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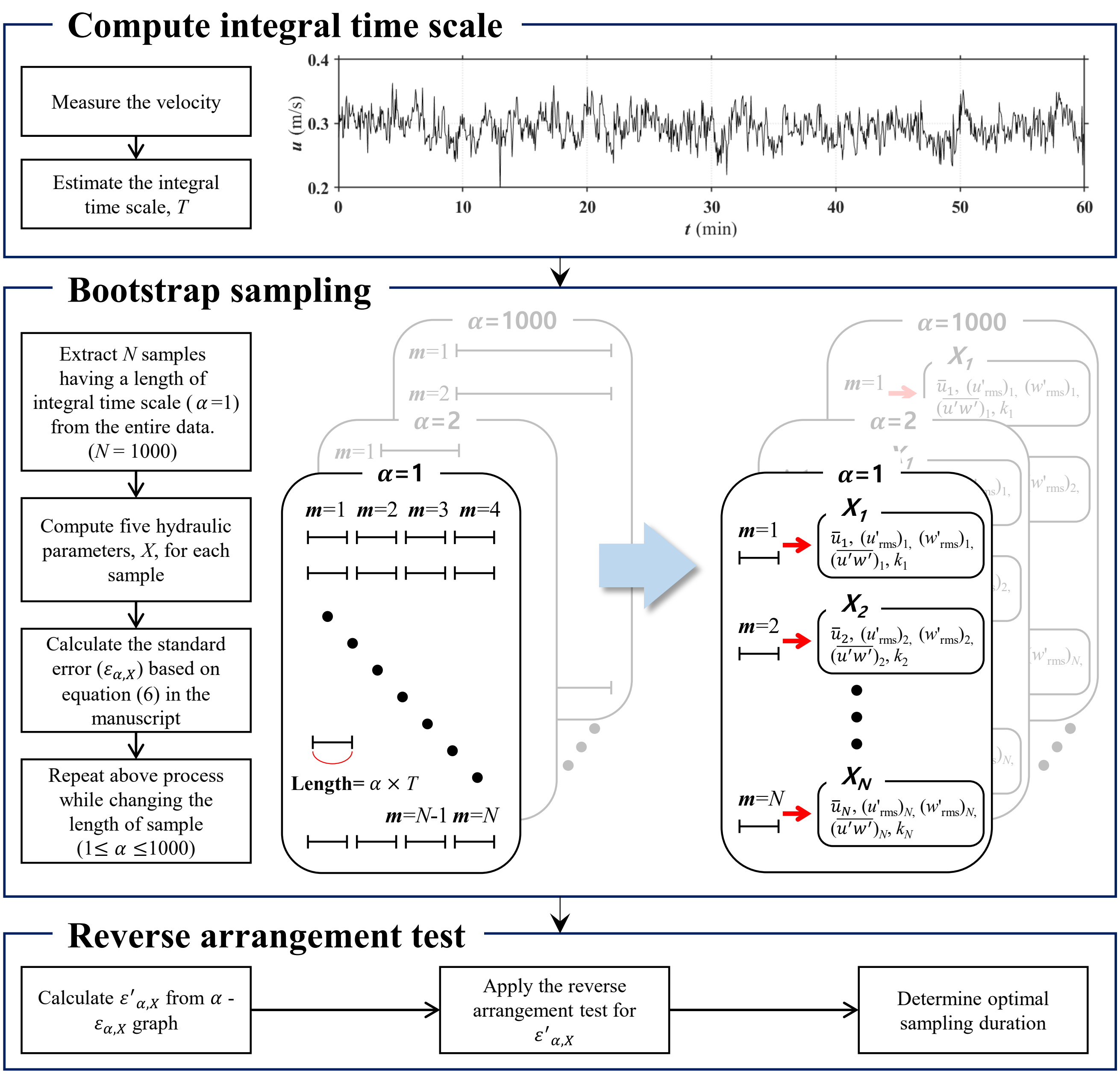
Supplementary Material

Figure A.1. Schematic describing the determination of the optimal sampling period.



Description of Figure A.1

Figure A.1 summarizes illustratively the overall procedure of how this study determines the optimal sampling period. As mentioned in the manuscript, the process of determining the optimal period can be classified into three main steps: 1) compute integral time scale from the measured velocity; 2) apply bootstrap sampling method and estimate the standard error; 3) apply the reverse arrangement test to determine the optimal sampling time. Specifically, in the first step, the integral time scale considered as the basic unit of time is calculated from the autocorrelation function presented in equation (4) in the manuscript. In the second step, sequential time series data with a length of the integral time scale are sampled at a random position within the entire data. Here, the number of samples, N, is determined as 1000 in this study. And the next step is to calculate the turbulence quantities for each sample and estimate the standard errors of them based on the equation (6) in the manuscript. The whole procedure of sampling data and computing standard error is repeated while changing the length of the sample from 1 to 1000 times the integral time scale. In the third step, after calculating the gradient of the standard error, the reverse arrangement test is applied for it to find the convergence point regarded as the optimal sampling time.

