

*The Many Uses of*  
**Orthogonal  
Functions**

**...just the color figures for those who got the B&W  
printed book...**

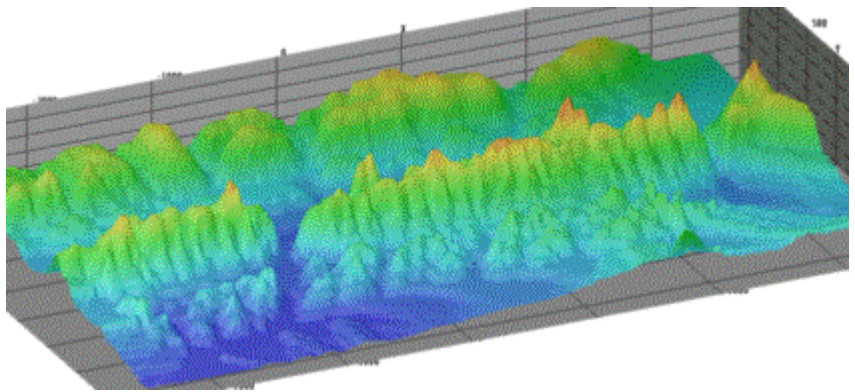
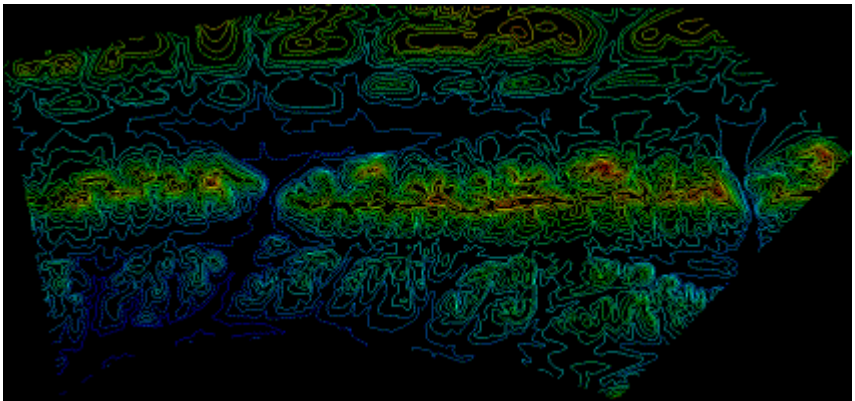
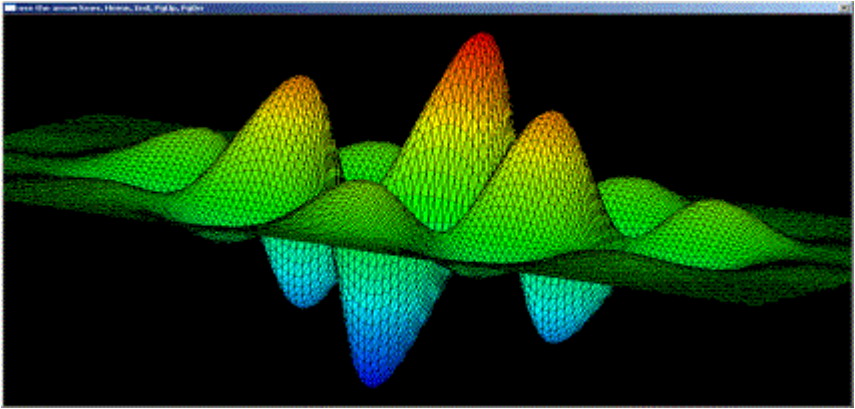
**by  
D. James Benton**

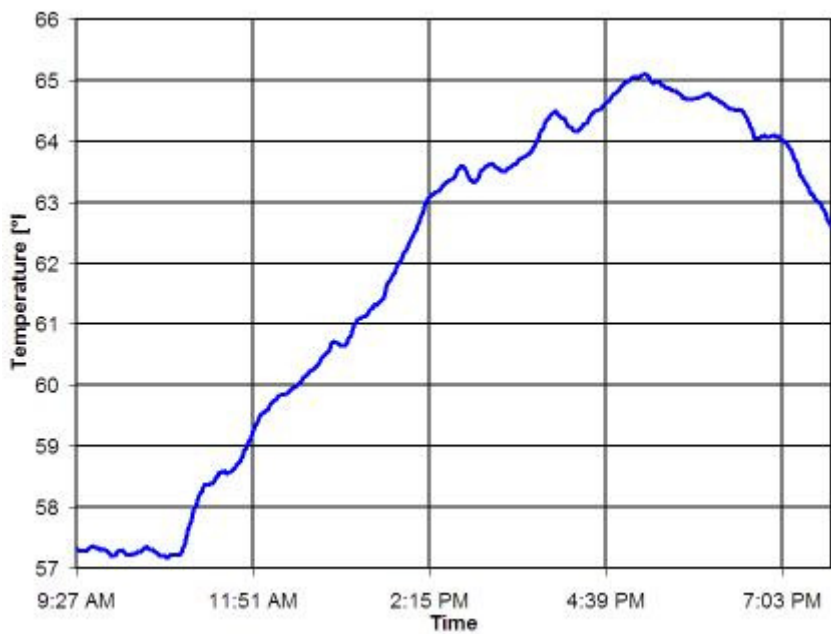
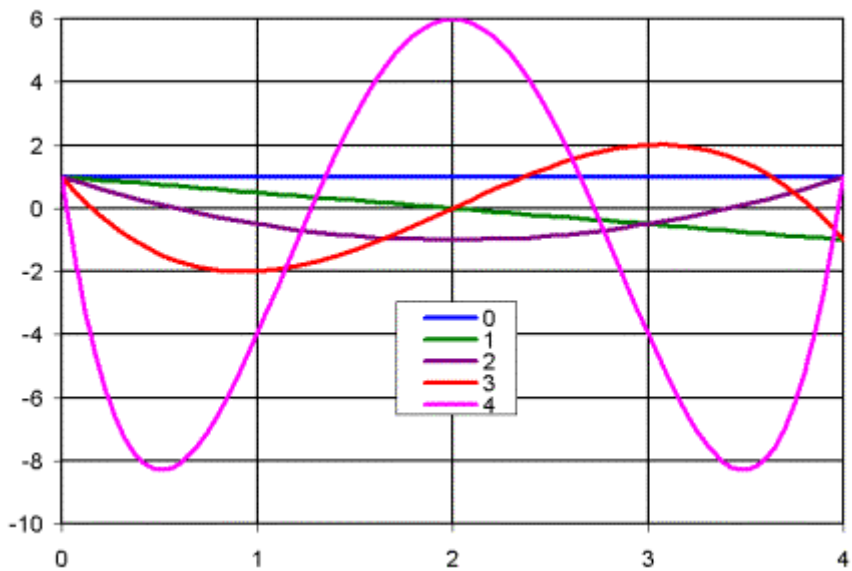
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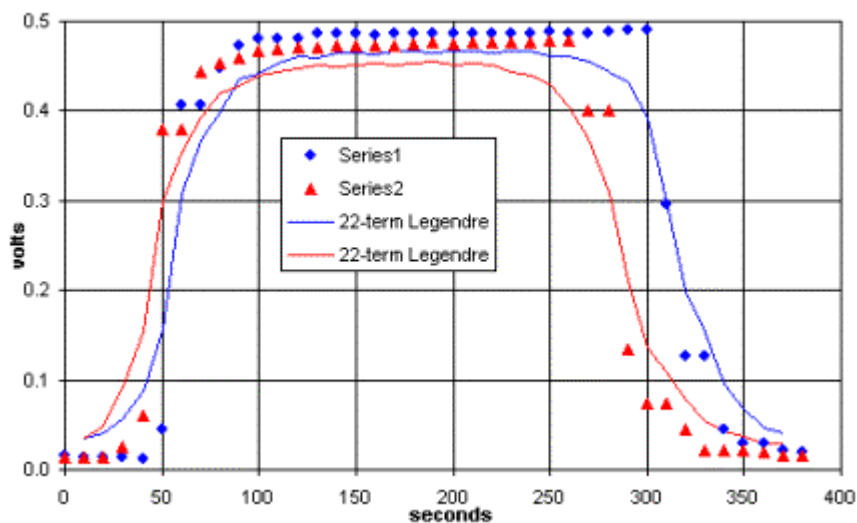
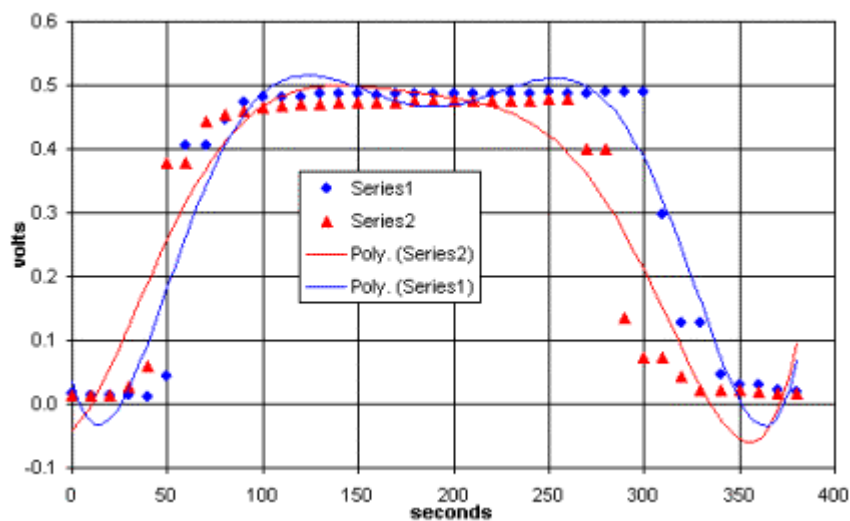
**Foreword**

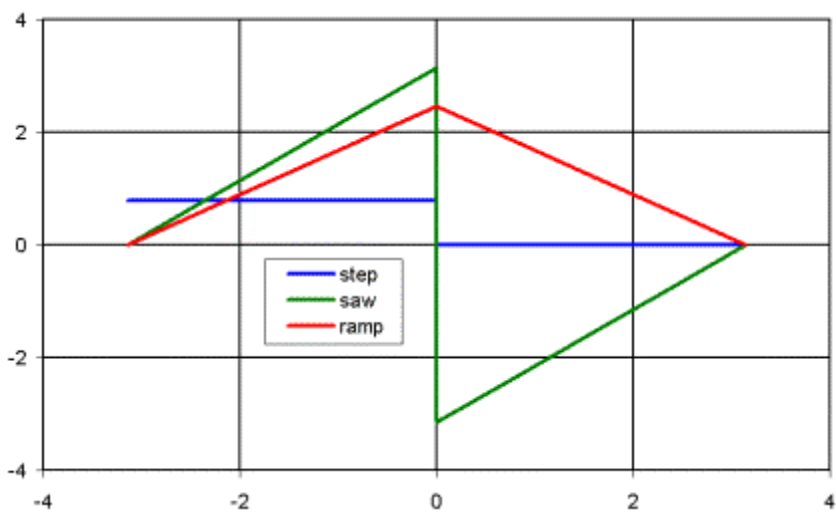
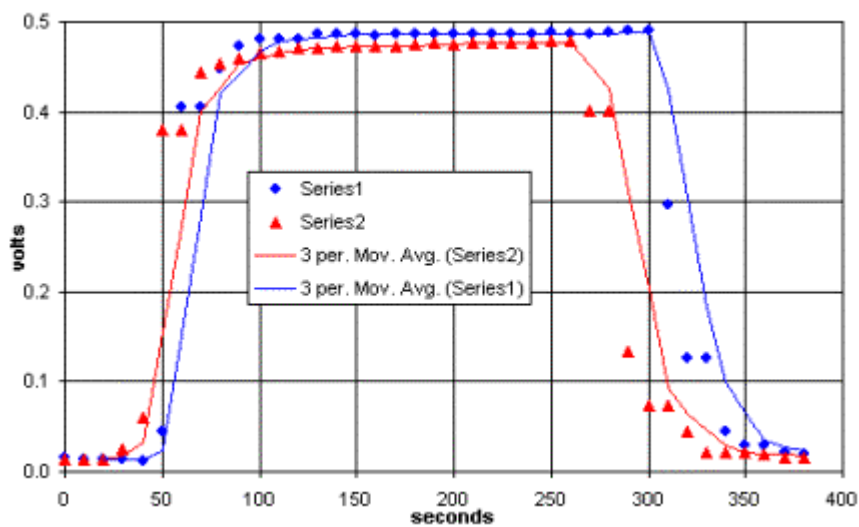
Orthogonal functions are clever tools that unlock many mathematical puzzles. Once you've seen this done and understand how they work, you will find many more useful applications. This remarkable area of applied mathematics supports a wide range of technologies, ranging from CAT scans to satellite pictures from space to unraveling the sounds of the deep. Join me on a tour of this fascinating topic in which we will explore data sampling and approximation in both temporal and spatial dimensions.

