	apr	5.33914	0.21037	1984
6	133.689	May-81	may	5.44237	0.49886	1985
7	484.852	Jun-81	jun	6.0667	0.8294	1986
8	372.644	Jul-81	jul	6.1397	0.876	1987
9	714.118	Aug-81	aug	6.01213	0.29334	1988
10	489.347	Sep-81	sep	6.54053	0.49854	1989
11	211.773	Oct-81	oct	5.90428	0.56646	1990
12	249.962	Nov-81	nov	5.46794	0.63672	1991
13	70.969	Dec-81	dec	4.83637	0.58463	1992
14	44.286	Jan-82				1993
15	27.955	Feb-82				1994
16	24.146	Mar-82				1995

The value 4.508243 in cell D2 is highlighted with a red box. The formula bar above the spreadsheet shows the value 4.508243.

Viewing of Results

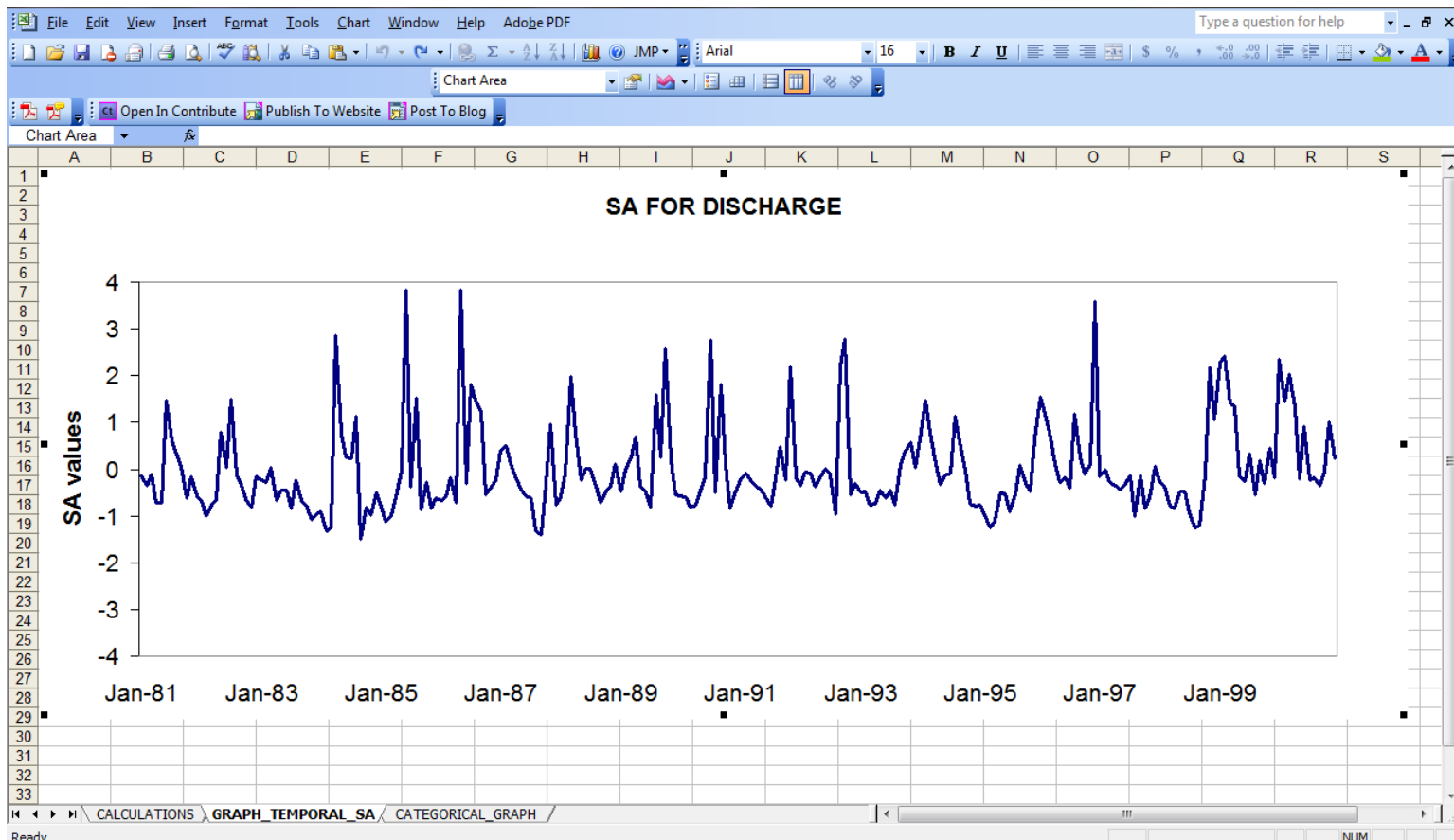
U1	SA				S	T	U	V	W	X	Y	Z	AA	AB	AC
1	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER		date	SA	counters of SA occurrence for the different conditions							
2	489.347	211.773	249.962	70.969		Jan-81	-0.13341	Normal	Normal	Normal		Normal	Normal	Normal	
3	395.694	198.624	120.423	99.568		Feb-81	-0.34856	Normal	Normal	Normal		Normal	Normal	Normal	
4	307.07	148.37	70.477	44.89		Mar-81	-0.10119	Normal	Normal	Normal		Normal	Normal	Normal	
5	107.395	132.521	87.885	75.769		Apr-81	-0.71029	Normal	Normal	Normal		Normal	Normal	Normal	
6	261.513	362.843	114.978	67.923		May-81	-0.71029	Normal	Normal	Normal		Normal	Normal	Normal	
7	777.673	241.215	207.662	94.051		Jun-81	1.471032	Normal	Normal	Normal		1	Moderately Wet	Moderately Wet	
8	130.198	345.05	473.299	57.228		Jul-81	0.62874	Normal	Normal	Normal		Normal	Normal	Normal	
9	295.09	274.735	212.265	116.981		Aug-81	0.329941	Normal	Normal	Normal		Normal	Normal	Normal	
10	537.643	1634.781	325.827	72.458		Sep-81	0.058487	Normal	Normal	Normal		Normal	Normal	Normal	
11	922.432	540.076	117.716	78.298		Oct-81	-0.62523	Normal	Normal	Normal		Normal	Normal	Normal	
12	593.696	386.939	720.396	97.211		Nov-81	-0.17013	Normal	Normal	Normal		Normal	Normal	Normal	