Figure A.2. Time series velocity data measured in still water: red lines indicate spikes.

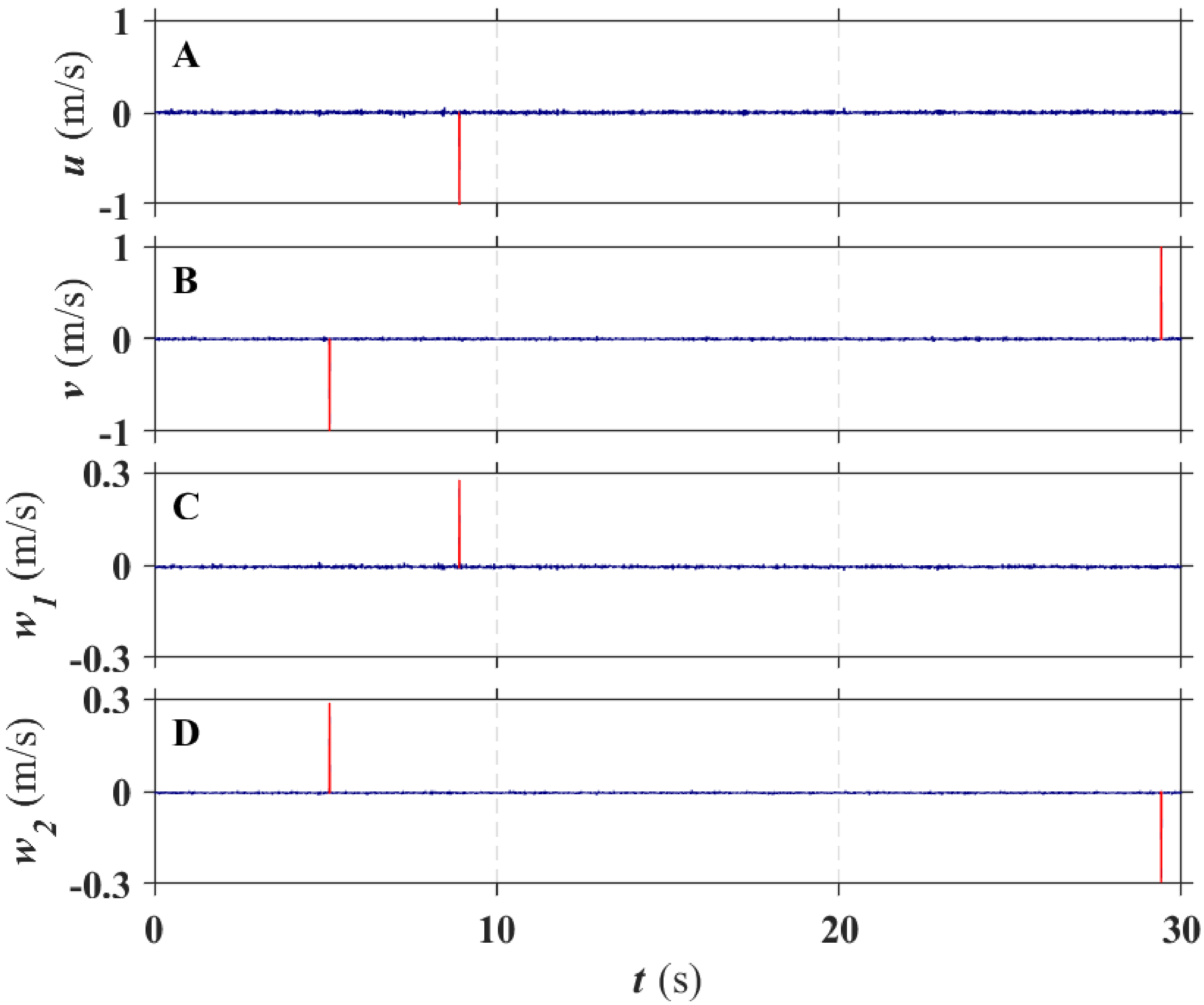


Figure A.3. Relations between (A) T_c and $\overline{u}$, and between (B) α_c and $\overline{u}$.