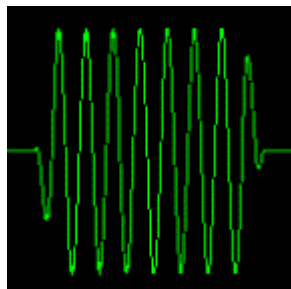
*All of the examples contained in this book,  
(as well as a lot of free programs) are available at...*  
<http://www.dudleybenton.altervista.org/software/index.html>



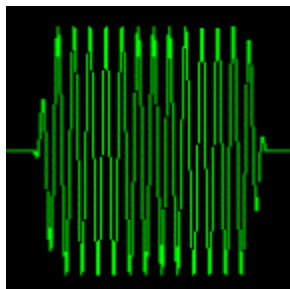




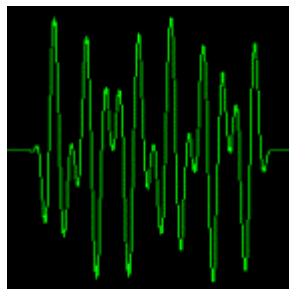




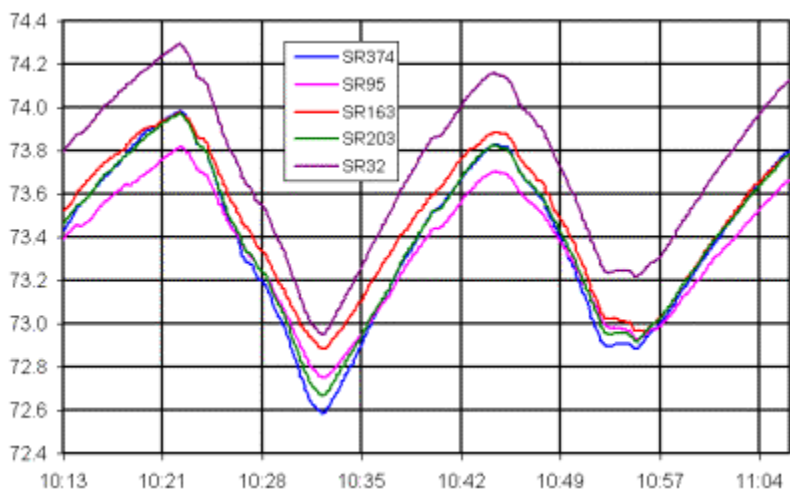
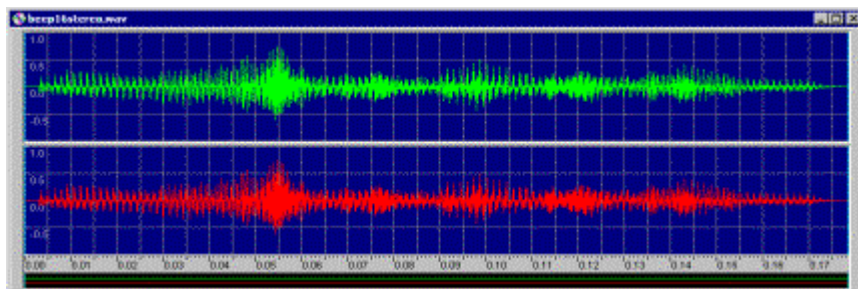
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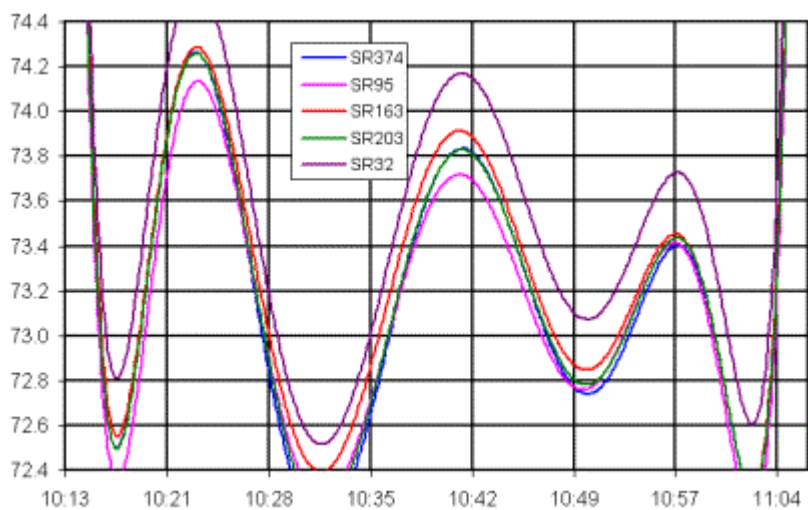
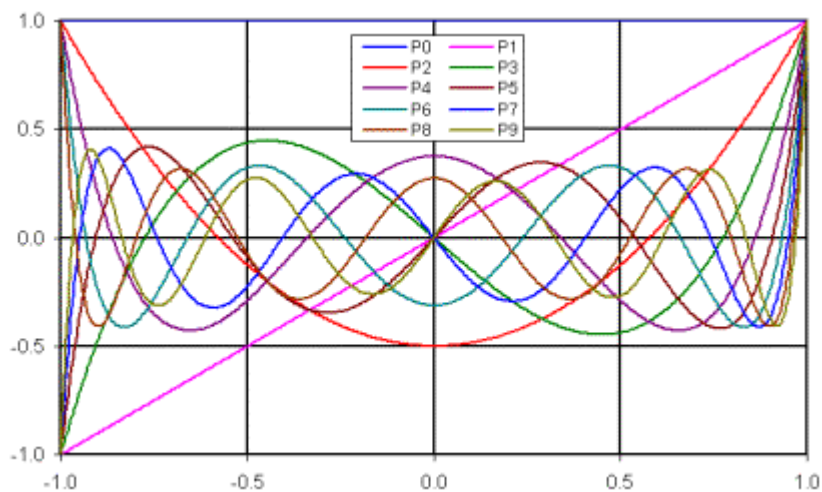


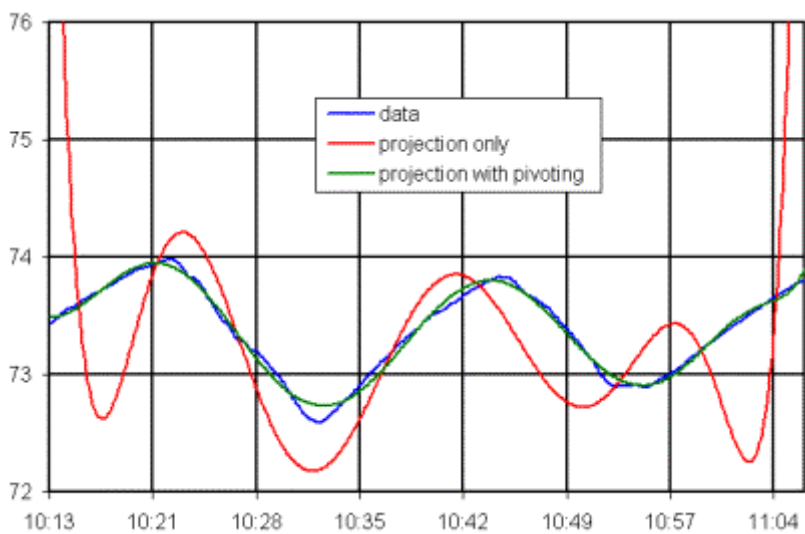
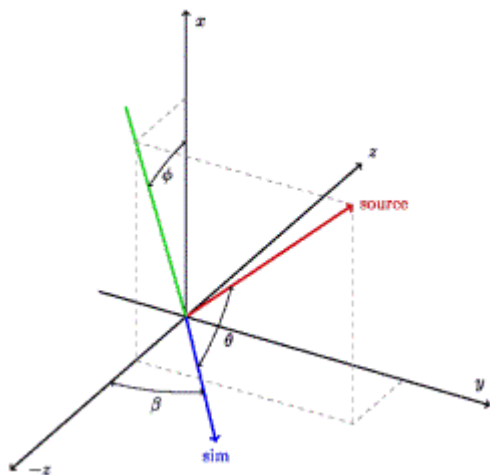
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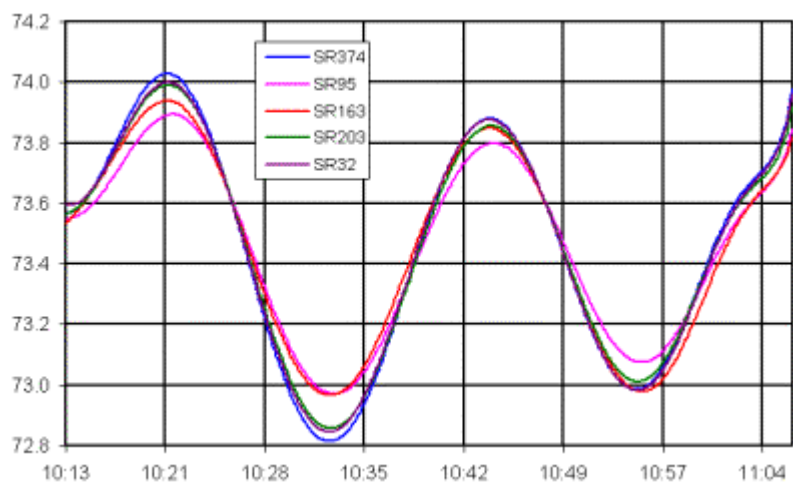
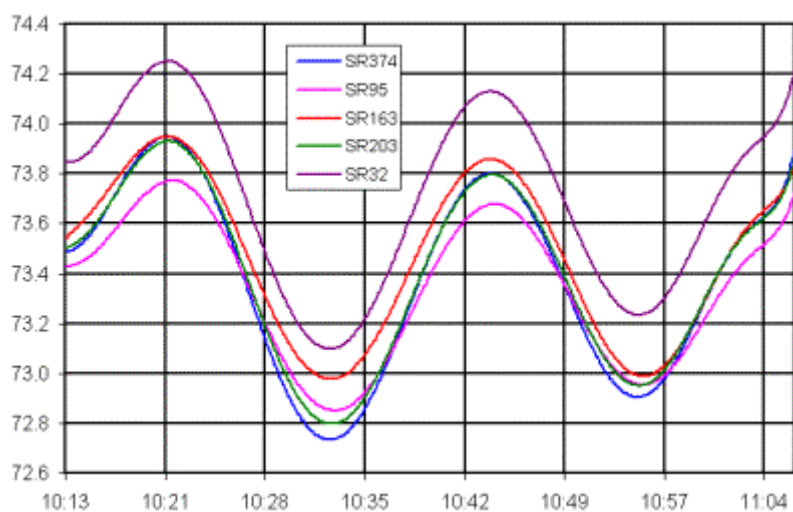
composite



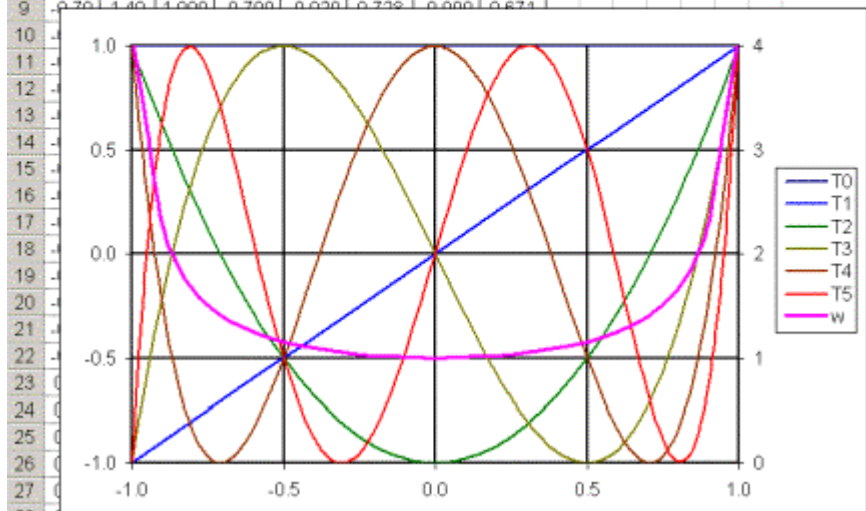




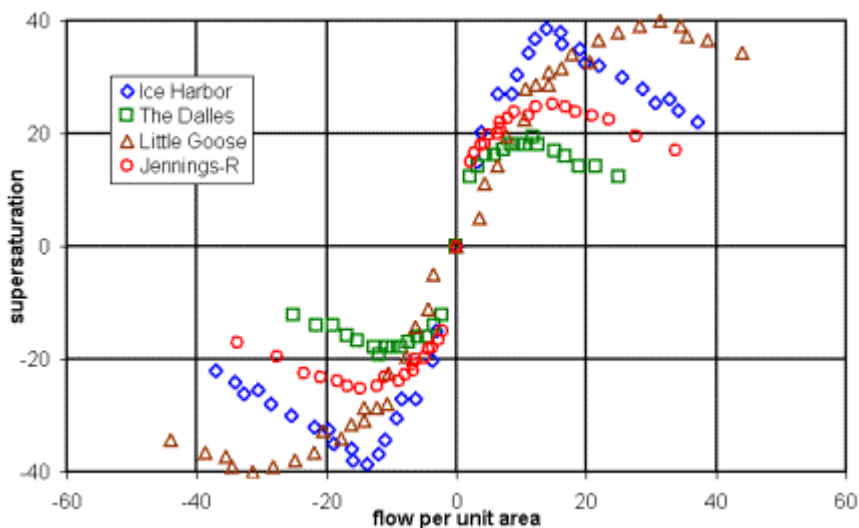
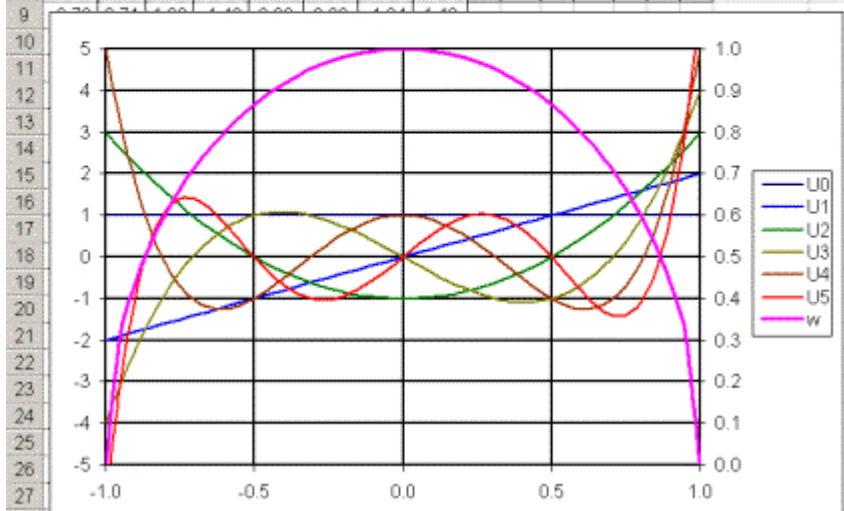


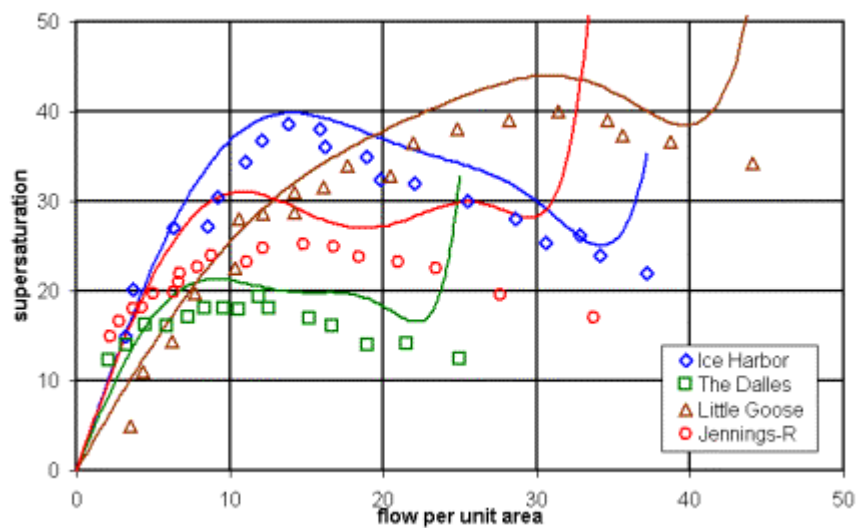
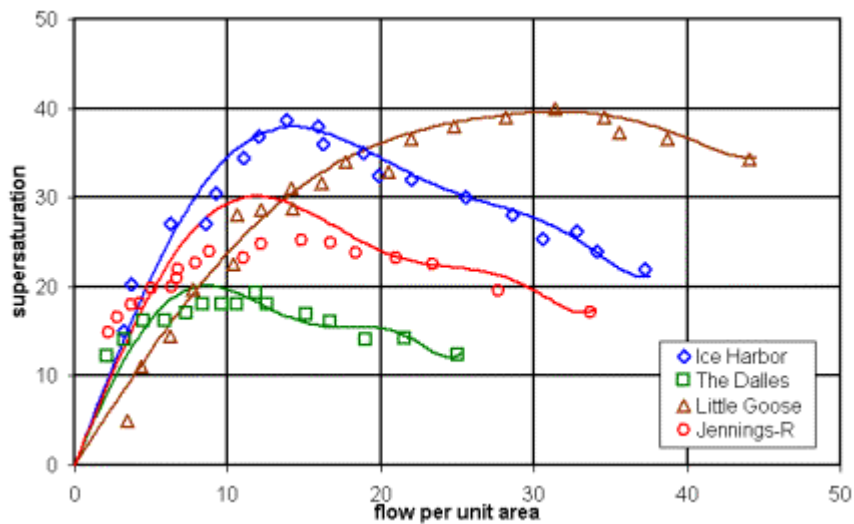


