

GET

FILE='C:\Users\Ezekiel\Documents\Environmental Earth Science\september.sav'.

DATASET NAME DataSet0 WINDOW=FRONT.

CORRELATIONS

/VARIABLES=pH EC TDS NaCl HCO3 CI Mg Ca Na K S04

/PRINT=TWOTAIL NOSIG

/MISSING=PAIRWISE.

## Correlations

### Notes

|                        |                                |                                                                                                                   |
|------------------------|--------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Output Created         |                                | 13-Apr-2017 03:42:45                                                                                              |
| Comments               |                                |                                                                                                                   |
| Input                  | Data                           | C:<br>\Users\Ezekiel\Documents\Environmental Earth Science\september.sav                                          |
|                        | Active Dataset                 | DataSet1                                                                                                          |
|                        | Filter                         | <none>                                                                                                            |
|                        | Weight                         | <none>                                                                                                            |
|                        | Split File                     | <none>                                                                                                            |
|                        | N of Rows in Working Data File | 15                                                                                                                |
| Missing Value Handling | Definition of Missing          | User-defined missing values are treated as missing.                                                               |
|                        | Cases Used                     | Statistics for each pair of variables are based on all the cases with valid data for that pair.                   |
| Syntax                 |                                | CORRELATIONS<br>/VARIABLES=pH EC TDS NaCl<br>HCO3 CI Mg Ca Na K S04<br>/PRINT=TWOTAIL NOSIG<br>/MISSING=PAIRWISE. |
| Resources              | Processor Time                 | 00:00:00.062                                                                                                      |
|                        | Elapsed Time                   | 00:00:00.028                                                                                                      |

[DataSet1] C:\Users\Ezekiel\Documents\Environmental Earth Science\september.sav

### Correlations

|    |                     | pH    | EC    | TDS     | NaCl    | HCO3  | Cl     | Mg     | Ca     |
|----|---------------------|-------|-------|---------|---------|-------|--------|--------|--------|
| pH | Pearson Correlation | 1     | -.008 | -.013   | .000    | -.223 | .114   | -.235  | -.307  |
|    | Sig. (2-tailed)     |       | .978  | .963    | 1.000   | .424  | .685   | .399   | .266   |
|    | N                   | 15    | 15    | 15      | 15      | 15    | 15     | 15     | 15     |
| EC | Pearson Correlation | -.008 | 1     | 1.000** | 1.000** | -.270 | .798** | .699** | -.560* |
|    | Sig. (2-tailed)     | .978  |       | .000    | .000    | .330  | .000   | .004   | .030   |
|    | N                   | 15    | 15    | 15      | 15      | 15    | 15     | 15     | 15     |

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

### Correlations

|    |                     | Na     | K      | S04    |
|----|---------------------|--------|--------|--------|
| pH | Pearson Correlation | .054   | .178   | -.092  |
|    | Sig. (2-tailed)     | .848   | .525   | .746   |
|    | N                   | 15     | 15     | 15     |
| EC | Pearson Correlation | .905** | .812** | .838** |
|    | Sig. (2-tailed)     | .000   | .000   | .000   |
|    | N                   | 15     | 15     | 15     |

