

Analysis Techniques: Monthly Analysis Tutorial

Information to get started:

- The lesson below contains step-by-step instructions and "snapshots" of what each step looks like when carried out in a Microsoft Excel workbook. Blue shading of information in the Excel illustrations denotes changes made from the previous step. Dots placed in three consecutive rows indicate that a portion of data is hidden from sight.
 - You can download an Excel workbook containing the complete data set by clicking on the "Download Data" link below. It contains each calculation step on a separate worksheet. To move between steps, click on the tabs at the bottom of the excel window.
 - When you download the file, it may open in your browser window. You may wish to use the "save as" function to save the file to a local drive and then reopen it in Excel. This will make it easier to flip between the online lesson and the example workbook.
 - Finally, we want to remind you that the techniques explained on this site are statistically based; therefore results must be viewed as predictions and not as facts. Please use the techniques and the information obtained from them responsibly!
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Download Data

Step 1: Calculate Mean Monthly Flow for Period of Record

- Find mean monthly flow for each month of every year in period of record
- Refer to [Tips for Data Manipulation](#) section

Microsoft Excel - Tronhstep2

AG36

1	AGENCY	STATION	DATE (Month, Day, Year)	STREAMFLOW (CFS)	MONTHLY AVERAGE
2	USGS	14306500	10/1/90	83	
3	USGS	14306500	10/2/90	85	
4	USGS	14306500	10/3/90	93	
5	USGS	14306500	10/4/90	96	
6	USGS	14306500	10/5/90	101	
7	USGS	14306500	10/6/90	106	
8	USGS	14306500	10/7/90	94	
9	USGS	14306500	10/8/90	87	
10	USGS	14306500	10/9/90	84	
11	USGS	14306500	10/10/90	82	
12	USGS	14306500	10/11/90	83	
13	USGS	14306500	10/12/90	94	
14	USGS	14306500	10/13/90	99	
15	USGS	14306500	10/14/90	97	
16	USGS	14306500	10/15/90	130	
17	USGS	14306500	10/16/90	177	
18	USGS	14306500	10/17/90	152	
19	USGS	14306500	10/18/90	241	
20	USGS	14306500	10/19/90	350	
21	USGS	14306500	10/20/90	209	
22	USGS	14306500	10/21/90	272	
23	USGS	14306500	10/22/90	575	
24	USGS	14306500	10/23/90	315	
25	USGS	14306500	10/24/90	230	
26	USGS	14306500	10/25/90	195	
27	USGS	14306500	10/26/90	352	
28	USGS	14306500	10/27/90	315	
29	USGS	14306500	10/28/90	323	
30	USGS	14306500	10/29/90	431	
31	USGS	14306500	10/30/90	999	
32	USGS	14306500	10/31/90	1400	
33	USGS	14306500	11/1/90	927	
34	USGS	14306500	11/2/90	640	
35	USGS	14306500	11/3/90	534	
36	USGS	14306500	11/4/90	696	
37	USGS	14306500	11/5/90	790	
38	USGS	14306500	11/6/90	713	
39	USGS	14306500	11/7/90	670	
40	USGS	14306500	11/8/90	594	

monthly averages (Sheet1, Sheet2)