	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Chebyshev polynomials of the 1st kind								orthogonality test							
2	x	w	T0	T1	T2	T3	T4	T5	T0	T1	T2	T3	T4	T5		
3	-1.00	4.11	1.000	-1.000	1.000	-1.000	1.000	-1.000	T0	62	0	-1	0	0	0	
4	-0.95	3.20	1.000	-0.950	0.805	-0.580	0.296	0.017	T1	0	31	0	0	0	1	
5	-0.90	2.29	1.000	-0.900	0.620	-0.216	-0.231	0.632	T2	-1	0	31	0	0	0	
6	-0.85	1.90	1.000	-0.850	0.445	0.094	-0.604	0.933	T3	0	0	0	32	0	1	
7	-0.80	1.67	1.000	-0.800	0.280	0.352	-0.843	0.997	T4	0	0	0	0	32	0	
8	-0.75	1.51	1.000	-0.750	0.125	0.563	-0.969	0.891	T5	0	1	0	1	0	33	
9	-0.70	1.40	1.000	-0.700	0.000	0.738	-0.999	0.674								

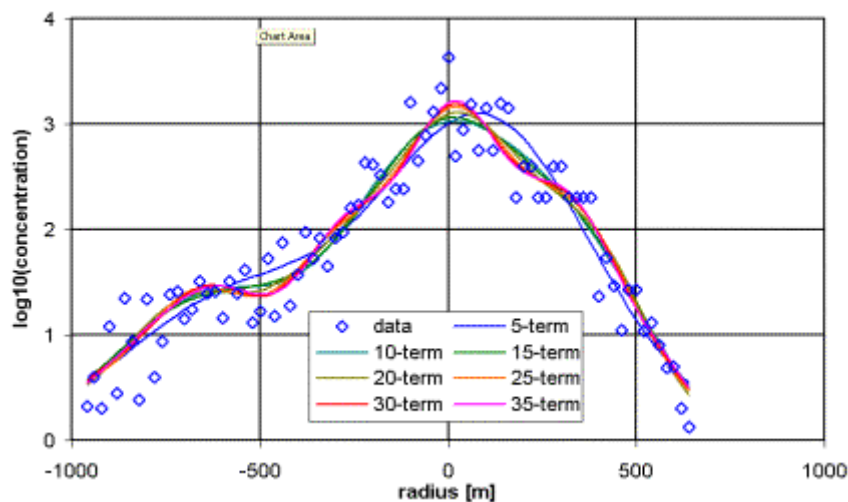
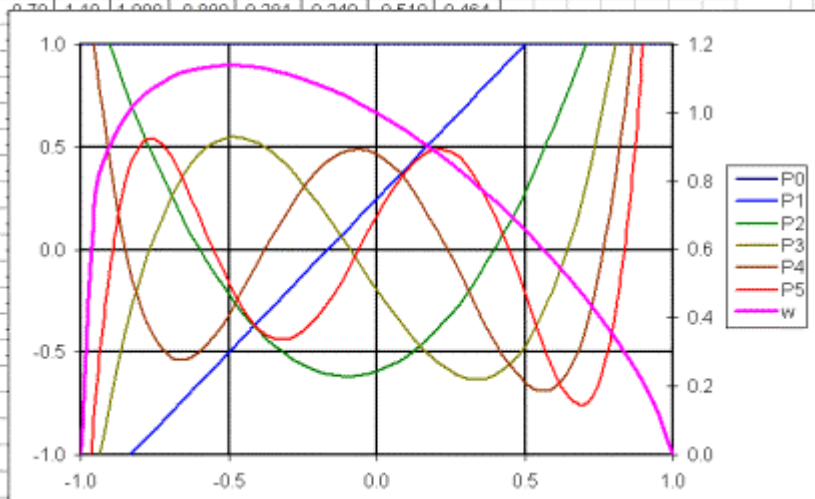


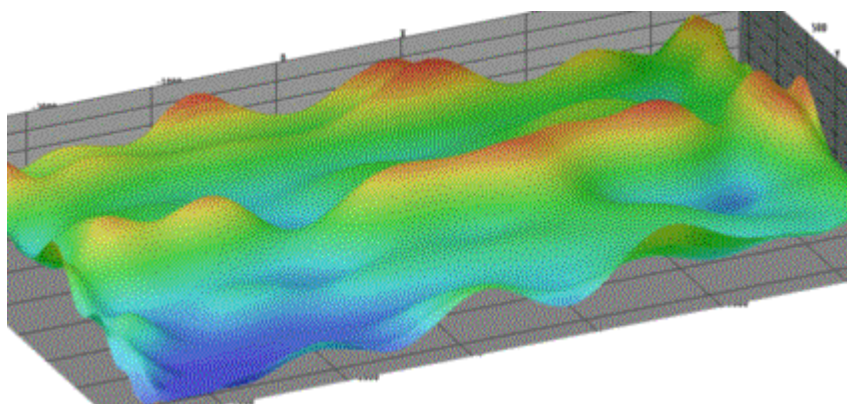
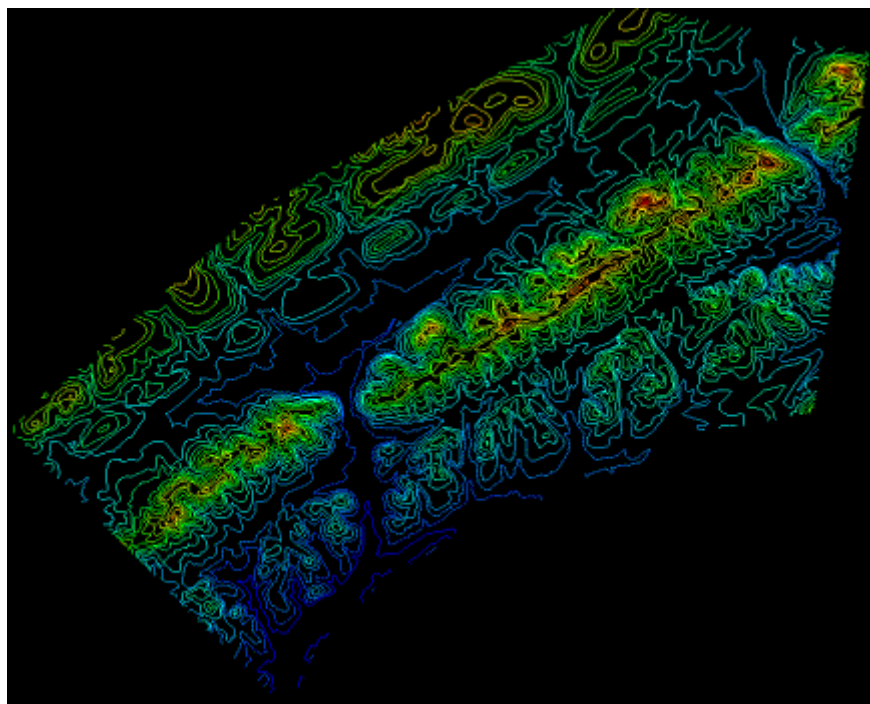
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Chebyshev polynomials of the 2nd kind								orthogonality test							
2	x	w	U0	U1	U2	U3	U4	U5	U0	U1	U2	U3	U4	U5		
3	-1.00	0.00	1.00	-2.00	3.00	-4.00	5.00	-6.00	U0	31	0	0	0	-1	0	
4	-0.95	0.31	1.00	-1.90	2.61	-3.06	3.20	-3.02	U1	0	31	0	-1	0	-1	
5	-0.90	0.44	1.00	-1.80	2.24	-2.23	1.78	-0.97	U2	0	0	30	0	-2	0	
6	-0.85	0.53	1.00	-1.70	1.89	-1.51	0.68	0.35	U3	0	-1	0	29	0	-3	
7	-0.80	0.60	1.00	-1.60	1.56	-0.90	-0.13	1.10	U4	-1	0	-2	0	28	0	
8	-0.75	0.66	1.00	-1.50	1.25	-0.37	-0.69	1.41	U5	0	-1	0	-3	0	27	

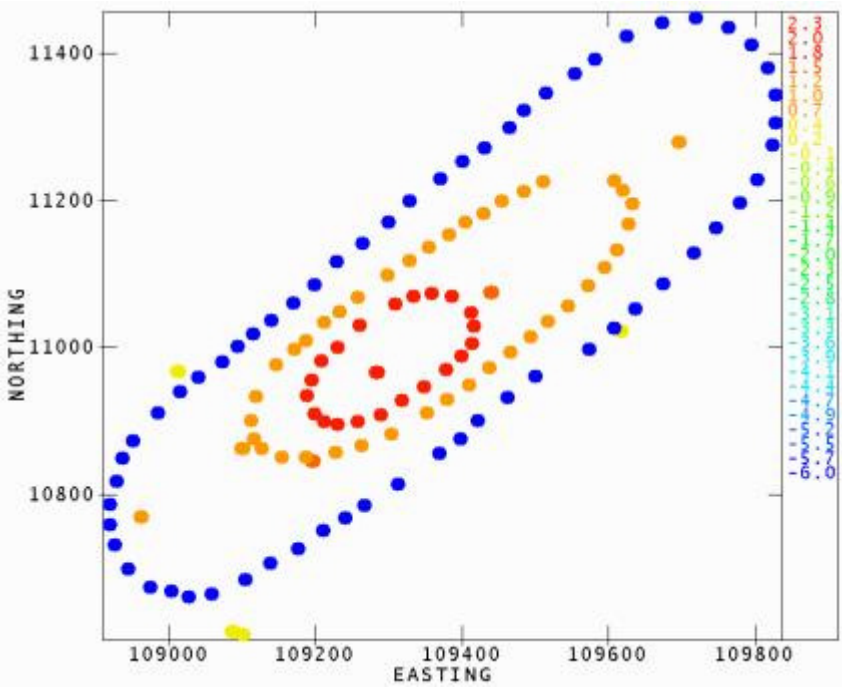
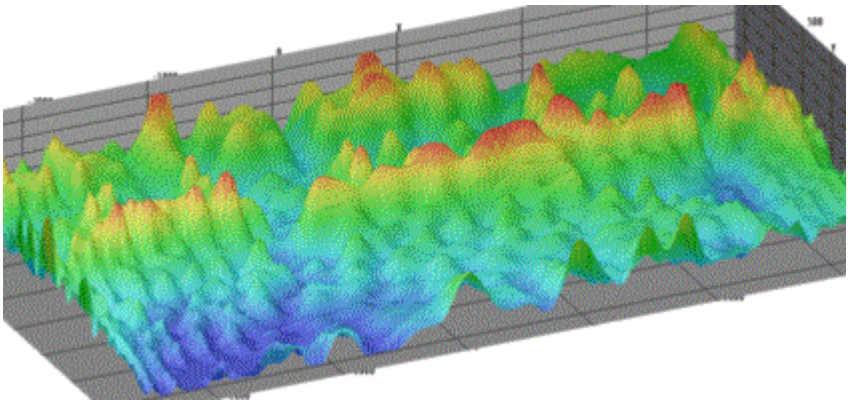


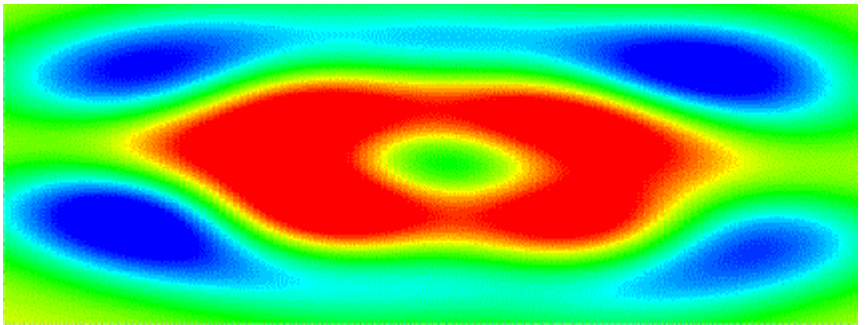
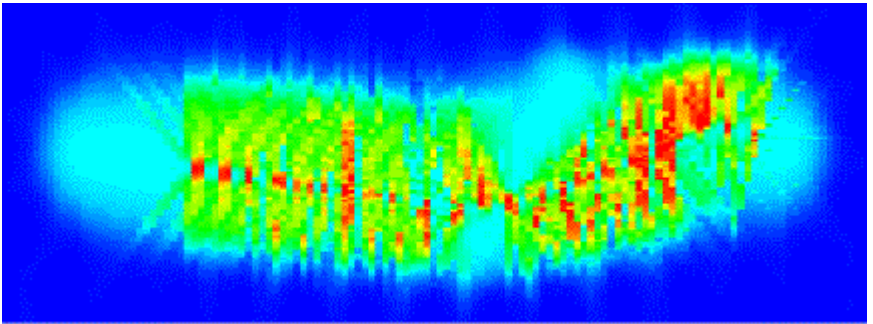
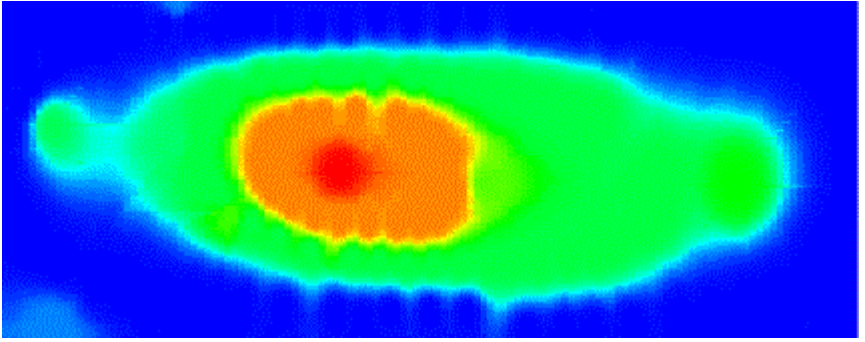


