



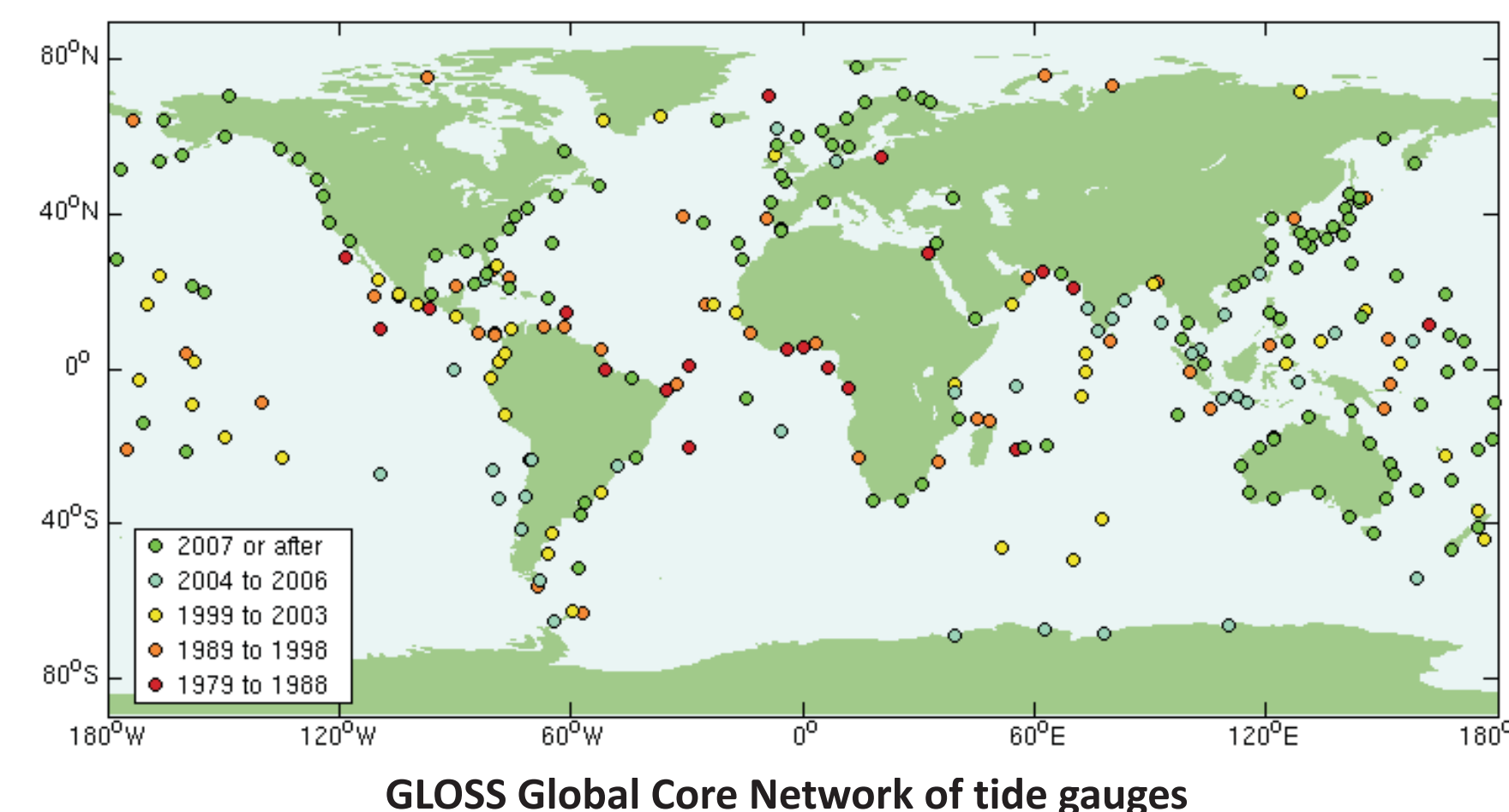
# Global Sea Level Observing System (GLOSS) standardised quality control of sea level observations