Ready

Microsoft Excel - Tronhstep3

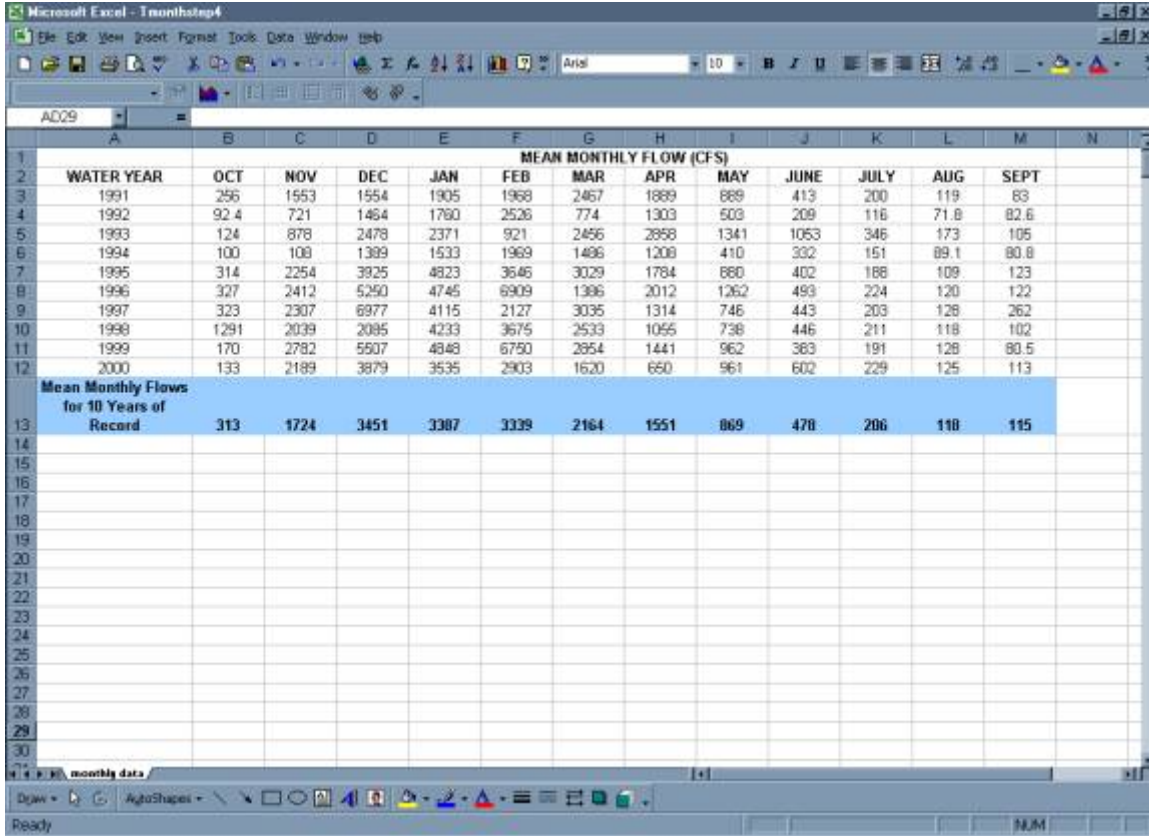
Y26

1														
2		WATER YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT
3		1991	296	1553	1554	1905	1968	2467	1889	889	413	200	119	83
4		1992	92.4	721	1464	1760	2526	774	1303	503	209	116	71.6	82.6
5		1993	124	878	2478	2371	921	2495	2958	1341	1053	346	173	106
6		1994	100	108	1389	1533	1969	1496	1208	410	332	151	89.1	80.8
7		1995	314	2254	3925	4823	3646	3029	1784	880	402	188	109	123
8		1996	327	2412	5250	4745	6909	1396	2012	1262	493	224	120	122
9		1997	323	2307	6977	4115	2127	3035	1314	746	443	203	126	262
10		1998	1291	2039	2095	4233	3675	2533	1055	738	446	211	118	102
11		1999	170	2782	5507	4848	6750	2854	1441	962	383	191	126	80.5
12		2000	133	2189	3879	3535	2903	1620	650	961	602	229	125	113