	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	Jacobi polynomials									orthogonality test						0.75 $\alpha$	
2	x	w	P0	P1	P2	P3	P4	P5		P0	P1	P2	P3	P4	P5		0.25 $\beta$
3	-1.00	0.00	1.000	-1.250	1.406	-1.523	1.619	-1.700		P0	33	0	0	0	0		
4	-0.95	0.78	1.000	-1.175	1.188	-1.096	0.929	-0.707		P1	0	18	0	-1	0	-1	
5	-0.90	0.91	1.000	-1.100	0.981	-0.727	0.396	-0.056		P2	0	0	12	0	-1	0	
6	-0.85	0.99	1.000	-1.025	0.788	-0.412	0.007	0.328		P3	0	-1	0	9	0	-1	
7	-0.80	1.04	1.000	-0.950	0.606	-0.148	-0.264	0.507		P4	0	0	-1	0	7	0	
8	-0.75	1.08	1.000	-0.875	0.437	0.068	-0.434	0.537		P5	0	-1	0	-1	0	6	
9	0.70	1.10	1.000	-0.800	0.264	0.240	-0.510	0.464									

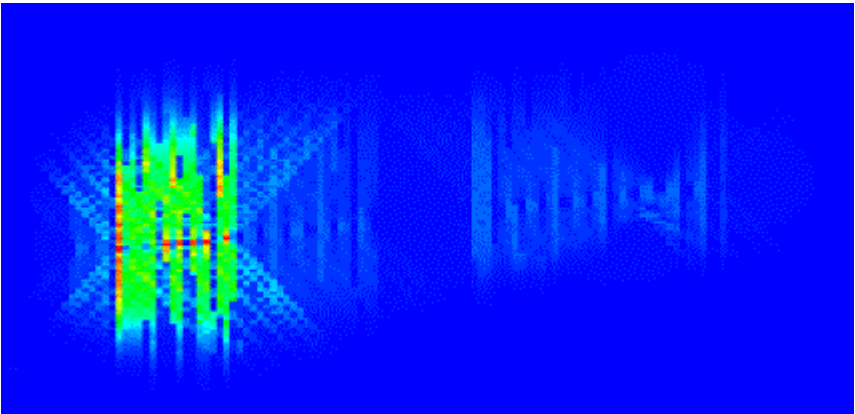
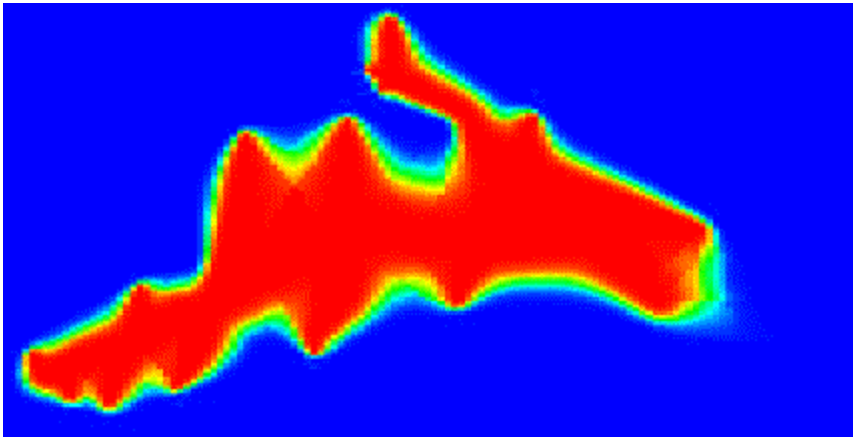
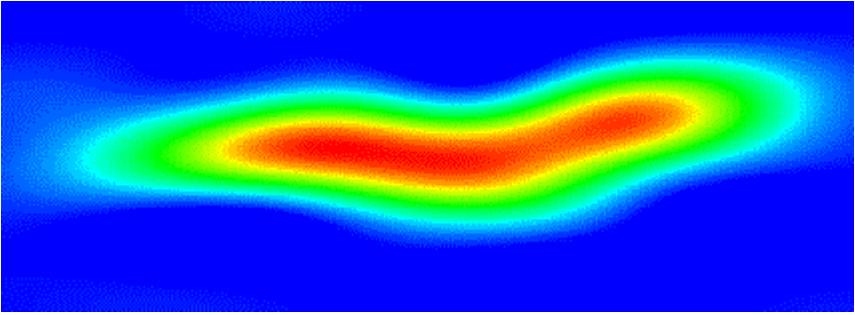


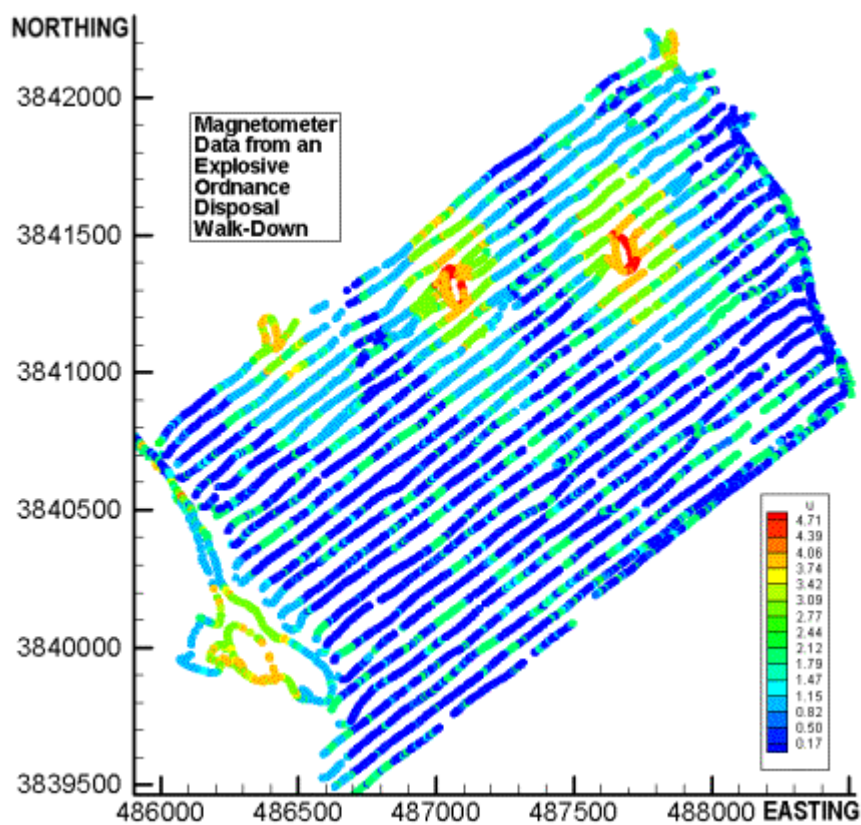
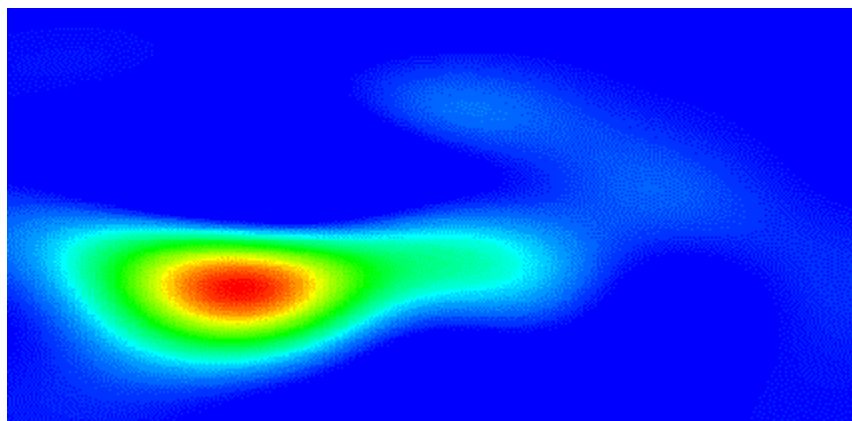


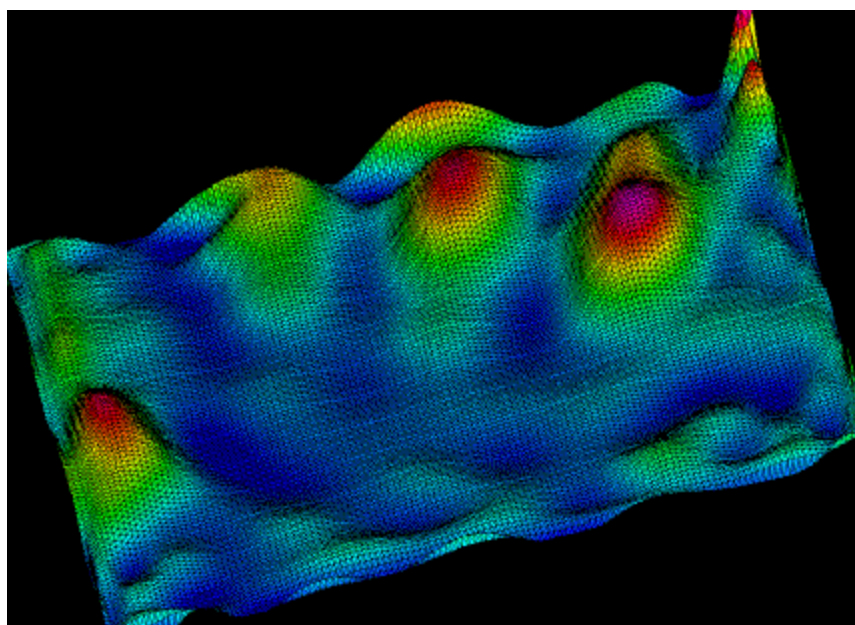
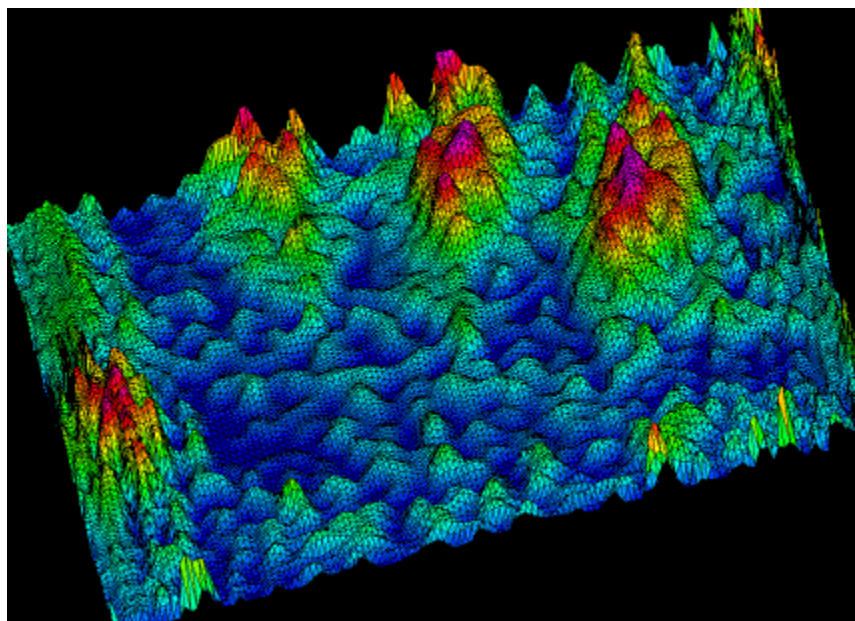