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

### Correlations

|      |                     | pH    | EC      | TDS    | Nacl   | HCO3  | Cl     | Mg     | Ca     |
|------|---------------------|-------|---------|--------|--------|-------|--------|--------|--------|
| TDS  | Pearson Correlation | -.013 | 1.000** | 1      | .999** | -.268 | .790** | .707** | -.563* |
|      | Sig. (2-tailed)     | .963  | .000    |        | .000   | .334  | .000   | .003   | .029   |
|      | N                   | 15    | 15      | 15     | 15     | 15    | 15     | 15     | 15     |
| Nacl | Pearson Correlation | .000  | 1.000** | .999** | 1      | -.274 | .807** | .687** | -.560* |
|      | Sig. (2-tailed)     | 1.000 | .000    | .000   |        | .323  | .000   | .005   | .030   |
|      | N                   | 15    | 15      | 15     | 15     | 15    | 15     | 15     | 15     |
| HCO3 | Pearson Correlation | -.223 | -.270   | -.268  | -.274  | 1     | -.413  | .099   | .071   |
|      | Sig. (2-tailed)     | .424  | .330    | .334   | .323   |       | .126   | .726   | .802   |
|      | N                   | 15    | 15      | 15     | 15     | 15    | 15     | 15     | 15     |
| Cl   | Pearson Correlation | .114  | .798**  | .790** | .807** | -.413 | 1      | .426   | -.311  |
|      | Sig. (2-tailed)     | .685  | .000    | .000   | .000   | .126  |        | .114   | .258   |
|      | N                   | 15    | 15      | 15     | 15     | 15    | 15     | 15     | 15     |
| Mg   | Pearson Correlation | -.235 | .699**  | .707** | .687** | .099  | .426   | 1      | -.338  |
|      | Sig. (2-tailed)     | .399  | .004    | .003   | .005   | .726  | .114   |        | .218   |
|      | N                   | 15    | 15      | 15     | 15     | 15    | 15     | 15     | 15     |
| Ca   | Pearson Correlation | -.307 | -.560*  | -.563* | -.560* | .071  | -.311  | -.338  | 1      |
|      | Sig. (2-tailed)     | .266  | .030    | .029   | .030   | .802  | .258   | .218   |        |
|      | N                   | 15    | 15      | 15     | 15     | 15    | 15     | 15     | 15     |
| Na   | Pearson Correlation | .054  | .905**  | .905** | .903** | -.263 | .791** | .670** | -.578* |
|      | Sig. (2-tailed)     | .848  | .000    | .000   | .000   | .344  | .000   | .006   | .024   |
|      | N                   | 15    | 15      | 15     | 15     | 15    | 15     | 15     | 15     |
| K    | Pearson Correlation | .178  | .812**  | .805** | .818** | -.459 | .963** | .415   | -.485  |
|      | Sig. (2-tailed)     | .525  | .000    | .000   | .000   | .085  | .000   | .124   | .067   |
|      | N                   | 15    | 15      | 15     | 15     | 15    | 15     | 15     | 15     |
| S04  | Pearson Correlation | -.092 | .838**  | .844** | .833** | .010  | .425   | .697** | -.552* |
|      | Sig. (2-tailed)     | .746  | .000    | .000   | .000   | .973  | .114   | .004   | .033   |
|      | N                   | 15    | 15      | 15     | 15     | 15    | 15     | 15     | 15     |

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

### Correlations

|      |                     | Na     | K      | S04    |
|------|---------------------|--------|--------|--------|
| TDS  | Pearson Correlation | .905** | .805** | .844** |
|      | Sig. (2-tailed)     | .000   | .000   | .000   |
|      | N                   | 15     | 15     | 15     |
| NaCl | Pearson Correlation | .903** | .818** | .833** |
|      | Sig. (2-tailed)     | .000   | .000   | .000   |
|      | N                   | 15     | 15     | 15     |
| HCO3 | Pearson Correlation | -.263  | -.459  | .010   |
|      | Sig. (2-tailed)     | .344   | .085   | .973   |
|      | N                   | 15     | 15     | 15     |
| Cl   | Pearson Correlation | .791** | .963** | .425   |
|      | Sig. (2-tailed)     | .000   | .000   | .114   |
|      | N                   | 15     | 15     | 15     |
| Mg   | Pearson Correlation | .670** | .415   | .697** |
|      | Sig. (2-tailed)     | .006   | .124   | .004   |
|      | N                   | 15     | 15     | 15     |
| Ca   | Pearson Correlation | -.578* | -.485  | -.552* |
|      | Sig. (2-tailed)     | .024   | .067   | .033   |
|      | N                   | 15     | 15     | 15     |
| Na   | Pearson Correlation | 1      | .871** | .729** |
|      | Sig. (2-tailed)     |        | .000   | .002   |
|      | N                   | 15     | 15     | 15     |
| K    | Pearson Correlation | .871** | 1      | .461   |
|      | Sig. (2-tailed)     | .000   |        | .084   |
|      | N                   | 15     | 15     | 15     |
| S04  | Pearson Correlation | .729** | .461   | 1      |
|      | Sig. (2-tailed)     | .002   | .084   |        |
|      | N                   | 15     | 15     | 15     |

