

1.3 GLOSS Requirements

With so many different technologies available, it is best to summarise the measurement requirements for a GLOSS-quality tide gauge in as general a way as possible. These have been stated in the Implementation Plan for GLOSS 1997 (IOC, 1997) and are summarised in Appendix 1. In brief, the gauge must be capable of measuring to centimetre accuracy in all weather (especially wave) conditions for the temporal averaging indicated (typically hourly). An important principle is that if one technology is replaced by another, then there should be a period of overlap during which both are operated in parallel and inter-compared in order to validate the centimetric requirement. An ideal period would be a decade which in tropical areas would allow full sampling of inter-decadal ocean changes (especially temperatures). However, such a long period will be impractical in most cases, and several years will be more suitable.

A reasonable question is to ask why one should be satisfied with the centimetre requirement, given that these days one can easily measure in a laboratory to much higher precision with a laser, for example. One part of the answer is that some gauge-types can certainly measure to much better than 1 cm (or at least can do so under most conditions) and, therefore, are certainly to be preferred over other types. A second part, however, is connected with a proper appreciation of the physical characteristics of the sea surface, and therefore sea level, given the presence of waves, spume, bubbles etc. It is pointless to be capable of measuring such high frequency 'noise' on the surface if there is no clear scientific requirement to do so, and if the demands of the measurement process result in high cost and/or unreliable continuous operation over long periods. There are few ocean processes from tides to seasonal cycles to interannual variability which cannot be addressed with a 1 cm accuracy instrument. In addition, the 'red' (predominantly low-frequency) character of sea level variability at most locations, with typically decimetre amplitudes at decadal timescales, means that one could not measure secular trends (with typical magnitudes of 1 cm/decade) with even the most precise device without a record at least 50 years long. Therefore, the emphasis of programmes such as GLOSS with a long term measurement component has been placed upon the ability to conduct reliable long term measurements in most parts of the world to adequate (< 1 cm) accuracy and at reasonable cost.

In environmentally hostile areas, it may not be possible to measure to the same accuracy as elsewhere. The general rule here will be to do 'as well as one can'. Several workshops have been held on the theme of sea level (or sub-surface pressure) measurements in hostile areas and their reports (IOC, 1988, 1991, 1992) are still useful.