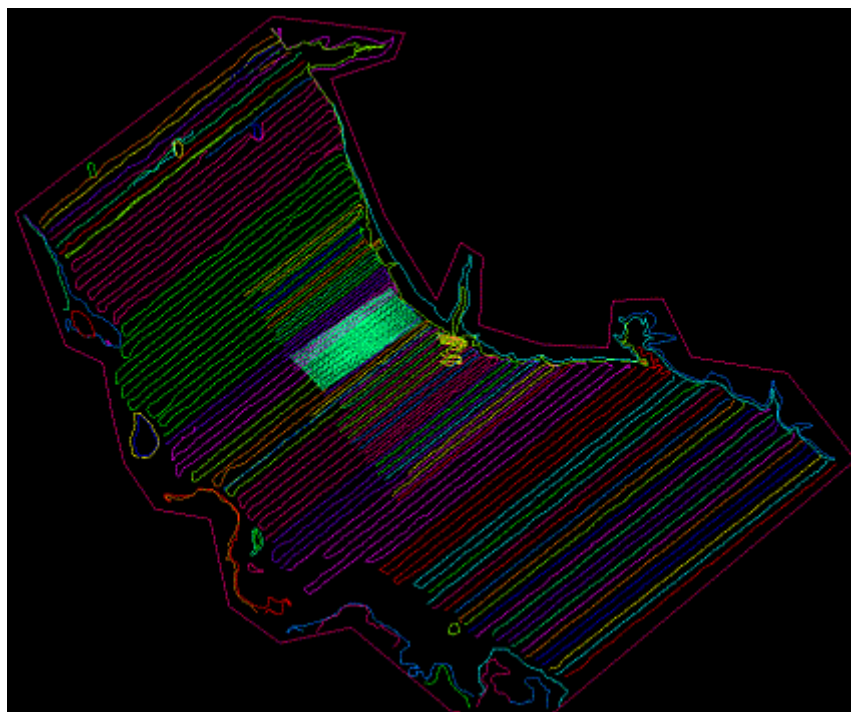




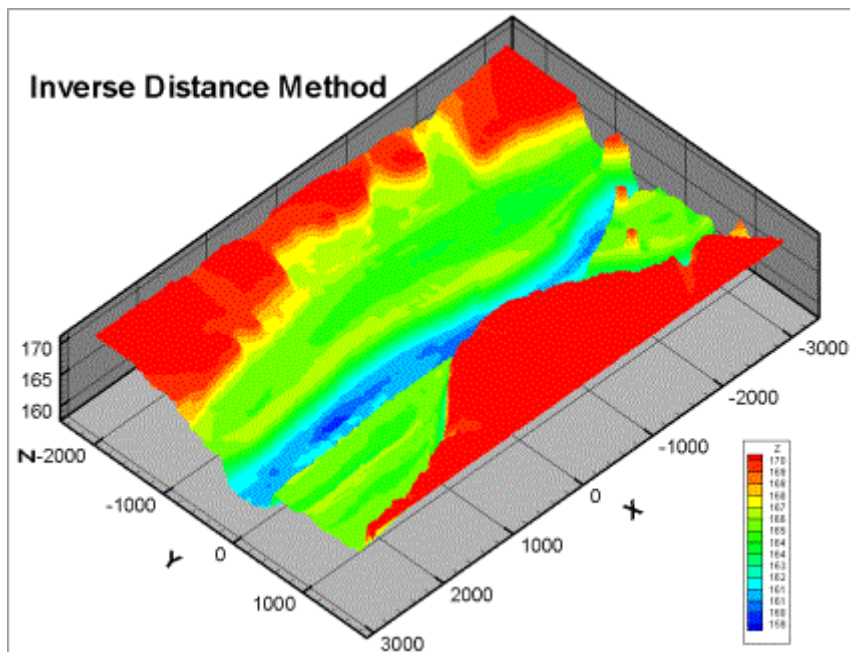




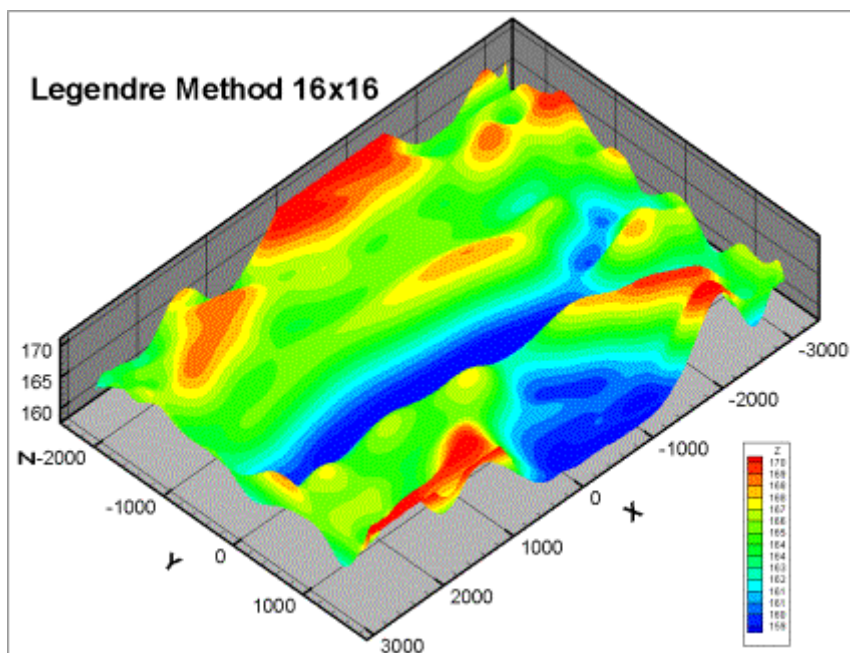


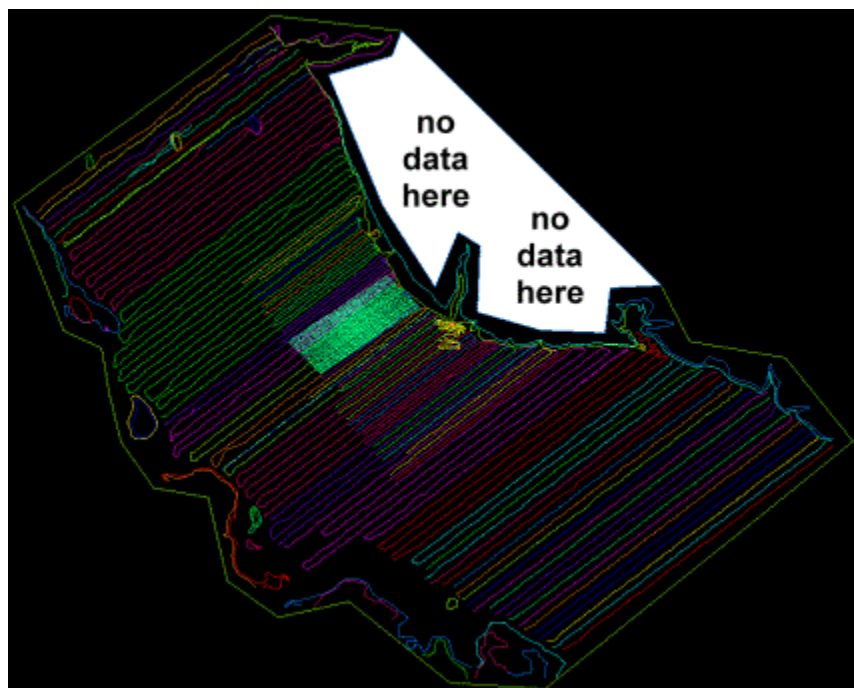


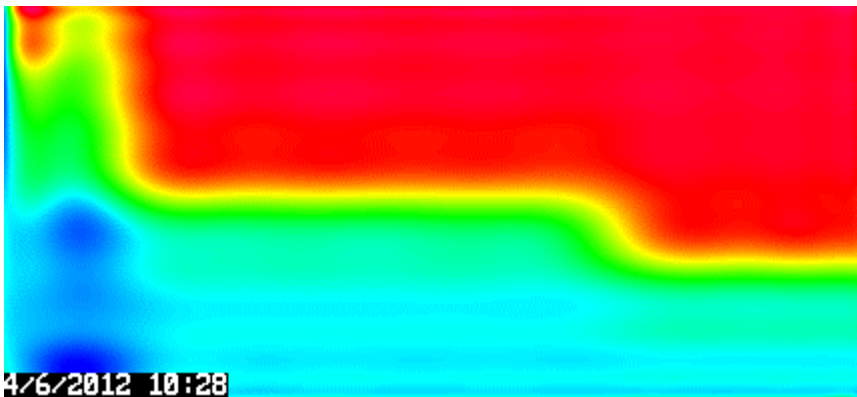
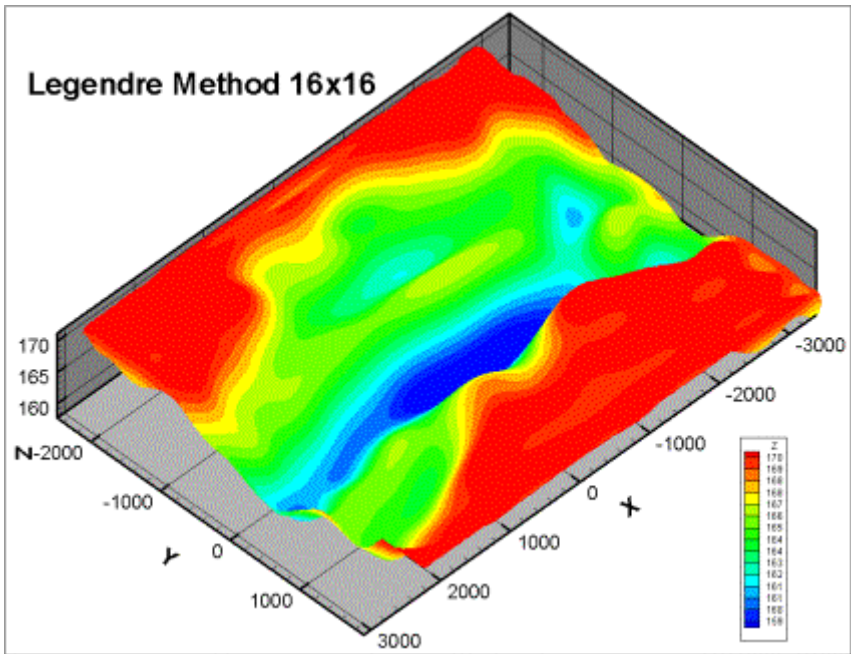
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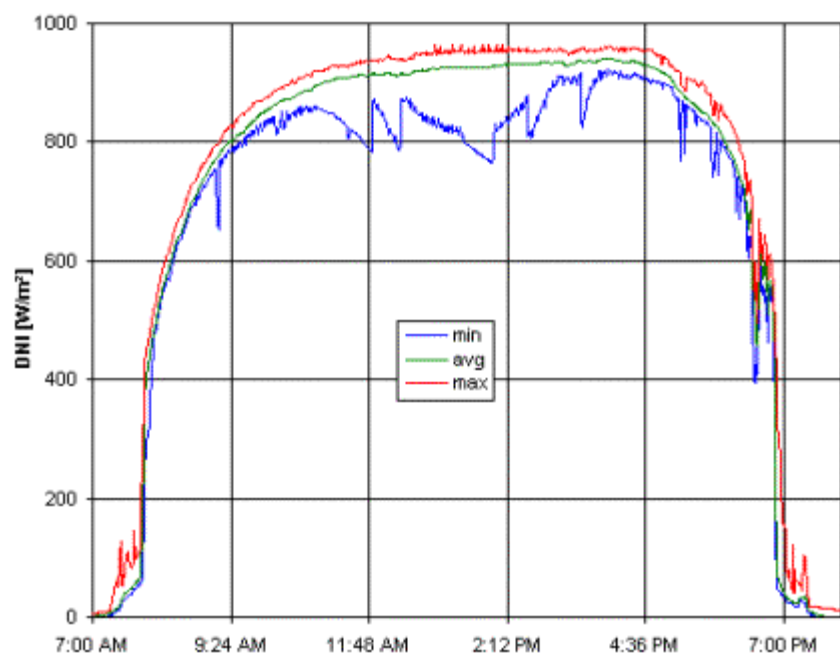
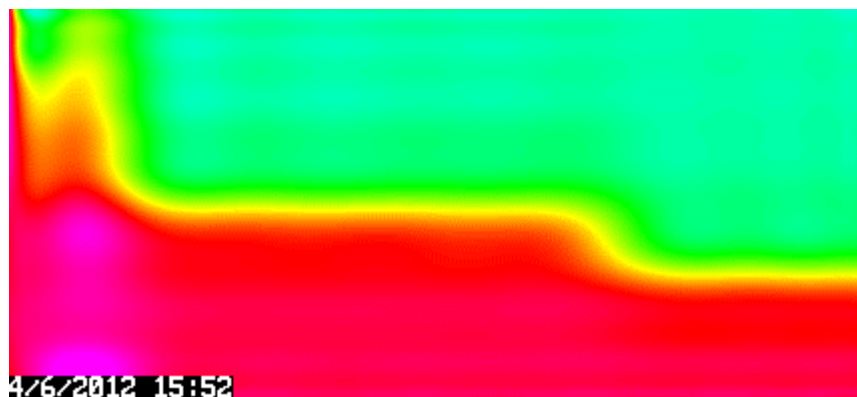


### Legendre Method 16x16

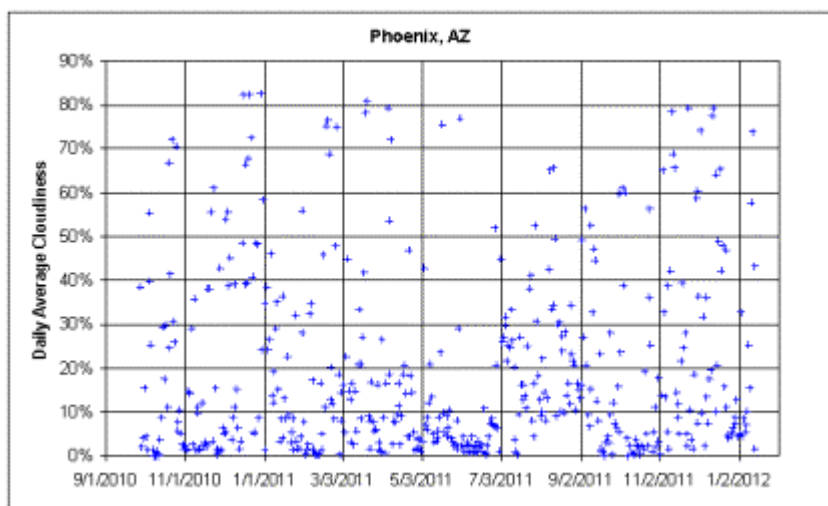
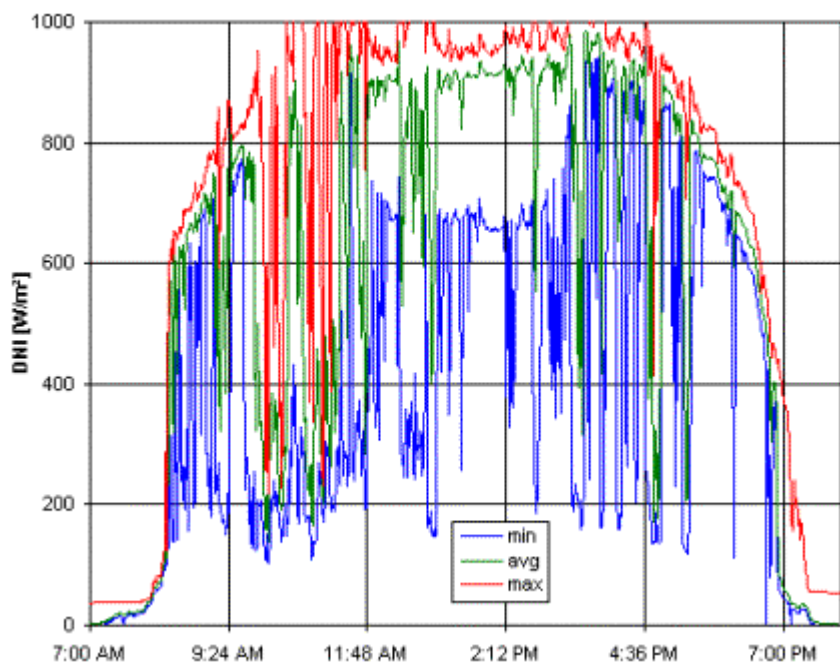


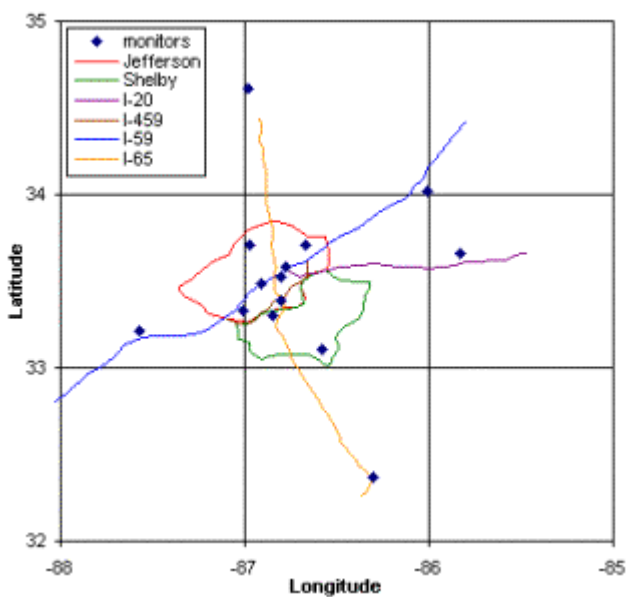
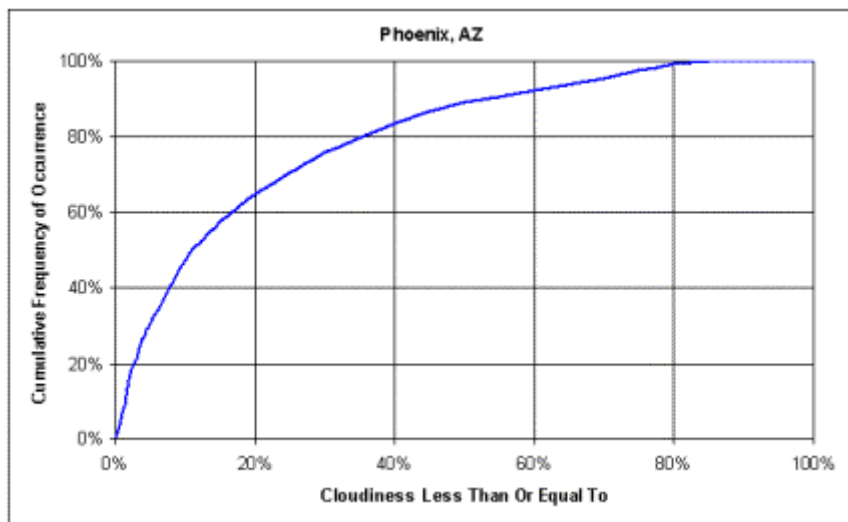




