Supplementary material

Table S1. Summary of number of whole rock samples collected for each of the generalized units in Orange County.

Generalized unit	Number of samples	Sample IDs
Felsic lavas and tuffs	8	CH-04, CH-392, CH-1260*, CH-2311*, CD-15*, WX-304, WX-380, HL-3098*
Felsic plutonic	2	CH-418, CH-2488
Mafic lavas and tuffs	3	CH-374, HL-553*, HL-2294
Intermediate/mafic plutonic	3	CH-1069, CH-1196, CH-2207
Proterozoic meta-epiclastics	5	Epi-1, CH-367, CH-2093, CH-2266, CH-2267
Triassic sedimentary	5	Tr-1, Tr-2, Tr-3, CH-522, CH-523

Note: The sample ID corresponds to the quadrangle in which the samples were collected. CH=Chapel Hill quadrangle, CD=Caldwell quadrangle, HL-Hillsborough quadrangle, and WX=Whitecross quadrangle, and each of the samples was collected from a marked NCGS outcrop. Some of the sample IDs are named "Tr" or "Epi" because they were not located on the outcrop location map provided by the NCGS and were named after the generalized unit instead. Samples directly provided by Phil Bradley were CH-2311, HL-553, HL-3098, CH-1260, and CD-15, noted by astericks (*).

Table S2. Summary of number of wholerock samples previously analyzed by the NCGS and matched to the six generalized rock units in Orange County.

Generalized unit	Number of samples	Sample IDs
Felsic lavas and tuffs	15	WX-28, WX-216, WX-899, WX-976, WX-1067, WX-1080, WX-1136, WX-1137, WX-1138, WX-4104, WX-4267, HL-277, HL-914, HL-2554, HL-2943
Felsic plutonic	9	WX-4095, WX-4362, EF-306, EF-599, EF-730, EF-2044, EF-2531, DF-3, DF-4
Mafic lavas and tuffs	13	EF-140, EF-368, EF-2001, EF-2142, EF-2187, EF-2207, HL-328, HL-419, HL-1177, HL-2233, HL-2418, HL-2643, HL-2752
Intermediate/mafic plutonic	6	WX-552, WX-4155, WX-4440, WX-4441, CH-533, DF-1
Proterozoic meta-epiclastics	6	DF-2, WX-1142, WX-1143, WX-1144, WX-1145, HL-3060
Triassic sedimentary	0	

Table S3. Calculated concentrations of standards after dilution to make calibration curve used in the ICP-MS analysis.

Standard number	Arsenic (ppb)	Iron (ppb)
1	Blank (only 2% nitric acid)	Blank (only 2% nitric acid)
2	0.05463	4.174
3	0.5463	41.74
4	5.463	417.4
5	54.63	4174

Note: The different levels of dilution were done by taking 1 ml of the standard above it and diluting it 9 ml of 2% nitric acid. The initial volume was calculated out using a scale and was 0.4189 ml for the 997 ppm iron standard and 0.5466 ml for the 10 ppm arsenic standard.

Table S4. The known arsenic and iron concentration of the USGS SBC-1 reference sample in relation to the concentrations calculated in this study.

Reference sample	Known As concentration (ppm)	Known Fe concentration (ppm)	Calculated As concentration (ppm)	Calculated Fe concentration (ppm	Percent error As	Percent error Fe
SBC-1	27.87	54456	25.7	67912	8.4 %	19.8%

Table S5. Average arsenic concentrations in well water from each generalized rock grouping.

Group	Well counts per group	Average As (ppb)
Felsic lavas and tuffs	644	0.72
Felsic plutonic	243	0.28
Intermediate/mafic plutonic	96	0.76
Mafic lavas and tuffs	37	1.73
Neoproterozoic epiclastics	307	1.25
Triassic sedimentary	8	1.88

Table S6. Means of arsenic from each group with the p-value showing significance at the 95% confidence interval.

	Average As (<500 m)	Average As (>500 m)	p-value
As (ppb)	0.69	0.88	9.487e-05 < 0.05=different

Table S7. Means for each variable tested in each group and p-value from Mann-Whitney-Wilcoxon test.

