

CastTime is an adaptive feedback controller that will monitor water-column variability based on successively-acquired sound speed profiles from a Moving Vessel Profiler (MVP) and provide sampling interval recommendations based on the following logic:

1. If the oceanography is not showing a significant change, the sampling interval will be relaxed by 15%, to allow for a gradual interval relaxation over time. **This is “RELAX” mode—enacted when the outer beam refraction error is less than 1/3 of the maximum allowable error.**
2. If the oceanography is changing slightly, but the sampling interval sufficiently captures that change, then the sampling interval will be retained. **This is “STEADY” mode—enacted when the outer beam refraction error is greater than 1/3, but less than 2/3, of the maximum allowable error.**
3. If the oceanography is changing more rapidly than the sampling interval can capture, then the sampling interval will be reduced to one-half of the interval that *should* have been used to maintain sufficient capture. **This is “PANIC” mode—enacted when the outer beam refraction error is greater than 2/3 of the maximum allowable error.**

Note that the intended sampling interval and the *actual* time elapsed between casts are often quite different, considering other shipboard operations (i.e. turning, drills, etc.), or if a surveyor is performing a manual adjustment to the interval. In the event that the intended sampling interval is *less* than the *actual* time elapsed, the intended sampling interval will be retained in the logic stated above and will result in the new sampling interval; otherwise the *actual* time elapsed will be utilized and adjusted accordingly—this is the manner in which a manual adjustment to the sampling interval is performed.

Three user inputs are necessary for CastTime, entered upon starting the program:

1. **The initial sampling interval at the start of the day.** CastTime cannot make a recommendation until at least two casts are acquired, thus the initial interval must be provided by the user.
2. **The sampling interval upper bound.** This is the maximum amount of time the surveyor is willing to wait between casts during periods of oceanography that is unchanging, or “boring”. The 15% increase of the relax mode will never extend beyond this upper bound.
3. **The sampling interval lower bound.** This is the most rapid sampling interval possible (highly dependent on water depth) by the MVP, in the case of variability high enough such that continuous sampling is necessary. Interval reductions will never be less than this lower bound.

**Benefits:** CastTime may provide the justification necessary to relax sampling intervals, therefore *reducing unnecessary casts*, resulting in a decreased workload to the MVP and its components. Conversely, it also acts as a constant monitor of the water-column, and could *alert the surveyor to variability which may have otherwise gone unnoticed*, resulting in potential improvement to depth sounding accuracy.

**Limitations:** The interval recommendations are merely suggestions and *the decision ultimately resides with the surveyor*. One must keep in mind that the interval recommendations are based purely upon time elapsed between the two most recent profiles, and there is no spatial consideration. *It is up to the surveyor to ensure the spatial extents of the survey area are captured*, and this is done by performing a cast at any time—CastTime is always “listening” for incoming cast data, and a manual adjustment will adapt the sampling interval accordingly.

For more information, see the U.S. Hydro Paper, or send an email to [matthew.wilson@noaa.gov](mailto:matthew.wilson@noaa.gov). I’d certainly be interested in any comments, suggestions, issues, or any anecdotal information in general.