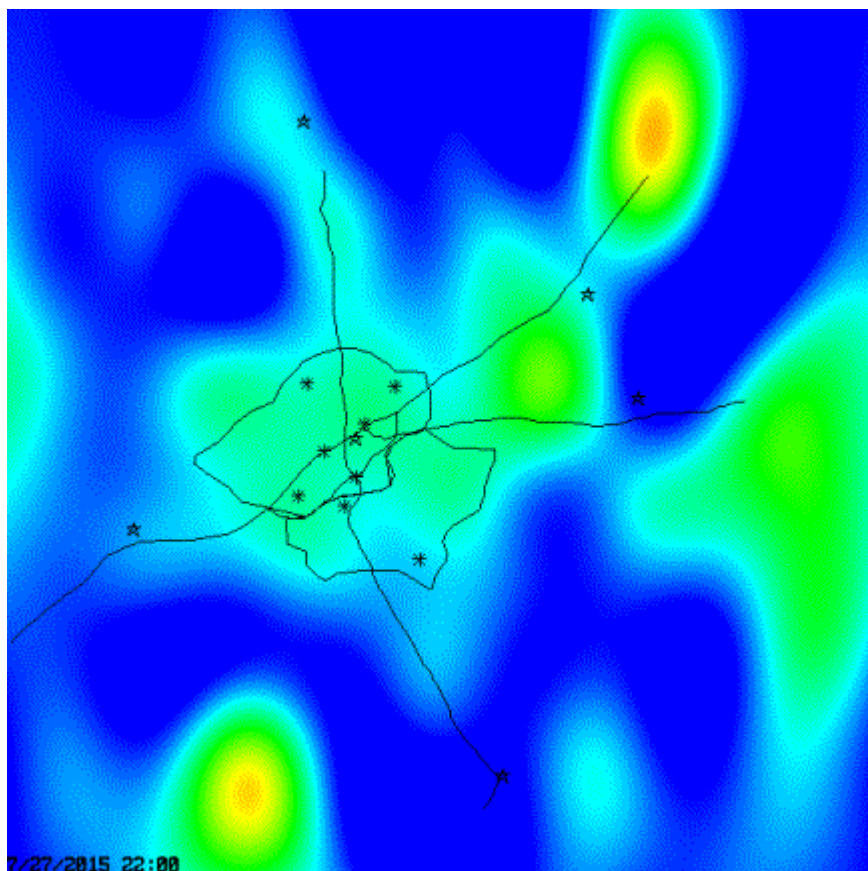


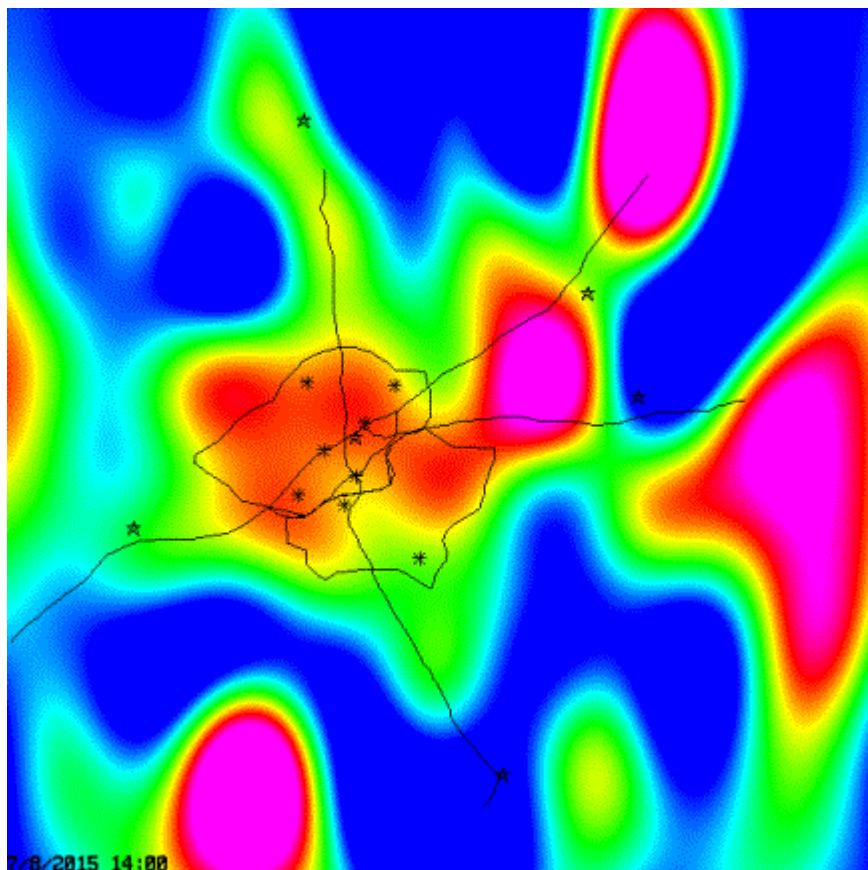


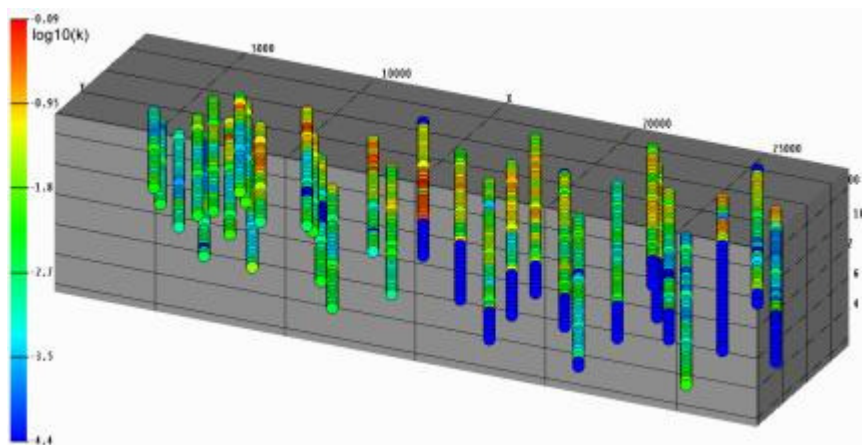
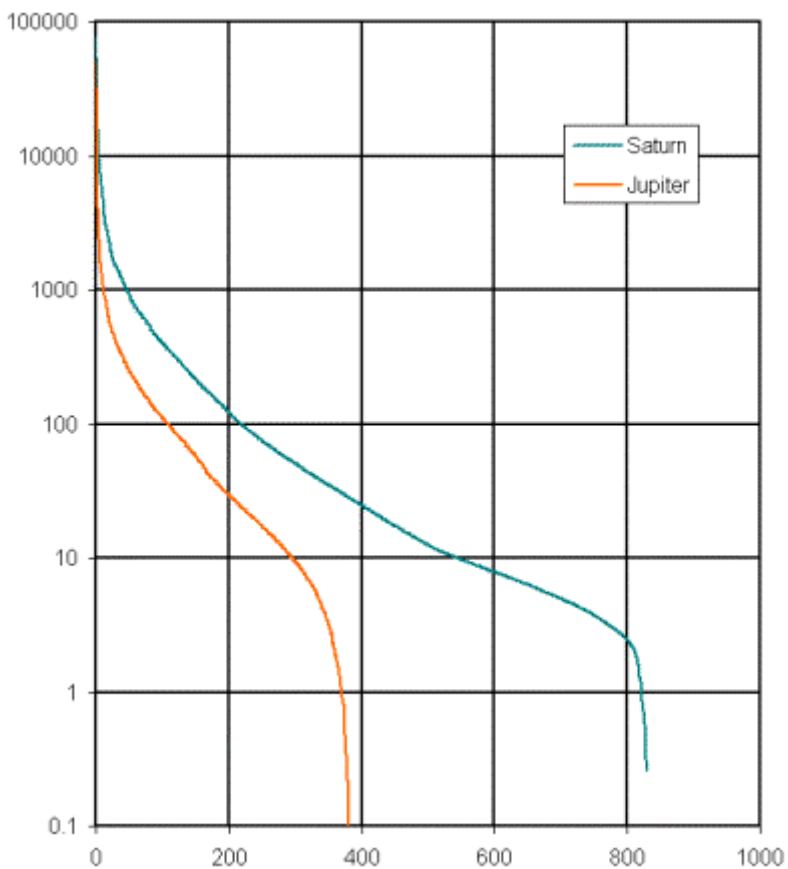


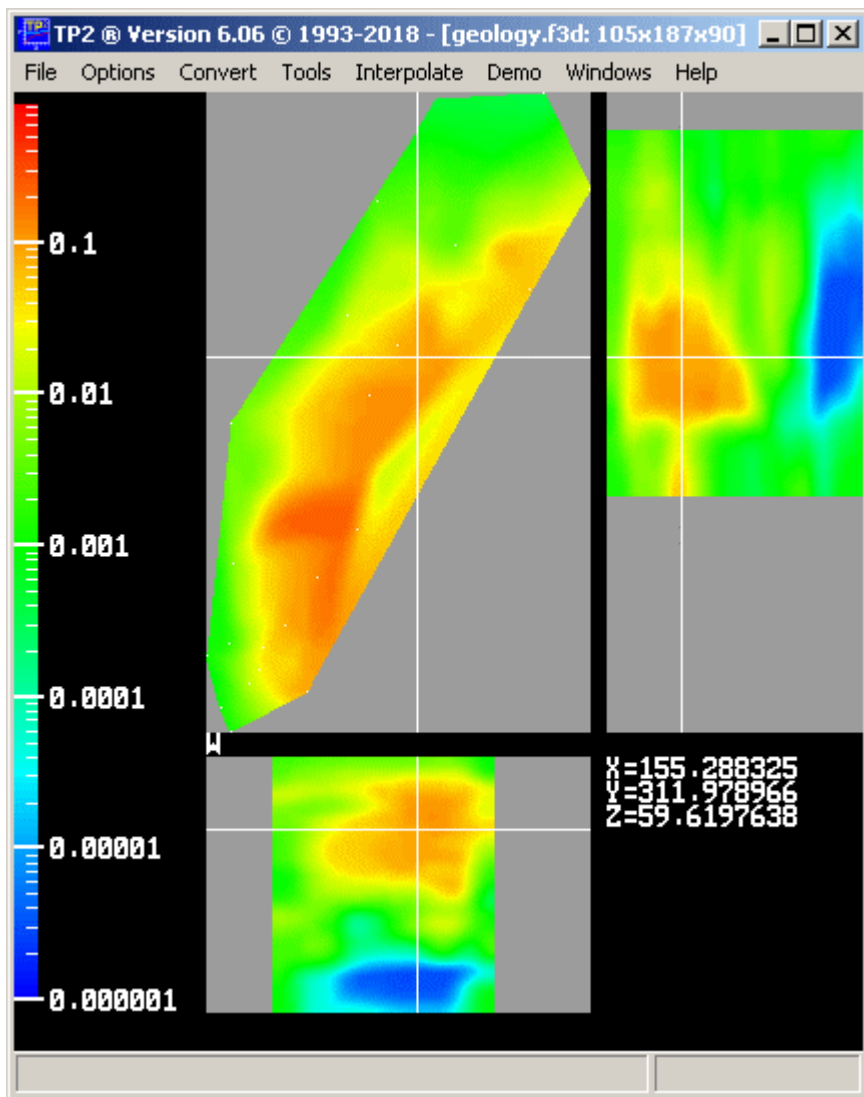




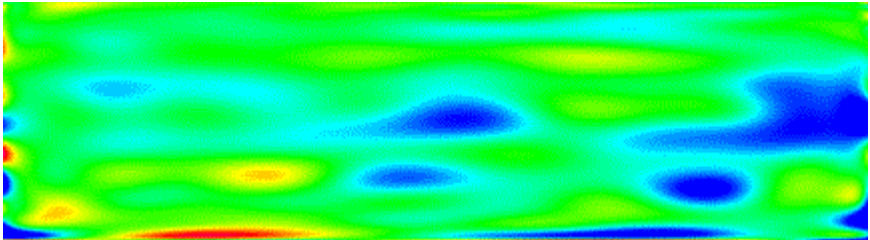
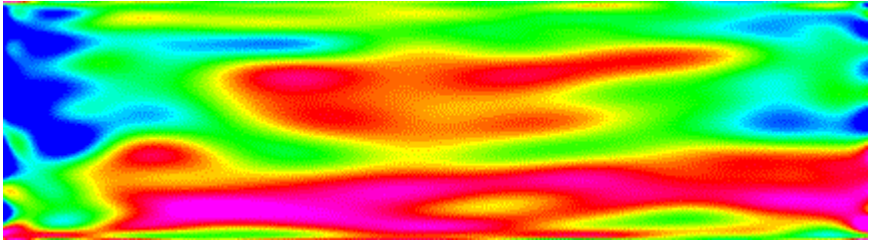