	Mean value for detect samples	Mean value for non-detect samples	P-value
pH	7.4	6.9	2.2e-16 < 0.05=difference
Alkalinity	139	88	2.2e-16 < 0.05=difference
Mg (mg/L)	7.1	5.1	5.2e-06 < 0.05=difference
Ca (mg/L)	39.5	19.6	2.2e-16 < 0.05=difference
Fl (mg/L)	0.09	0.05	2.62e-05 < 0.05=difference
Hardness	128	70.3	2.2e-16 < 0.05=difference

Arsenic distribution
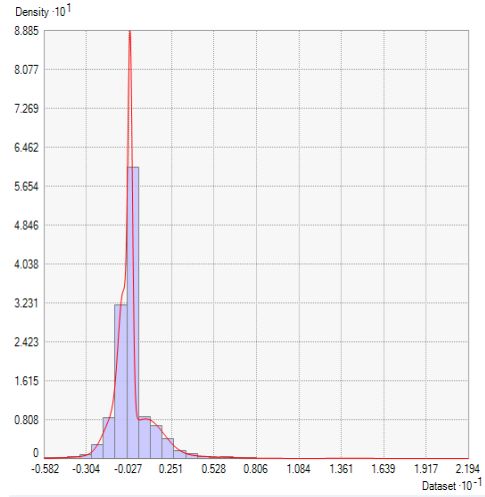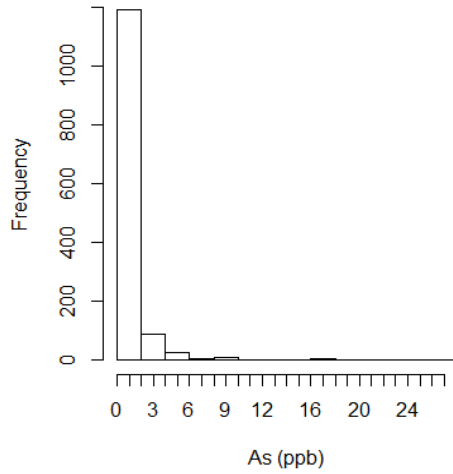
Figure S1A. Original distribution of As data