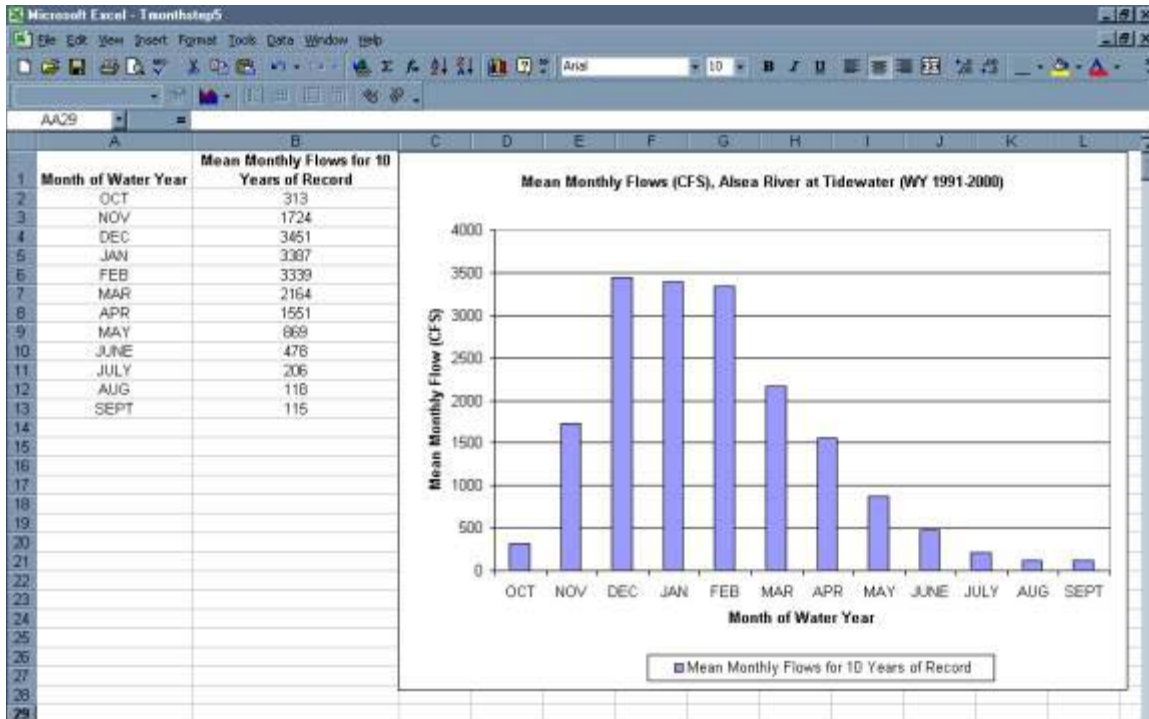
monthly data (Sheet1, Sheet2)

