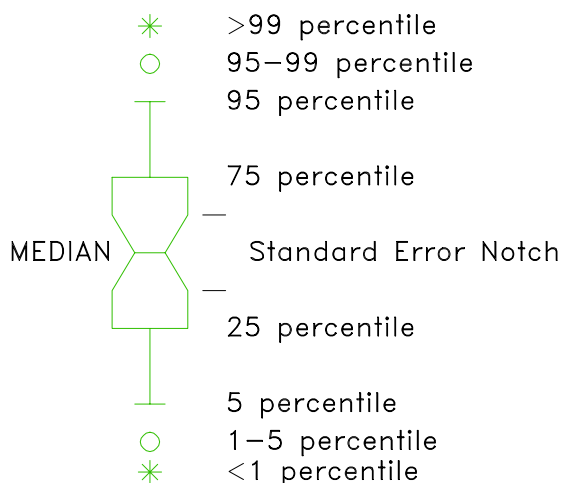


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BWHISK is one of the advanced statistical tools available in **TECHBASE**. It is an interactive application that graphically summarizes the infuriate distributions of numerical data stored in the database. These graphs can be used to compare the data visually, rather than numerically. The questions the box and whiskers plots help to answer, according to John W. Tukey (Tukey, 1990) are:

- * Is the value small, medium or large?
- * Is the difference, or change up, down, or neutral
- * Is the difference, or change small, medium, or large?*
- * Do the successive changes grow, shrink, or stay roughly constant?
- * What about change in ratio terms, perhaps thought of as percent previous?
- * Does the vertical scatter change, as we move from left to right?

Elements of the default box and whiskers figure are pre-defined. The box represents data between the 25 to 75 percentiles, whiskers are the 5 to 25 and 75 to 95 percentiles, while each outlier (< 5 and > 95) is denoted by a symbol. Since the outliers are often of most interest, data between 1-5 and 95-99 percentiles appear as a'o' while those < 1 and > 99 percent are plotted as a'*'. No symbols beyond the whiskers means there are no extreme values or outliers.



Other parts of the figure include the median and the standard error notch which is defined as 'median 1.57(std. dev)'. In some cases an inverted box appears, indicating that the standard error is greater than the standard deviation. One or more fields may be selected for processing with the figures scaled to fit an A sized sheet (8.5 x 11 inches.) If more than one *Field* is selected, the figures will be arranged horizontally along the x-axis. This is useful when comparing the results of chemical analyses, however, it is important that these data have common units (i.e. PPM or PPB.)

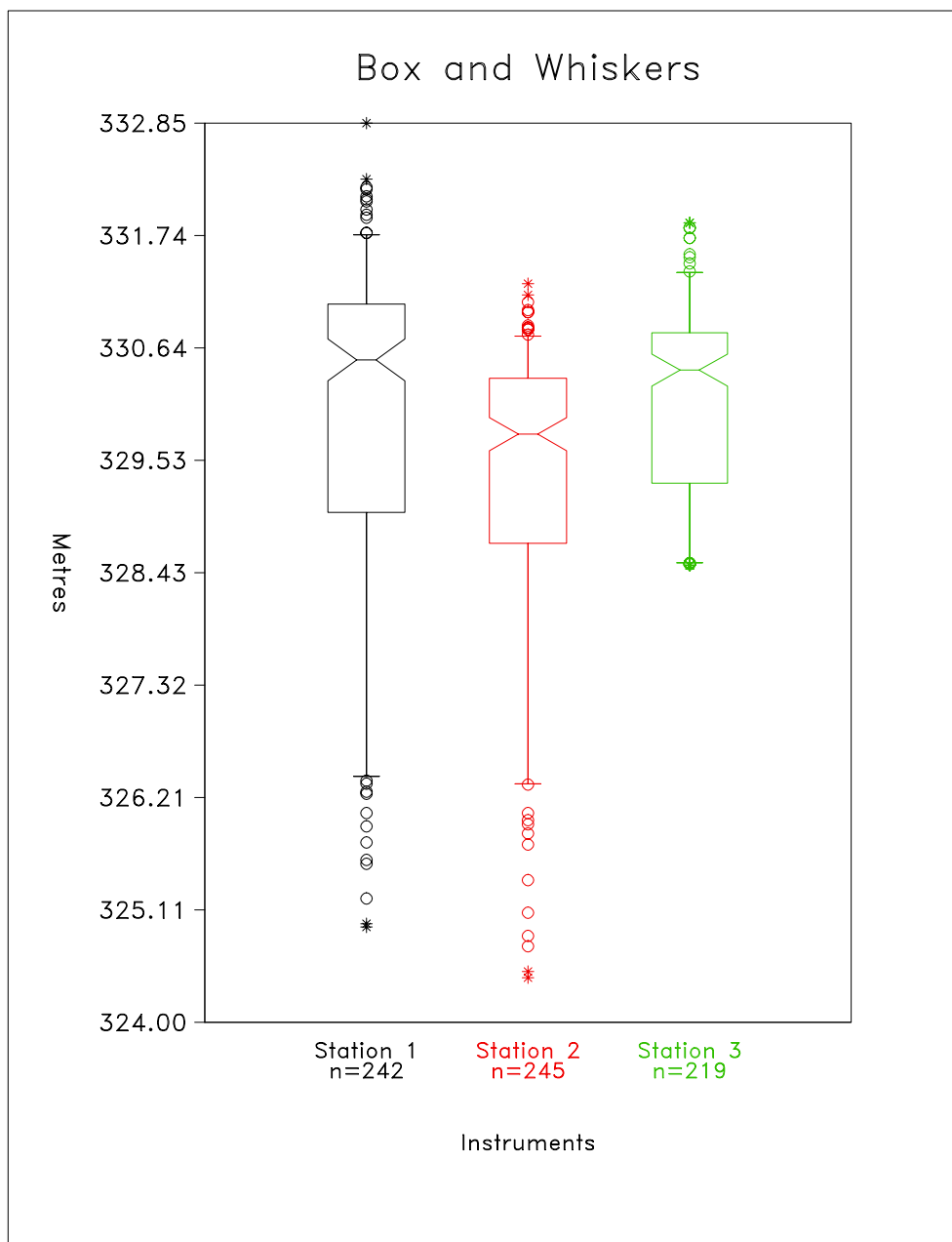
Once the graphical image appears on the screen, the interactive options in *BWHISK* allow the basic figures to be modified. As each parameter is changed, the graph is automatically updated to reflect the new value.

The percentile values of the figure may be re-defined in the *Limits* menu, thus influencing the shape and proportions of the box and whiskers. The symbols used to accentuate the outliers may be changed in the *Markers* menu. Axes titles and maximum / minimum limits on the Y-axis can be added through the *Axes* menu. Axis Type is LINEAR by default, bu can be LOG scale.

Technote: BWHISK - Box and Whiskers Plots

The *Parameters* menu allows the width of the box to be changed and provides an option to cycle colors when more than one field is displayed. The standard error notch may be eliminated, and there is provision to plot the number of data points used in constructing the figure ($n = \#$ of points.)

Under the *sHeet size* menu basic sheet parameters like orientation and margins can be modified. Although the default sheetsize is A, any size in the paper.map file can be used. When done, the *Draw* option saves the final diagram in the metafile.



For more information on the options in *BWHISK* see [“bwhisk – Box and Whiskers Plot” on page st-5](#)

For more information on interpreting this type of graph, see:

Tukey, J. W. - *Exploratory Data Analysis*; Addison Wesley, 1977.

Tukey, J. W. - *Data-Based Graphics: Visual Display in Decades to Come*; Statistical Science - 1990 Vol.5