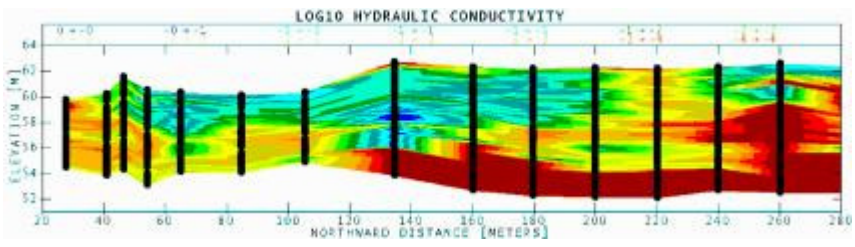




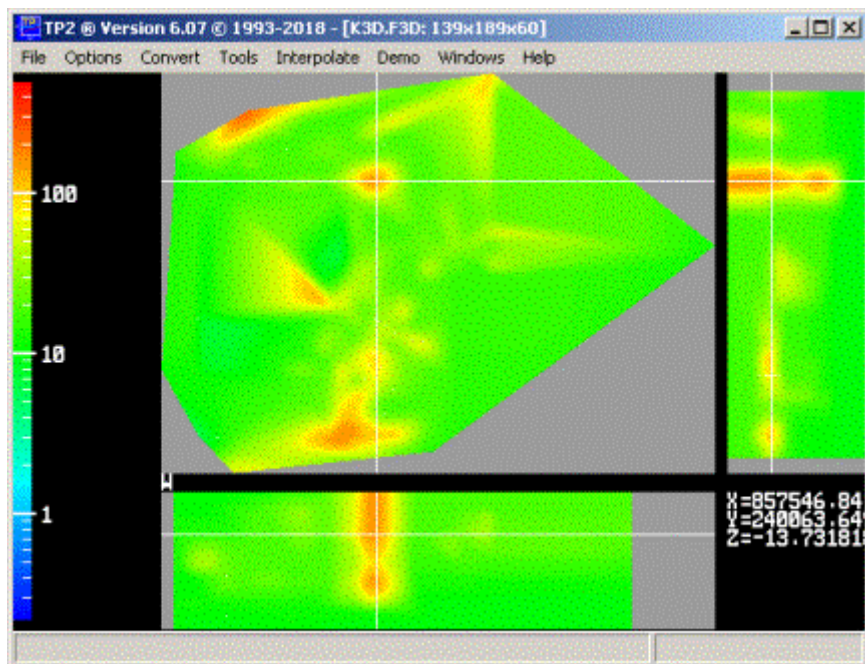
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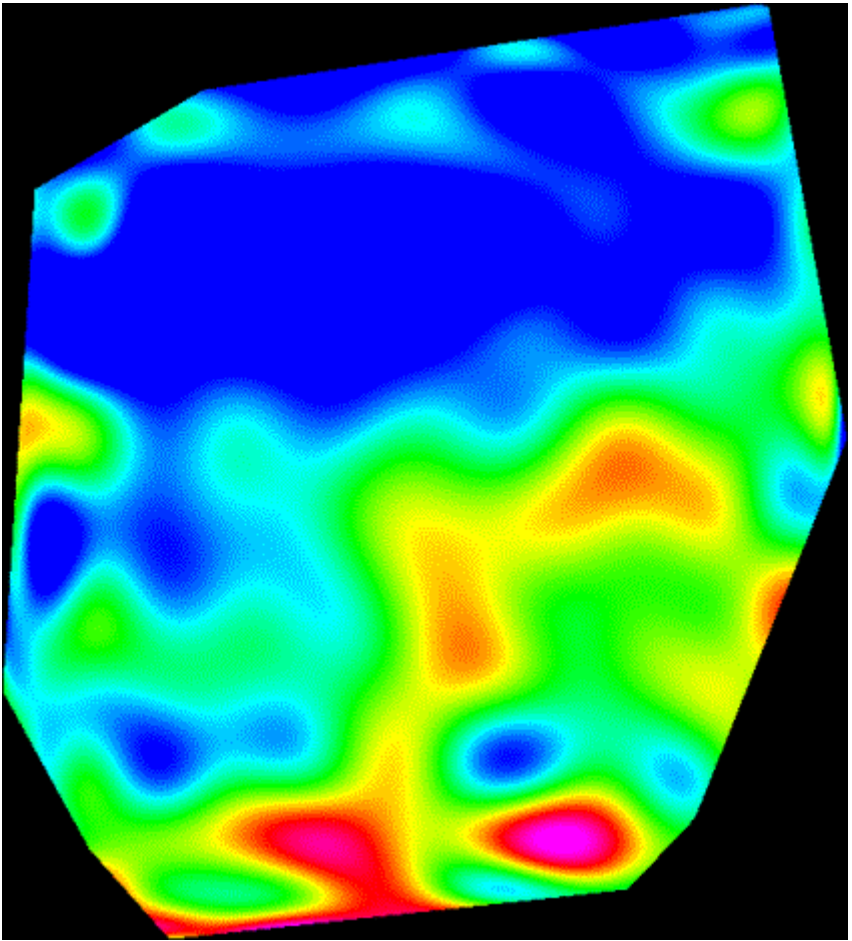


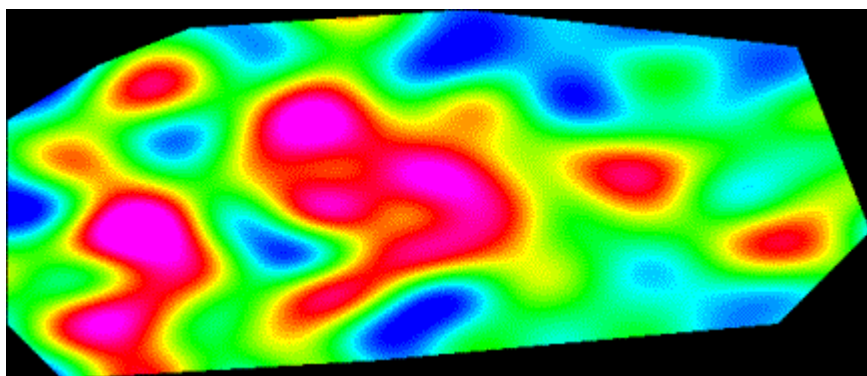
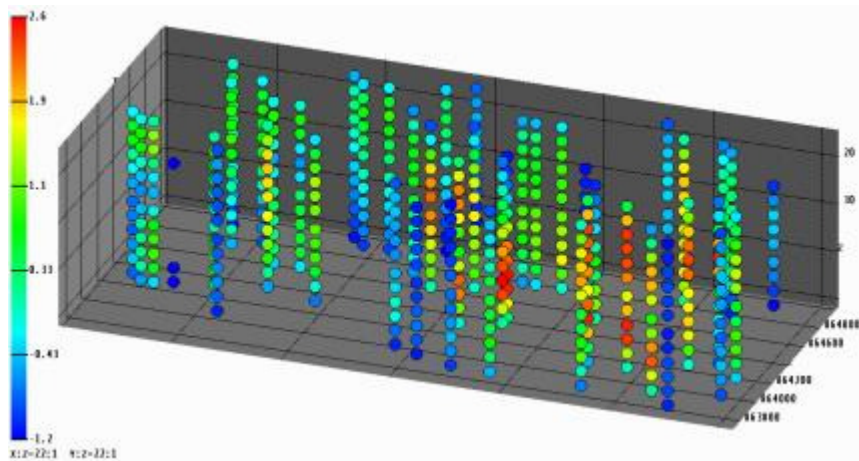
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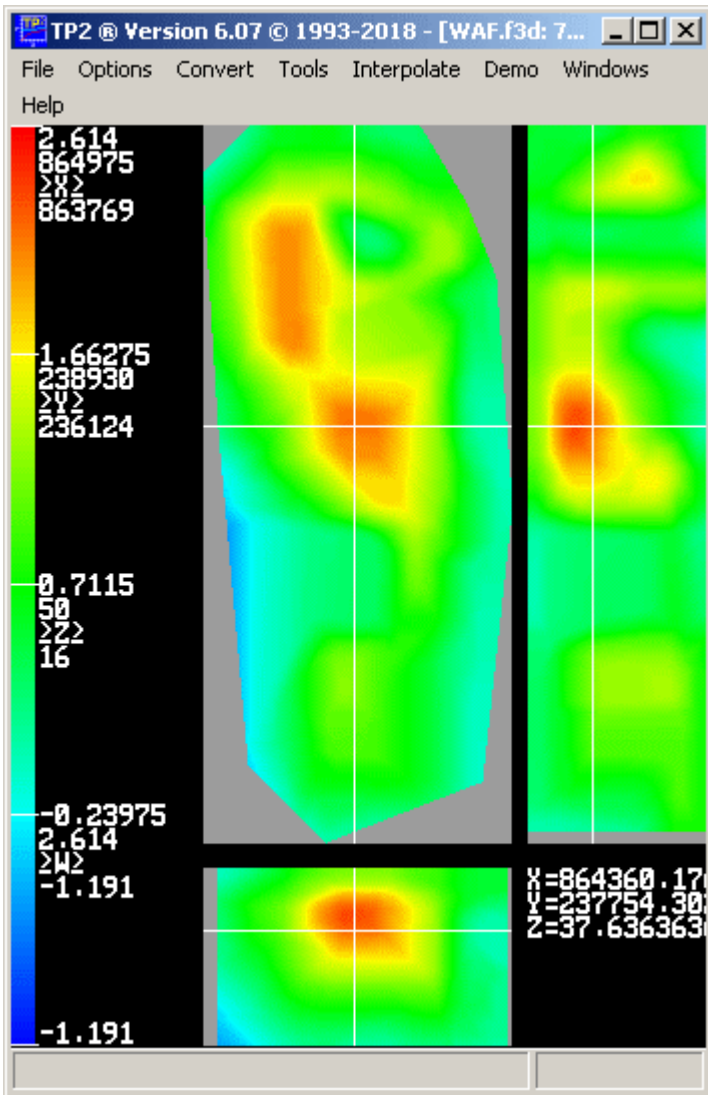




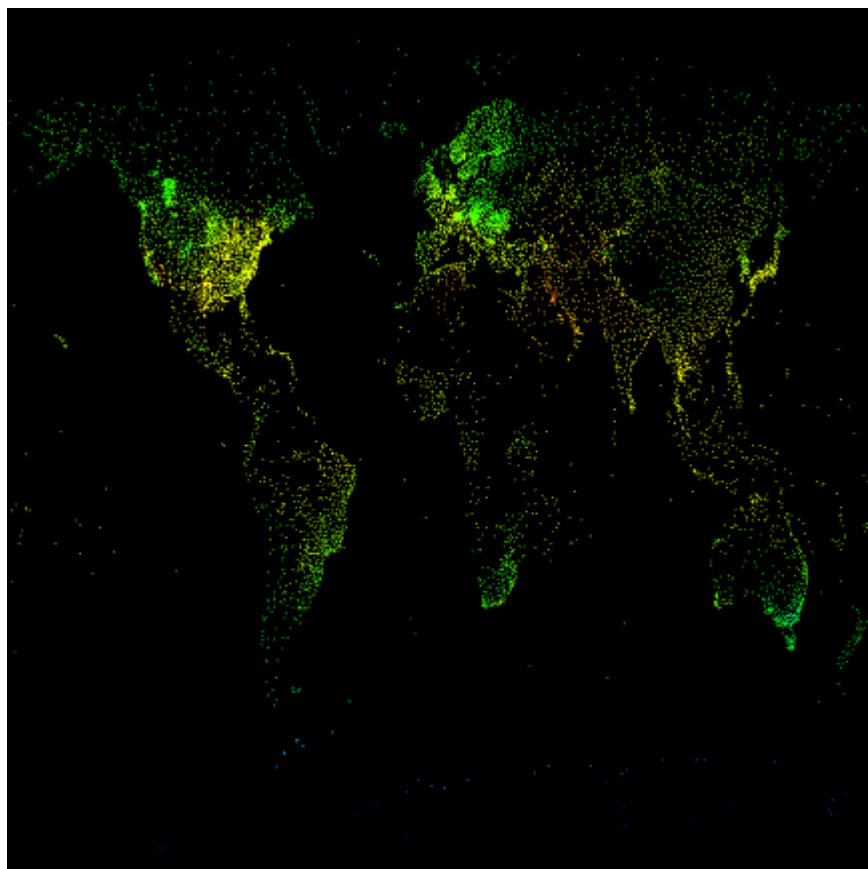
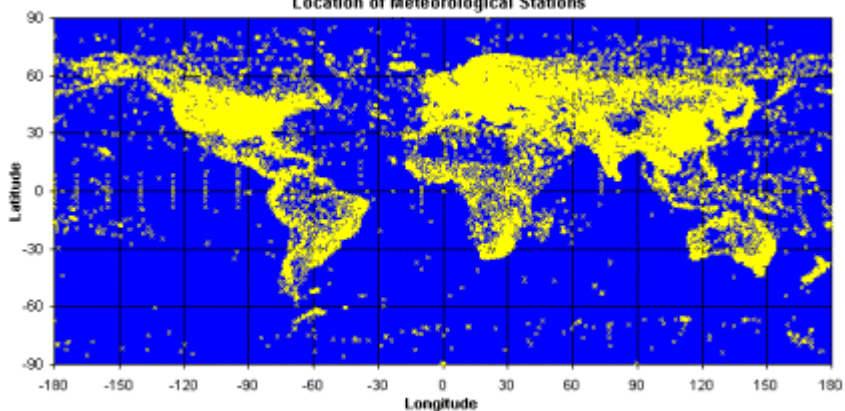