Ready

- Calculate Mean Monthly Flow for Period of Record



- Plot Mean Monthly Flow vs. Month



Step 2: Calculate the Simple Statistics on Monthly Data

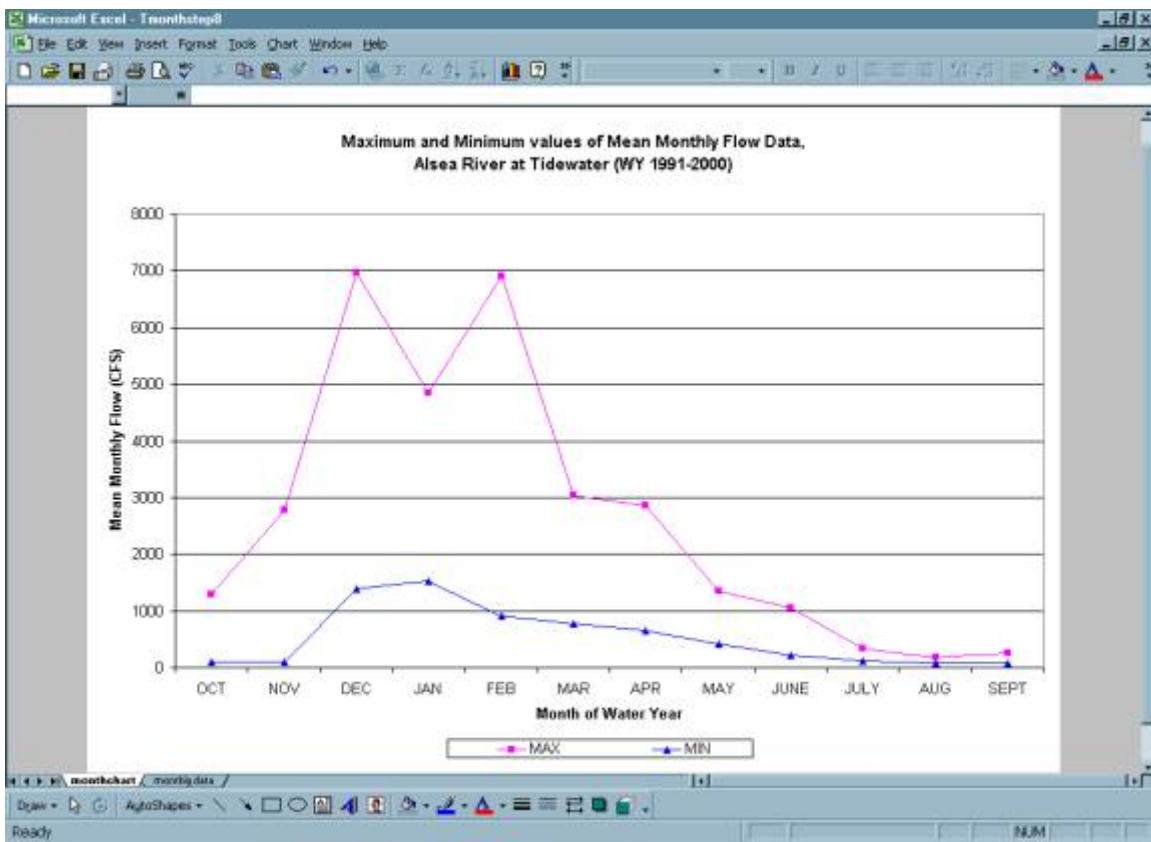
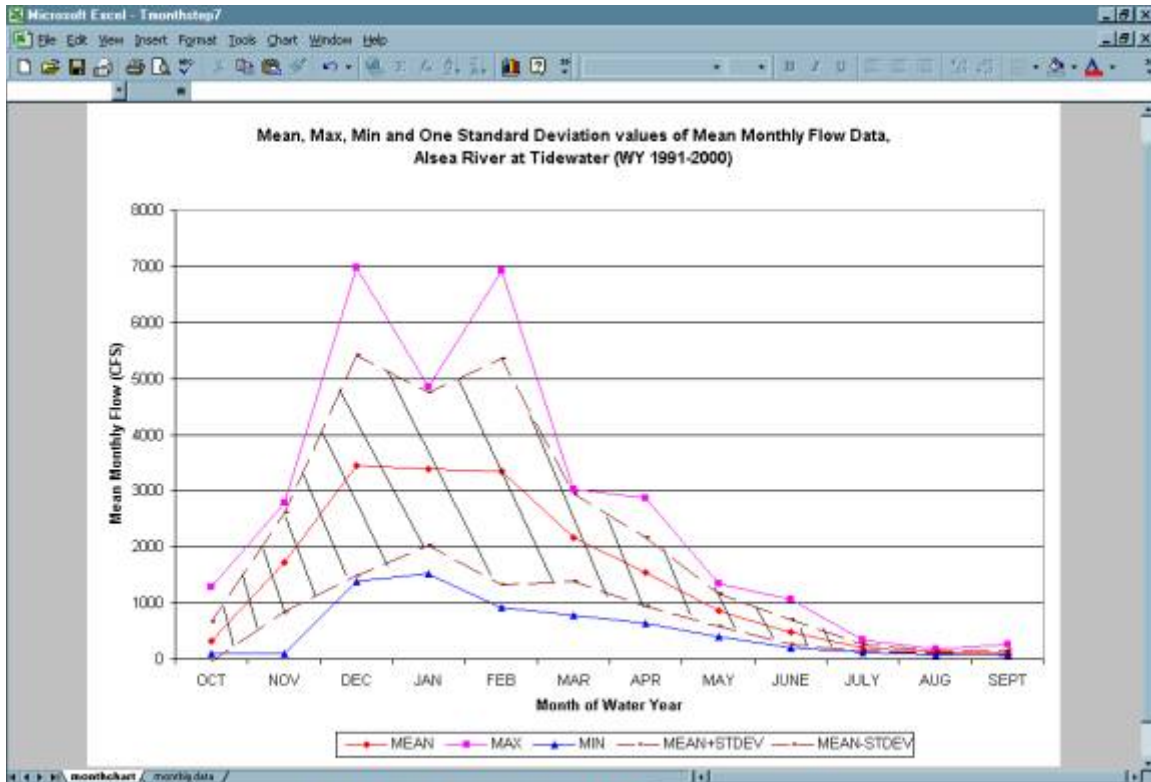
Microsoft Excel - Tmonthstep6