13	1021.465	1715.494	177.034	88.7		Dec-81	-0.57267	Normal	Normal	Normal		Normal	Normal	Normal	
14	494.069	658.503	397.545	111.991		Jan-82	-0.65776	Normal	Normal	Normal		Normal	Normal	Normal	
15	616.42	486.745	136.855	56.553		Feb-82	-1.0155	moderately dry	moderately dry		1	Normal	Normal	Normal	
16	495.512	350.98	188.152	154.099		Mar-82	-0.75497	Normal	Normal	Normal		Normal	Normal	Normal	
17	539.713	434.628	306.083	355.477		Apr-82	-0.63598	Normal	Normal	Normal		Normal	Normal	Normal	
18	444.547	119.16	161.527	114.688		May-82	0.792151	Normal	Normal	Normal		Normal	Normal	Normal	
19	176.436	432.088	716.142	182.301		Jun-82	0.034723	Normal	Normal	Normal		Normal	Normal	Normal	
20	518.233	349.729	374.251	98.225		Jul-82	1.504442	Normal	Normal	Normal		severely wet		1	Severely Wet
21	388.168	458.878	483.364	125.788		Aug-82	-0.14197	Normal	Normal	Normal		Normal	Normal	Normal	
22						Sep-82	-0.32047	Normal	Normal	Normal		Normal	Normal	Normal	
23	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER		Oct-82	-0.65499	Normal	Normal	Normal		Normal	Normal	Normal	
24	968.4407871	363.4302863	383.9899171	113.118776		Nov-82	-0.82177	Normal	Normal	Normal		Normal	Normal	Normal	
25	780.5862519	340.2177029	180.5425619	162.0368951		Dec-82	-0.1543	Normal	Normal	Normal		Normal	Normal	Normal	
26	602.819172	251.5018183	102.0999183	68.51107538		Jan-83	-0.22693	Normal	Normal	Normal		Normal	Normal	Normal	
27	202.2996655	223.5227907	129.4400364	121.329097		Feb-83	-0.28654	Normal	Normal	Normal		Normal	Normal	Normal	

Scroll to the right of the calculations sheet and find SA vertically tabulated and categorized



GRAPHING_TEMPORAL_SA: Sheet 2

This sheet automatically tabulates the calculated SA in sheet 1



CATEGORICAL GRAPH: 3rd Sheet