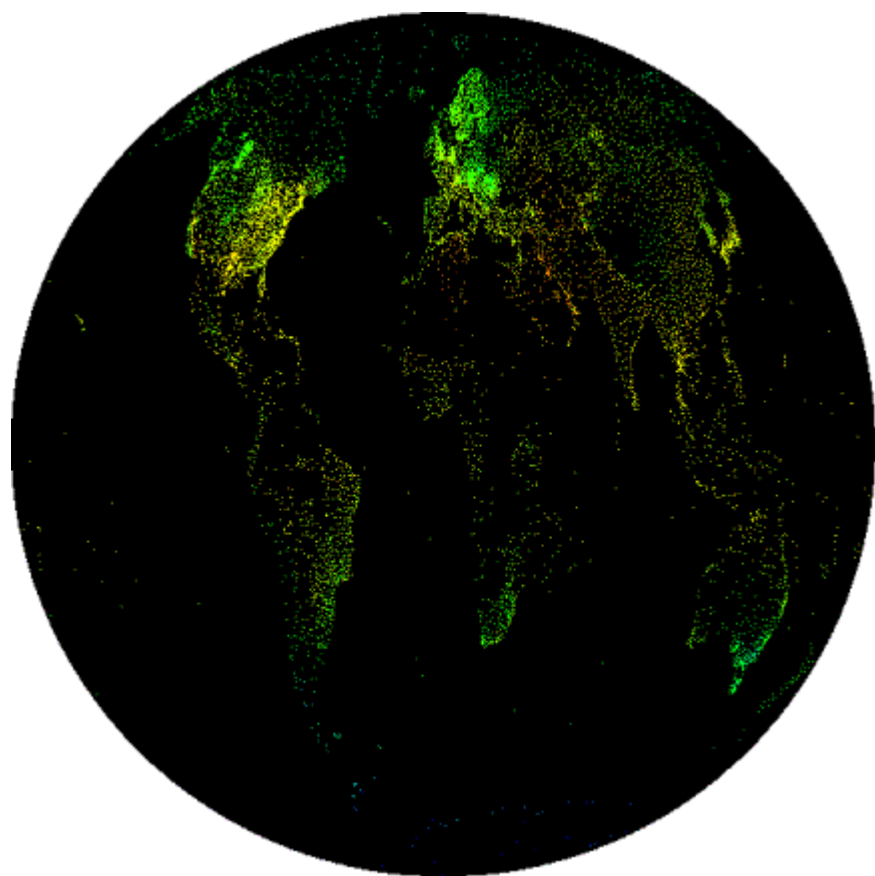


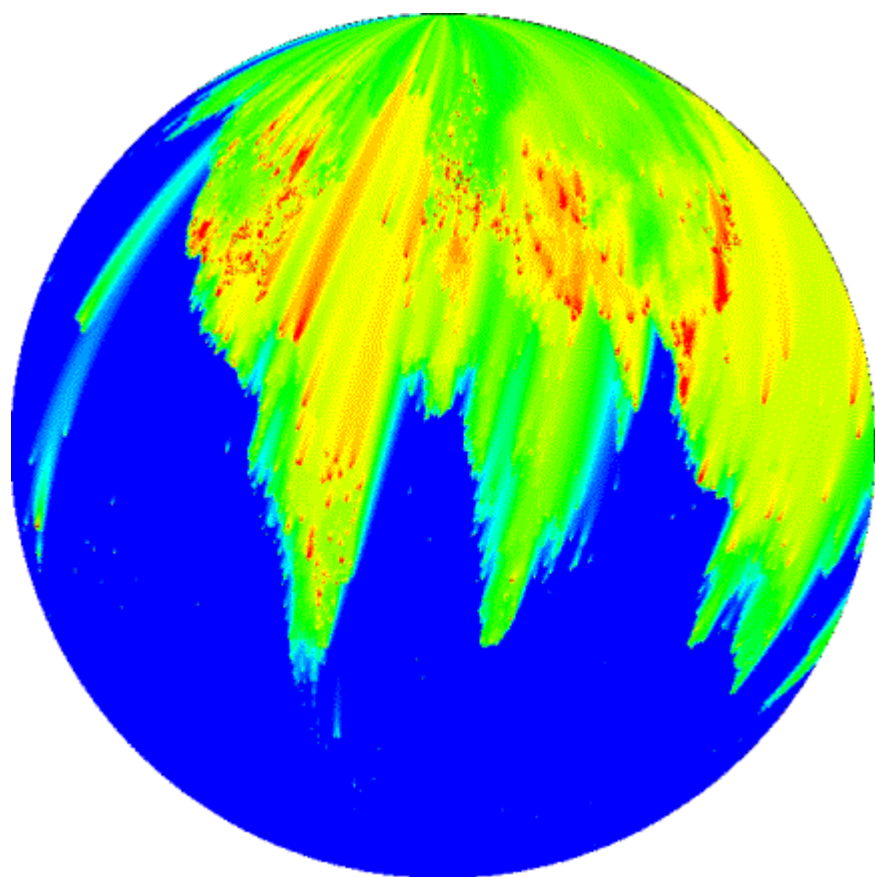


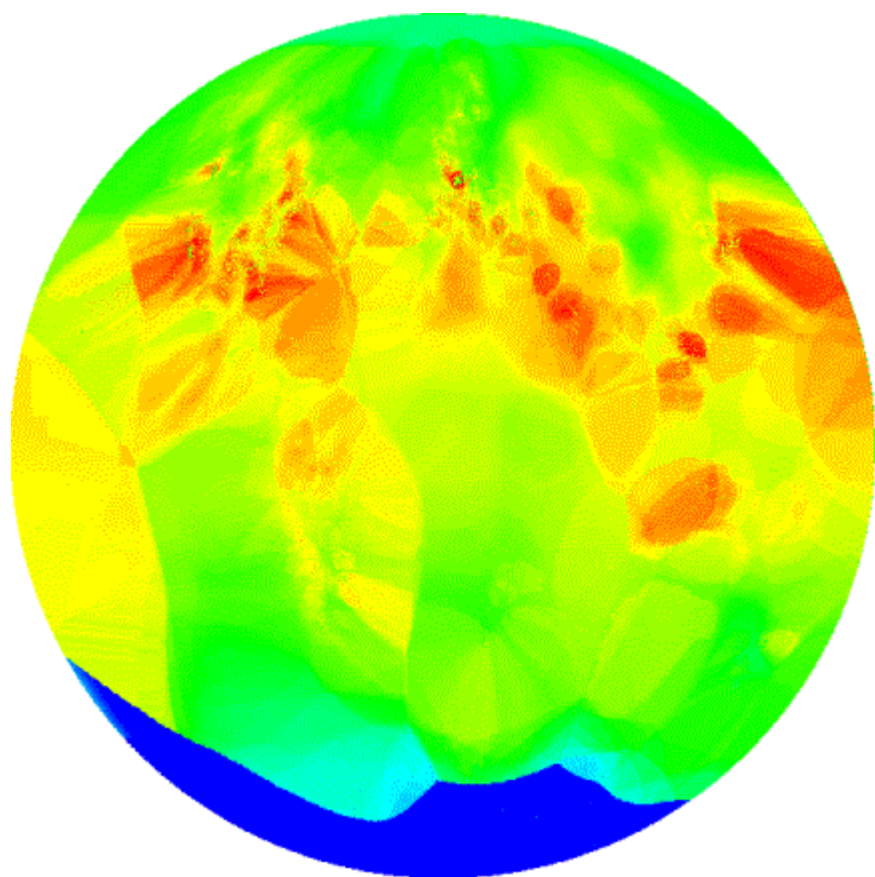


Location of Meteorological Stations

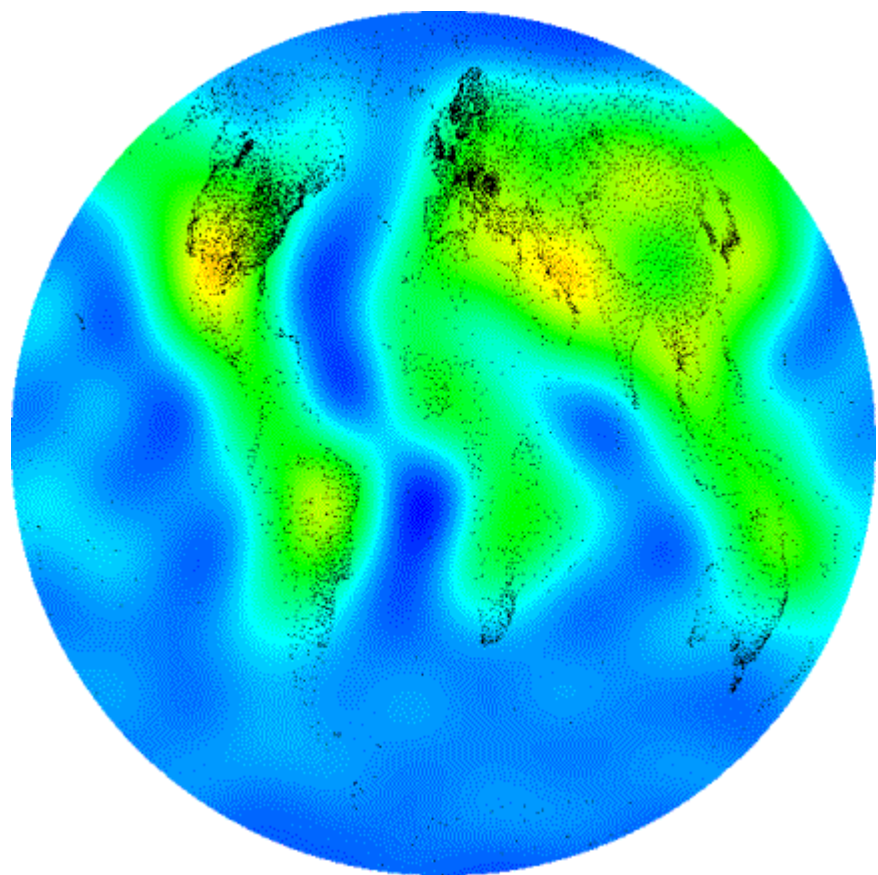


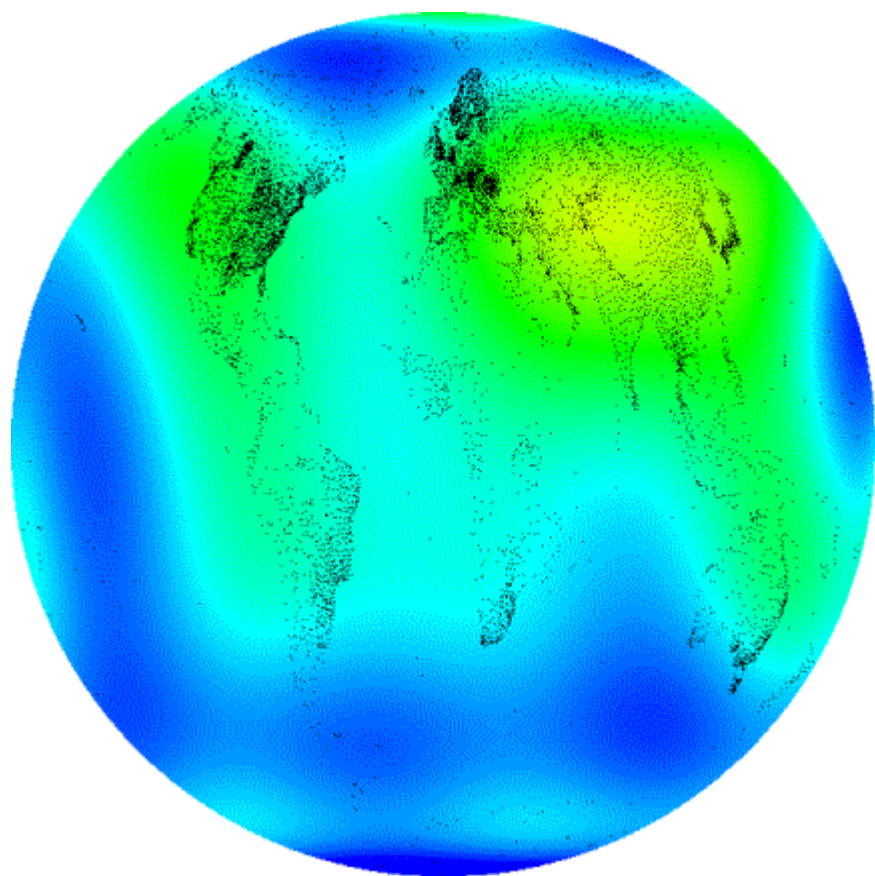


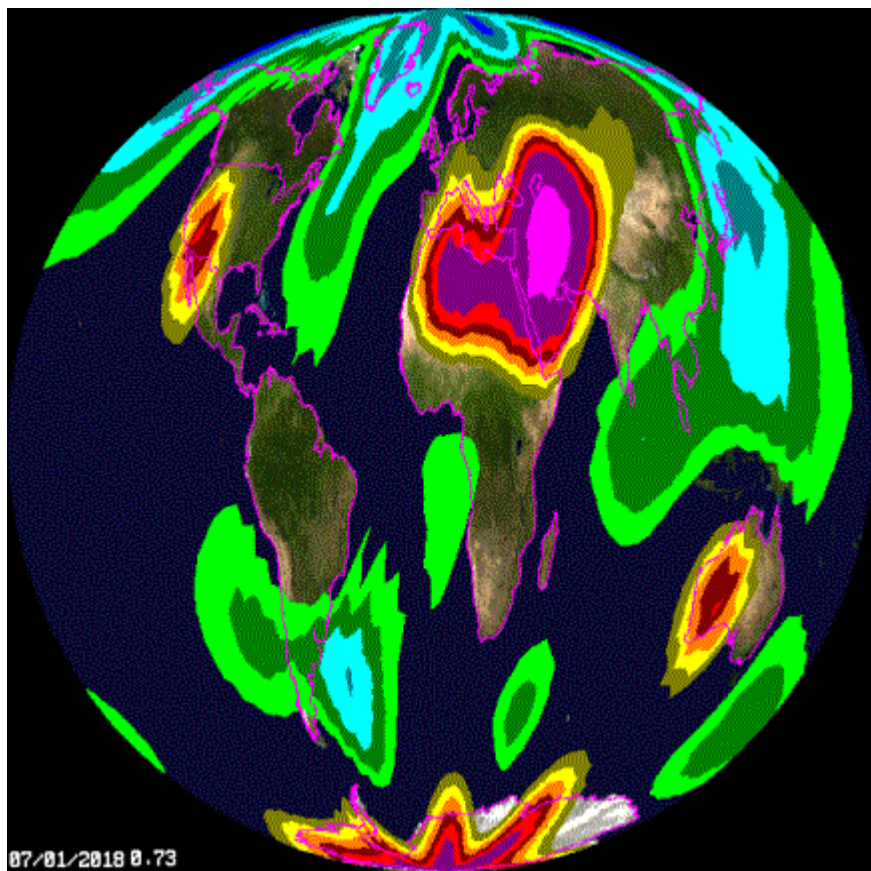


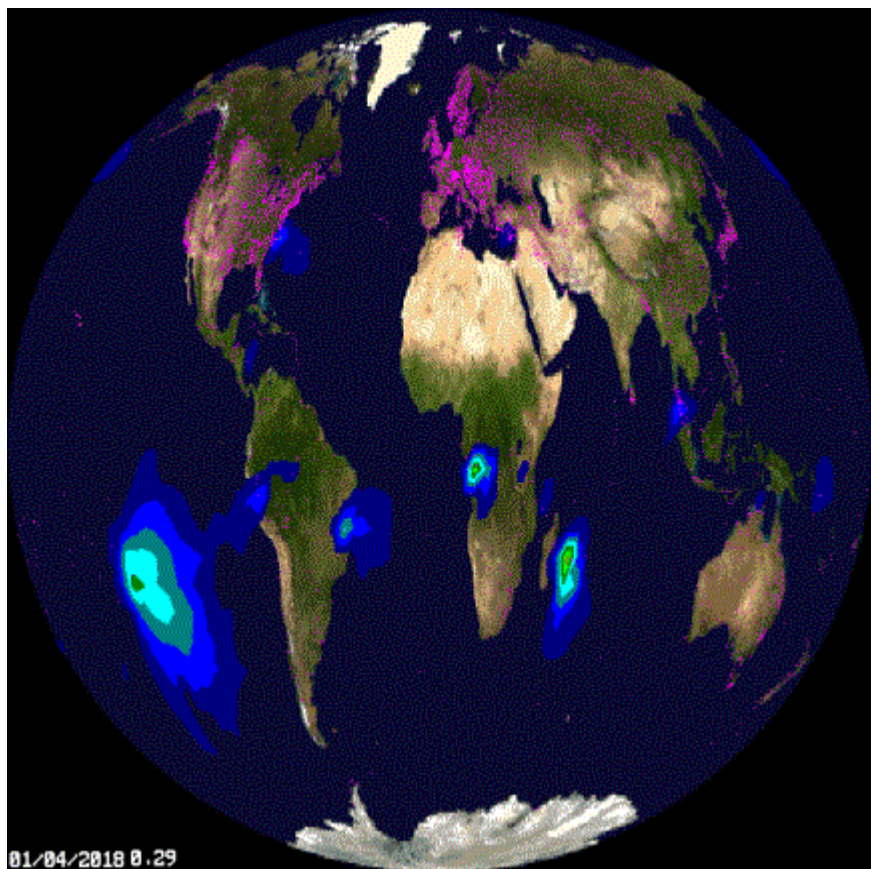












01/04/2016 0.29