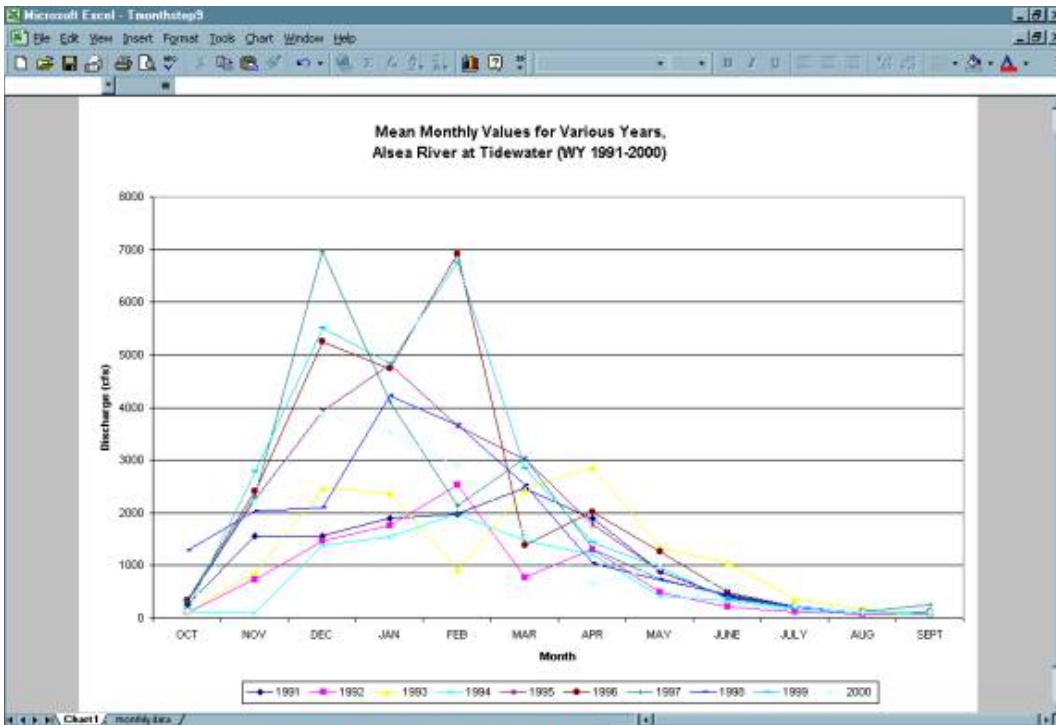
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1														
2	WATER YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	
3	1991	256	1553	1554	1905	1968	2467	1889	889	413	200	119	83	
4	1992	92.4	721	1464	1790	2526	774	1303	509	209	116	71.8	82.6	
5	1993	124	878	2478	2371	921	2456	2858	1341	1053	346	173	105	
6	1994	100	109	1389	1533	1969	1486	1209	410	332	151	89.1	80.8	
7	1995	314	2254	3925	4823	3646	3029	1784	880	402	188	109	123	
8	1996	327	2412	5250	4745	6909	1386	2012	1262	493	224	120	122	
9	1997	323	2307	6977	4115	2127	3035	1314	746	443	203	128	262	
10	1998	1291	2039	2095	4233	3675	2533	1055	738	446	211	118	102	
11	1999	170	2782	5507	4848	6790	2954	1441	962	363	191	128	80.5	
12	2000	133	2189	3879	3535	2903	1620	650	961	602	229	125	113	
13	Mean Monthly Flows for 10 Years of Record	313	1724	3451	3387	3339	2164	1551	869	478	206	118	115	
14	Standard Deviation	356	875	1970	1359	2014	788	614	293	226	60	27	64	
15	Maximum Flow	1291	2782	6977	4848	6909	3035	2858	1341	1053	346	173	262	
16	Minimum Flow	92	108	1389	1533	921	774	650	410	209	116	72	81	