Figure S1B. Transformed data using normal score transformation
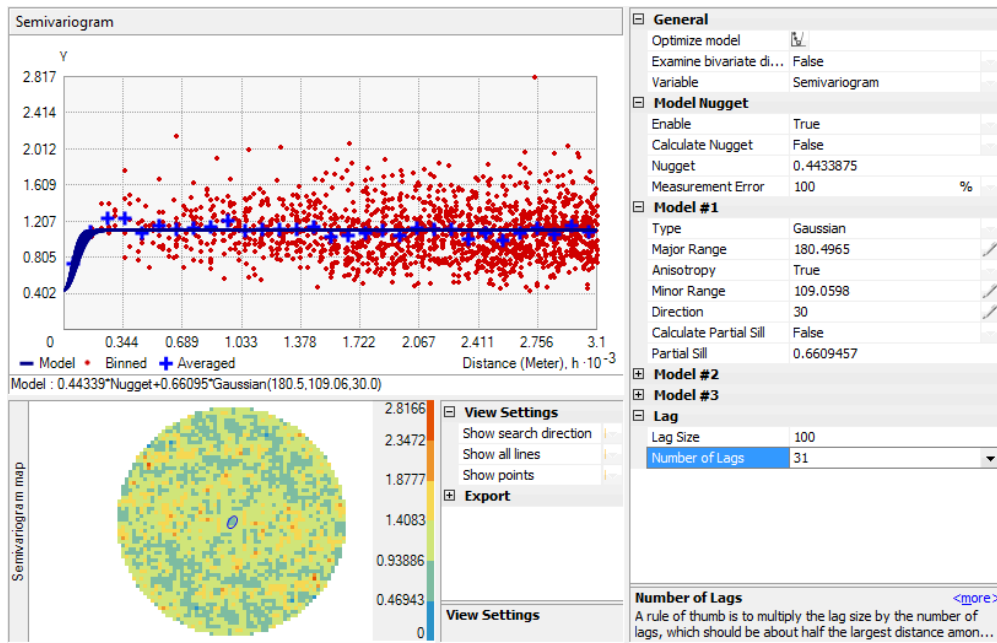
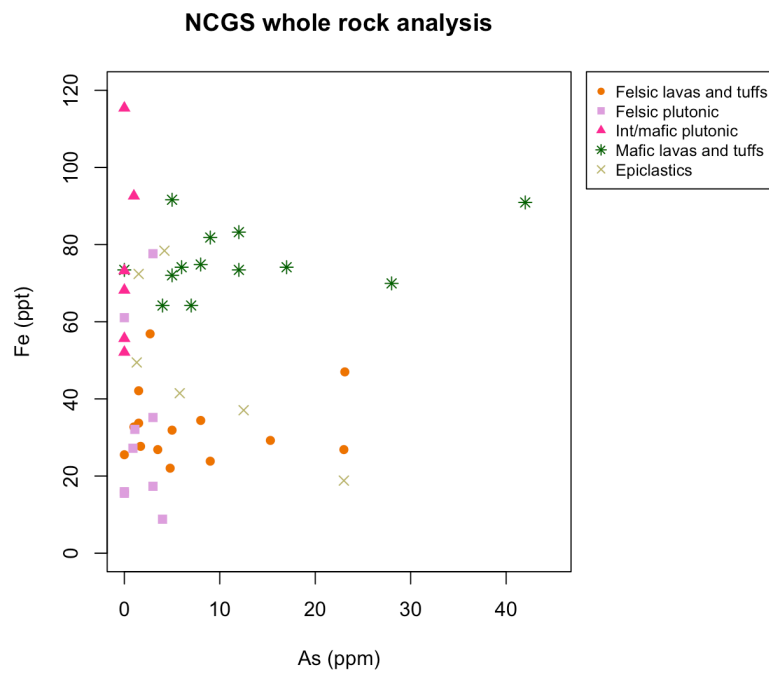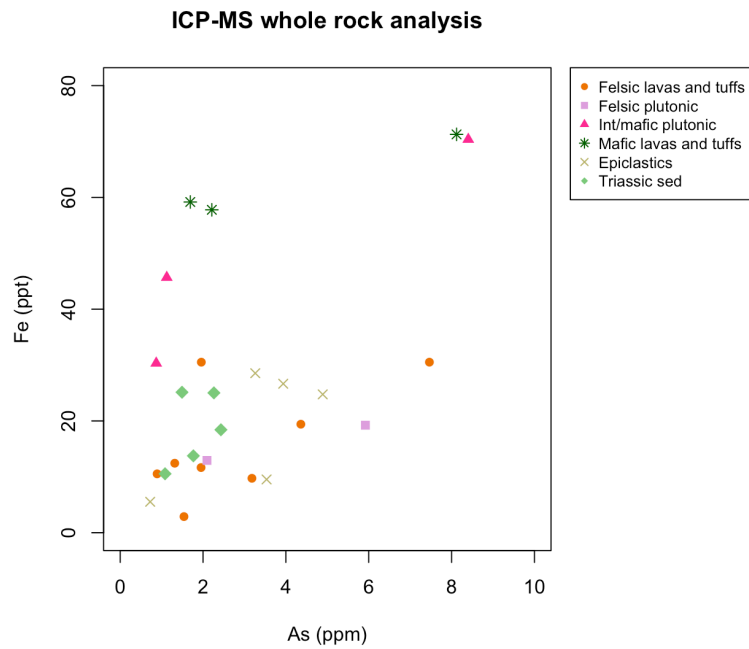Figure S1C. Simple kriging modeling parameters.

