

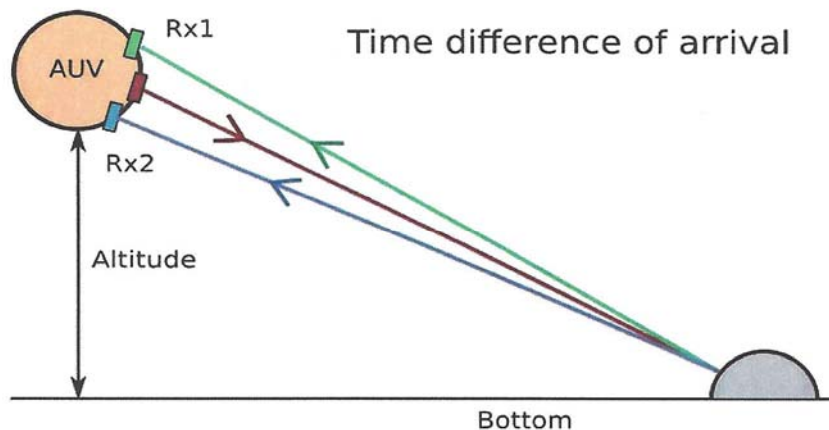
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Ocean Depth Estimation and Floor Profile Reconstruction using Interferometry.

ABSTRACT - Masterthesis

The problem this thesis intends to solve is recovering sea floor height using measurement geometry. Height reconstruction depends on an accurate time-delay. We want to recover the sea-floor height by Interferometry principle; one transmitter and two receivers. The measurement set-up is visualised in the figure below.



Since the time-delay can be used to calculate sea floor height, Time-Delay Estimation techniques based on cross-correlation of the received signals are used. If received signals are sampled at a rate of T_s , the cross-correlation function will have a maximum at sample points kT_s , where k is an integer. The estimated time delay is not always an integer multiple of the T_s , and in such cases we need to find the exact location of the correlation function maximum. Potential approaches could be Parabolic Interpolation, Fast Fourier Transform (FFT) Interpolation, or evaluation of the Complex Correlation function in the Time and Frequency domain.

The accuracy of the cross-correlation function depends on the signal length used. The signal has to be kept short if we intend to follow accurately the changing height profile of the sea floor and has to be kept long enough for accurate estimation of the time-delay. Hence, a compromise has been considered in the evaluation of a two-dimensional cross-correlation function.