Microsoft Excel - Tmonthstep7

	A	B	C	D	E	F	G	H	I	J	K
1	MONTH	Mean Monthly Flows for Period of Record	Standard Deviation	Maximum Flow	Minimum Flow	Mean + STDEV	Mean - STDEV				
2	OCT	313	356	1291	92	669	-43				
3	NOV	1724	875	2782	108	2599	649				
4	DEC	3451	1970	6977	1389	5420	1481				
5	JAN	3387	1359	4848	1533	4746	2028				
6	FEB	3339	2014	6909	921	5354	1325				
7	MAR	2164	788	3035	774	2952	1376				
8	APR	1551	614	2858	650	2166	937				
9	MAY	869	293	1341	410	1162	576				
10	JUNE	478	226	1053	209	704	251				
11	JULY	206	60	346	116	266	146				
12	AUG	118	27	173	72	145	92				
13	SEPT	115	54	262	81	170	61				
14											
15											
16	MONTH	MEAN	MAX	MIN	MEAN+STDEV	MEAN-STDEV					
17	OCT	313	1291	92	669	-43					
18	NOV	1724	2782	108	2599	649					
19	DEC	3451	6977	1389	5420	1481					
20	JAN	3387	4848	1533	4746	2028					
21	FEB	3339	6909	921	5354	1325					
22	MAR	2164	3035	774	2952	1376					
23	APR	1551	2858	650	2166	937					
24	MAY	869	1341	410	1162	576					
25	JUNE	478	1053	209	704	251					
26	JULY	206	346	116	266	146					
27	AUG	118	173	72	145	92					
28	SEPT	115	262	81	170	61					

- Various Plots of Monthly Data with Simple Statistics Included





Step 3: Normalize Monthly Data

(Mean Monthly Flow as Ratio and Percentage of Annual Flow)

- Calculate and Plot Mean Monthly Flows as ratio and percentage of Mean Annual Flow for Period of Record

1	Month of Water Year	Mean Monthly Flows for Period of Record, MMQ (cfs)	Mean Annual Flow for Period of Record, MAQ (cfs)	MMQ as Percentage of MAQ [(MMQ/MAQ)x100]
2				
3	OCT	313	1469	21
4	NOV	1724	1469	117
5	DEC	3451	1469	235
6	JAN	3387	1469	231
7	FEB	3339	1469	227
8	MAR	2164	1469	147
9	APR	1551	1469	106
10	MAY	859	1469	59
11	JUNE	478	1469	33
12	JULY	206	1469	14
13	AUG	118	1469	8
14	SEPT	115	1469	8
15				
16				
17				
18				
19	Month of Water Year	MMQ as Percent Ratio of MAQ [(MMQ/MAQ)]		
20				
21	OCT	0.21		
22	NOV	1.17		
23	DEC	2.35		
24	JAN	2.31		
25	FEB	2.27		
26	MAR	1.47		
27	APR	1.06		
28	MAY	0.59		
29	JUNE	0.33		
30	JULY	0.14		
31	AUG	0.08		
32	SEPT	0.08		