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

### FACTOR

```

/VARIABLES pH EC TDS NaCl HCO3 Cl Mg Ca Na K S04
/MISSING LISTWISE
/ANALYSIS pH EC TDS NaCl HCO3 Cl Mg Ca Na K S04
/PRINT UNIVARIATE INITIAL KMO EXTRACTION ROTATION
/PLOT EIGEN
/CRITERIA MINEIGEN(1) ITERATE(25)
/EXTRACTION PC
/CRITERIA ITERATE(25)
/ROTATION VARIMAX
/METHOD=CORRELATION.

```

- - - - - F A C T O R   A N A L Y S I S - - - - -

## Factor Analysis

### Notes

|                        |                                |                                                                                                                                                                                                                                                                                                                                         |
|------------------------|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Output Created         |                                | 13-Apr-2017 03:46:42                                                                                                                                                                                                                                                                                                                    |
| Comments               |                                |                                                                                                                                                                                                                                                                                                                                         |
| Input                  | Data                           | C:<br>\Users\Ezekiel\Documents\Environmental Earth Science\september.sav                                                                                                                                                                                                                                                                |
|                        | Active Dataset                 | DataSet1                                                                                                                                                                                                                                                                                                                                |
|                        | Filter                         | <none>                                                                                                                                                                                                                                                                                                                                  |
|                        | Weight                         | <none>                                                                                                                                                                                                                                                                                                                                  |
|                        | Split File                     | <none>                                                                                                                                                                                                                                                                                                                                  |
|                        | N of Rows in Working Data File | 15                                                                                                                                                                                                                                                                                                                                      |
| Missing Value Handling | Definition of Missing          | MISSING=EXCLUDE: User-defined missing values are treated as missing.                                                                                                                                                                                                                                                                    |
|                        | Cases Used                     | LISTWISE: Statistics are based on cases with no missing values for any variable used.                                                                                                                                                                                                                                                   |
| Syntax                 |                                | FACTOR<br>/VARIABLES pH EC TDS NaCl HCO3 Cl Mg Ca Na K S04<br>/MISSING LISTWISE<br>/ANALYSIS pH EC TDS NaCl HCO3 Cl Mg Ca Na K S04<br>/PRINT UNIVARIATE INITIAL KMO<br>EXTRACTION ROTATION<br>/PLOT EIGEN<br>/CRITERIA MINEIGEN(1) ITERATE (25)<br>/EXTRACTION PC<br>/CRITERIA ITERATE(25)<br>/ROTATION VARIMAX<br>/METHOD=CORRELATION. |
| Resources              | Processor Time                 | 00:00:00.250                                                                                                                                                                                                                                                                                                                            |
|                        | Elapsed Time                   | 00:00:00.219                                                                                                                                                                                                                                                                                                                            |
|                        | Maximum Memory Required        | 16004 (15.629K) bytes                                                                                                                                                                                                                                                                                                                   |

[DataSet1] C:\Users\Ezekiel\Documents\Environmental Earth Science\september.sav

### Descriptive Statistics

|      | Mean     | Std. Deviation | Analysis N |
|------|----------|----------------|------------|
| pH   | 7.8107   | .31856         | 15         |
| EC   | 2.9338E3 | 2409.68884     | 15         |
| TDS  | 1.5029E3 | 1204.64244     | 15         |
| NaCl | 2.8193E3 | 2510.90882     | 15         |
| HCO3 | 1.2015E2 | 33.98274       | 15         |
| Cl   | 1.4542E2 | 38.36481       | 15         |
| Mg   | 1.4833   | .23892         | 15         |