ICP-MS whole rock analysis

NCGS whole rock analysis

Figure S2. Scatterplot showing arsenic concentrations in parts per million (ppm) and iron concentrations in parts per thousand (ppt) in A. each whole rock sample analyzed in this study; B. the NCGS whole rock analyses.
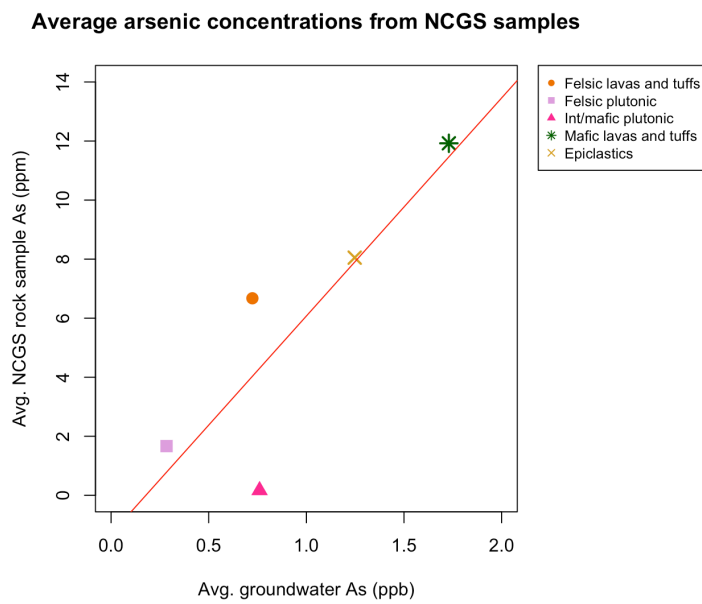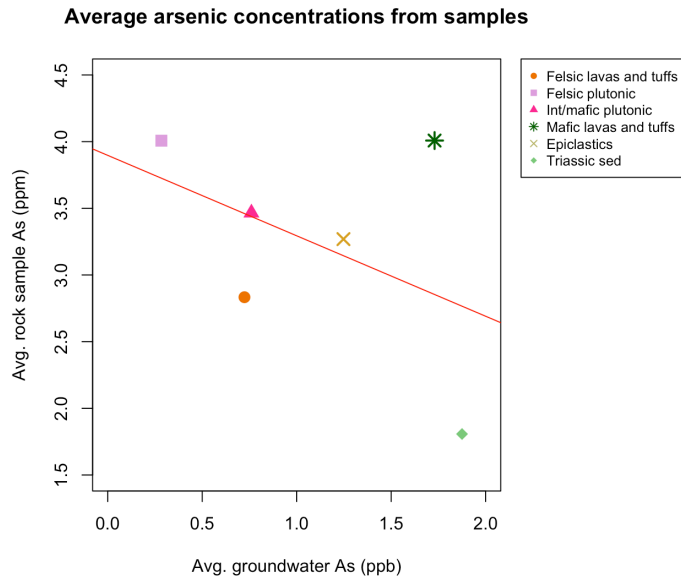
Average arsenic concentrations from samples

