Use of _extrap_ for evaluating extrapolation methods for ADCP measurements

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**What is _extrap_ and Why use it?**
_extrap_ is a tool developed by the Office of Surface Water to assist in evaluating and selecting the appropriate top and bottom extrapolation methods for ADCP measurements.

**Where can I obtain _extrap_?**
The software and documentation may be downloaded from the USGS Hydroacoustics Web pages and the Hydroacoustics forum by going to [http://hydroacoustics.usgs.gov/movingboat/extrap1.shtml](http://hydroacoustics.usgs.gov/movingboat/extrap1.shtml)

**What does _extrap_ Do?**
- Imports ADCP files from TRDI ADCPs and SonTek/YSI RiverSurveyors for analyzing extrapolation methods.
- Normalizes data for a given transect so that all ensembles can be plotted on one graph
- Provides an efficient, graphical method of viewing raw data (central tendency and scatter), as well as overlaying plots of the various extrapolation methods
How should `extrap` be used?

- Analyze enough transects for each discharge measurement to determine a trend, but always at least 1 pair of transects. Although two transects are often enough, users may need analyze more until they gain enough experience.
- The extrapolation method that best fits the data for all transects should be selected taking into account factors, such as wind conditions, channel roughness, presence of bi-directional flow, etc. Only measurements of rapidly-varying flows (e.g. tidal flows) may justify changing the extrapolation within the measurement.
- Always consider the random noise (instrument noise and effects of turbulence) found in the raw data. Use the ‘whiskers’ (extent of 25th and 75th percentiles) to help guide your selection.
- Don’t over-analyze extrapolation techniques when the final discharges may not be affected. Extrapol should save you time in evaluating appropriate extrapolation methods rather than increasing the time spent reviewing measurements. When the changes are small (<1%) it is likely that the default extrapolation method (1/6th power law) should be used.
- Use of extrapol is encouraged for all users, but is more necessary when using RiverSurveyor Live software as there is no functionality in that software for averaging data together.
- Do NOT just select Optimize and use optimized values for individual transects. An average value should be used for all transects.
- Extrapol does NOT interact directly with ADCP software. If the 1/6th power law is not used, users must manually select the appropriate extrapolation changes in WinRiver II or RiverSurveyor Live.

If you have any questions, please contact Dave Mueller (dmueller@usgs.gov) or (502) 493-1935 or email the USGS Hydroacoustics Work Group, hawg@simon.er.usgs.gov.

Sample extrapol analysis for a transect with bi-directional flow

[Image of extrapol analysis software interface]

Normalized discharge data plotted against dimensionless depth for all ensembles for the transect

25th, 50th, and 75th percentiles