### Descriptive Statistics

|     | Mean     | Std. Deviation | Analysis N |
|-----|----------|----------------|------------|
| Ca  | 7.5873   | 5.92444        | 15         |
| Na  | 2.4752E2 | 185.67127      | 15         |
| K   | 11.9053  | 16.12699       | 15         |
| S04 | 1.5810E2 | 71.14992       | 15         |

### KMO and Bartlett's Test

|                                                  |                    |         |
|--------------------------------------------------|--------------------|---------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. |                    | .538    |
| Bartlett's Test of Sphericity                    | Approx. Chi-Square | 314.644 |
|                                                  | df                 | 55      |
|                                                  | Sig.               | .000    |

### Communalities

|      | Initial | Extraction |
|------|---------|------------|
| pH   | 1.000   | .848       |
| EC   | 1.000   | .976       |
| TDS  | 1.000   | .976       |
| Nacl | 1.000   | .974       |
| HCO3 | 1.000   | .726       |
| Cl   | 1.000   | .879       |
| Mg   | 1.000   | .762       |
| Ca   | 1.000   | .799       |
| Na   | 1.000   | .902       |
| K    | 1.000   | .917       |
| S04  | 1.000   | .846       |

Extraction Method: Principal Component Analysis.

### Total Variance Explained

| Component | Initial Eigenvalues |               |              | Extraction Sums of Squared Loadings |               |              | Rotation Sums of Squared Loadings |
|-----------|---------------------|---------------|--------------|-------------------------------------|---------------|--------------|-----------------------------------|
|           | Total               | % of Variance | Cumulative % | Total                               | % of Variance | Cumulative % | Total                             |
| 1         | 6.885               | 62.590        | 62.590       | 6.885                               | 62.590        | 62.590       | 5.909                             |
| 2         | 1.643               | 14.936        | 77.527       | 1.643                               | 14.936        | 77.527       | 2.371                             |
| 3         | 1.078               | 9.798         | 87.325       | 1.078                               | 9.798         | 87.325       | 1.325                             |
| 4         | .526                | 4.782         | 92.107       |                                     |               |              |                                   |
| 5         | .399                | 3.628         | 95.735       |                                     |               |              |                                   |
| 6         | .295                | 2.681         | 98.416       |                                     |               |              |                                   |
| 7         | .119                | 1.081         | 99.498       |                                     |               |              |                                   |
| 8         | .053                | .478          | 99.976       |                                     |               |              |                                   |
| 9         | .003                | .024          | 100.000      |                                     |               |              |                                   |
| 10        | 4.012E-5            | .000          | 100.000      |                                     |               |              |                                   |
| 11        | 8.314E-6            | 7.558E-5      | 100.000      |                                     |               |              |                                   |