Average arsenic concentrations from NCGS samples

Figure S3.A. Average arsenic concentrations in water and rock, showing a weak, negative relationship with r^2=0.205; B. Average arsenic in groundwater and NCGS rock analysis, showing a strong, positive correlation with r^2=0.73.
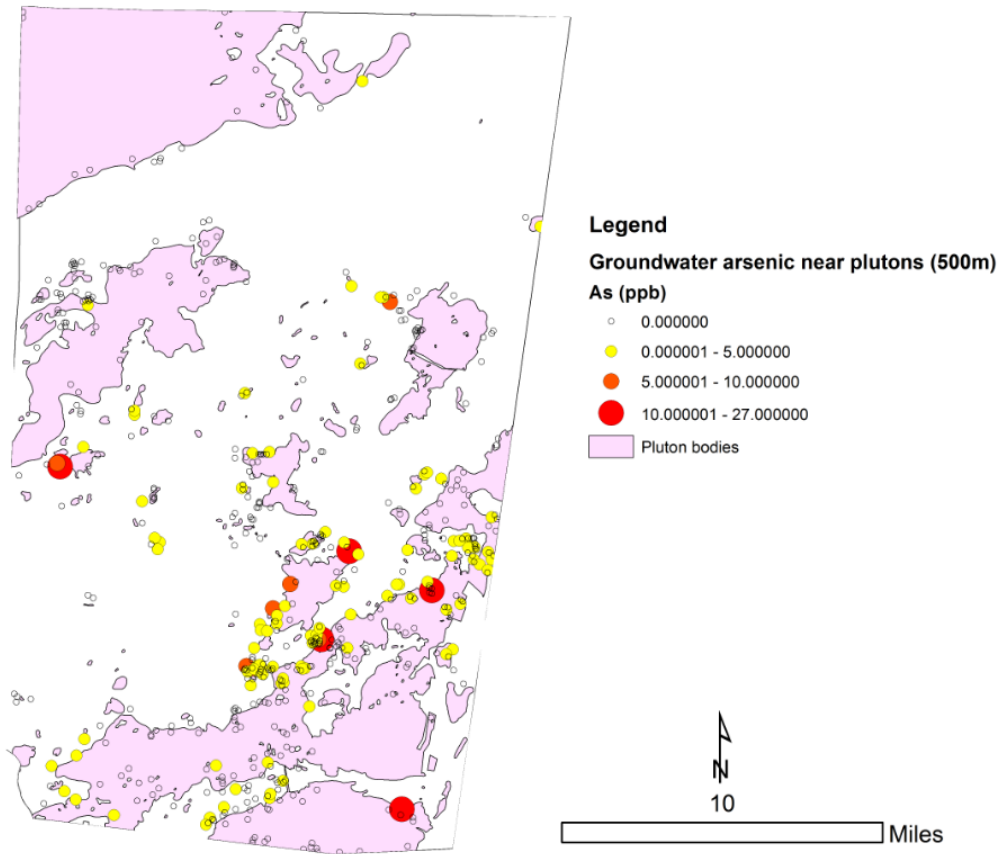
Figure S4. Map of Orange Counties with only the pluton bodies and proximal (within 500 m) well sample points shown.
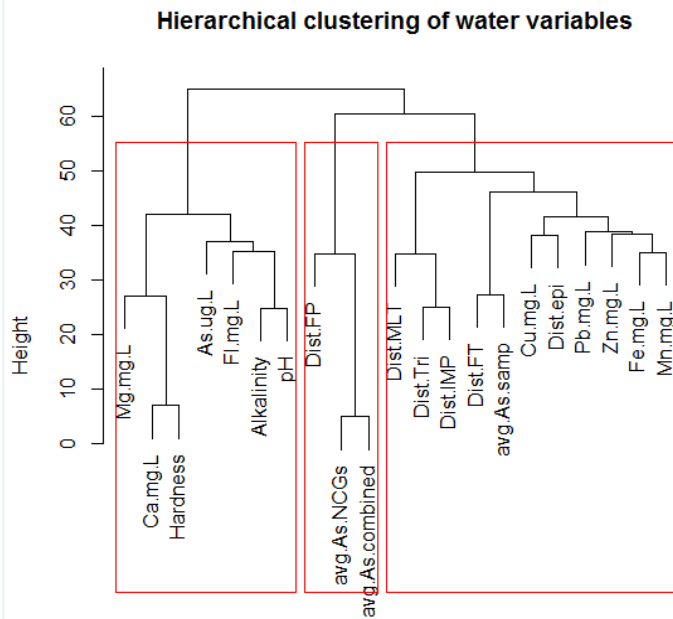
Figure S5. Hierarchical clustering dendrogram showing closely related variables in three groups that are boxed in red.
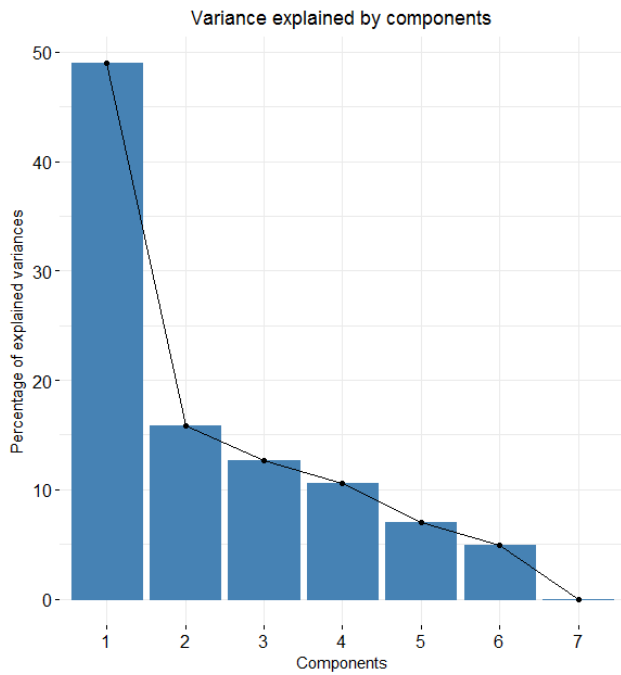
Figure S6. Histogram showing the percentage of variance in the dataset explained by each principal component. The first two components explain 64.8% of the variance.