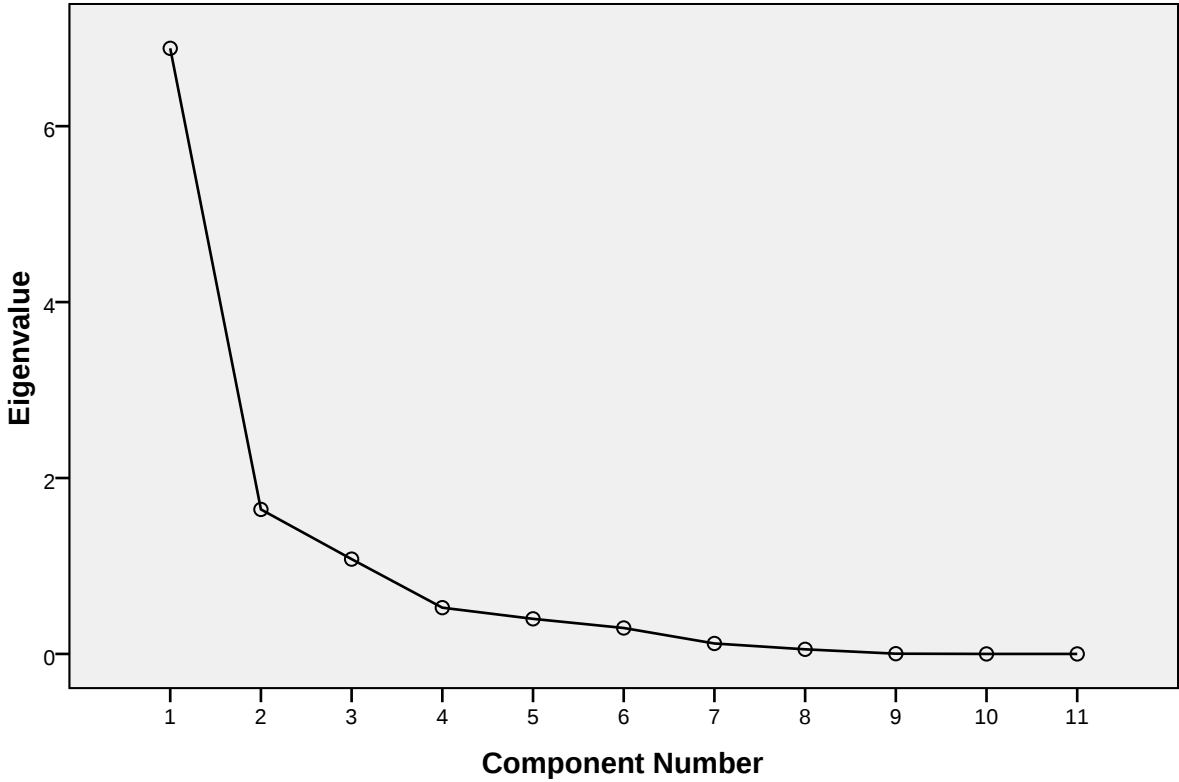
Extraction Method: Principal Component Analysis.

Total Variance Explained

| Component | Rotation Sums of Squared Loadings |              |
|-----------|-----------------------------------|--------------|
|           | % of Variance                     | Cumulative % |
| 1         | 53.720                            | 53.720       |
| 2         | 21.558                            | 75.278       |
| 3         | 12.047                            | 87.325       |
| 4         |                                   |              |
| 5         |                                   |              |
| 6         |                                   |              |
| 7         |                                   |              |
| 8         |                                   |              |
| 9         |                                   |              |
| 10        |                                   |              |
| 11        |                                   |              |

Extraction Method: Principal Component Analysis.

Scree Plot



**Component Matrix<sup>a</sup>**

|      | Component |       |       |
|------|-----------|-------|-------|
|      | 1         | 2     | 3     |
| pH   | .051      | -.681 | -.618 |
| EC   | .985      | .068  | .032  |
| TDS  | .984      | .079  | .029  |
| Nacl | .985      | .055  | .033  |
| HCO3 | -.301     | .712  | -.358 |
| Cl   | .835      | -.317 | .286  |
| Mg   | .704      | .516  | .027  |
| Ca   | -.613     | .058  | .648  |
| Na   | .949      | -.014 | .001  |
| K    | .873      | -.364 | .150  |
| S04  | .807      | .394  | -.200 |

Extraction Method: Principal Component Analysis.

a. 3 components extracted.

**Rotated Component Matrix<sup>a</sup>**

|      | Component |       |       |
|------|-----------|-------|-------|
|      | 1         | 2     | 3     |
| pH   | -.157     | .200  | .885  |
| EC   | .913      | .371  | .059  |
| TDS  | .918      | .362  | .056  |
| Nacl | .908      | .381  | .065  |
| HCO3 | .066      | -.842 | -.113 |
| Cl   | .588      | .729  | .031  |
| Mg   | .844      | -.079 | -.208 |
| Ca   | -.611     | .047  | -.651 |
| Na   | .851      | .402  | .124  |
| K    | .620      | .709  | .175  |
| S04  | .916      | -.067 | .059  |

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

**Component Transformation Matrix**

| Co... | 1     | 2     | 3     |
|-------|-------|-------|-------|
| 1     | .903  | .411  | .124  |
| 2     | .411  | -.743 | -.529 |
| 3     | -.125 | .528  | -.840 |

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.