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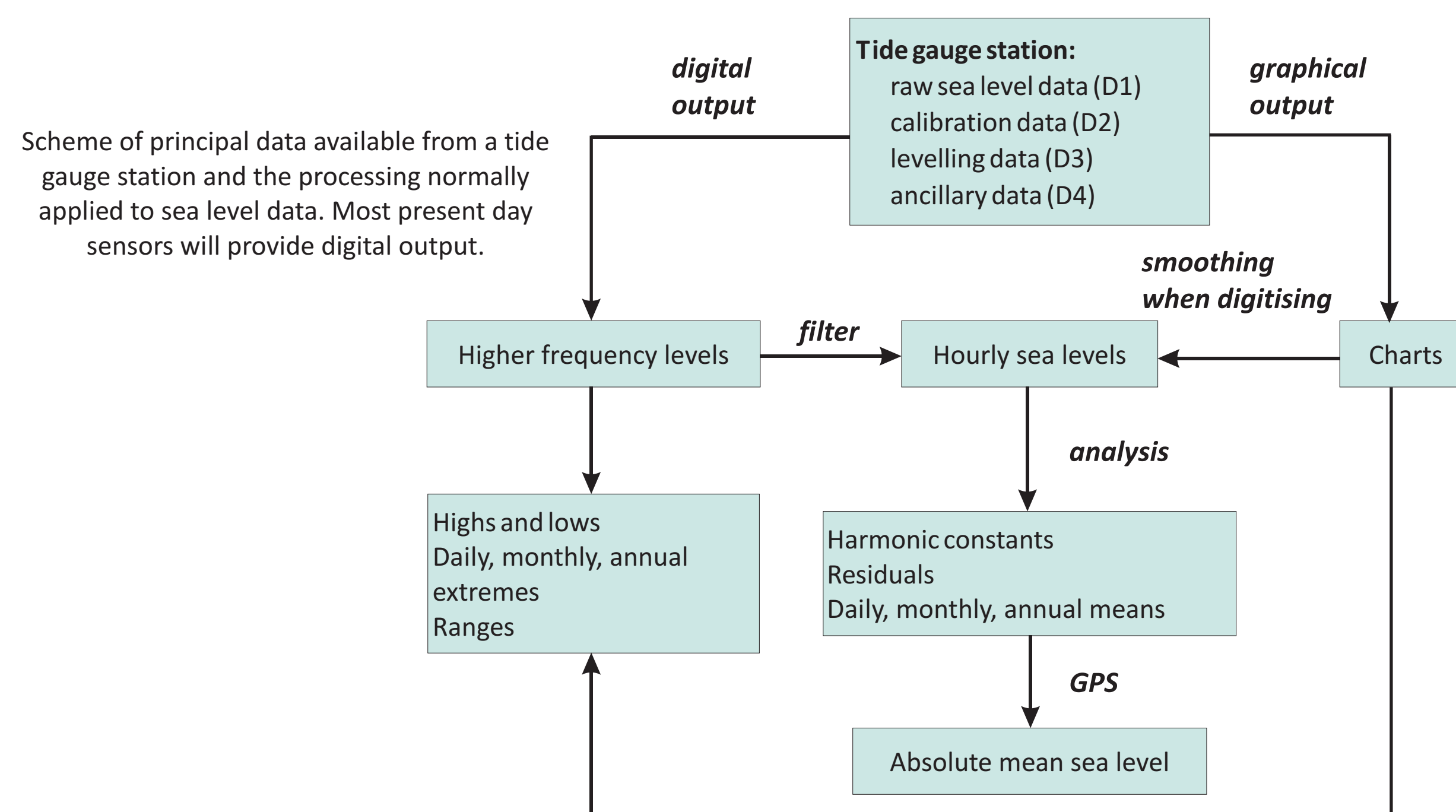
## What is GLOSS?

The Global Sea Level Observing System (GLOSS) is an international programme conducted under the auspices of the Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM) of the World Meteorological Organisation (WMO) and the Intergovernmental Oceanographic Commission (IOC).

GLOSS aims at the establishment of high-quality global and regional sea level networks for application to climate, oceanographic and coastal sea level research.



## Why do we need Quality Control?



Quality control should ensure data consistency within a single data set and within a collection of data sets as well as ensuring that the quality of, and errors in, the data are apparent to the user, who then has sufficient information to assess its suitability for a task.

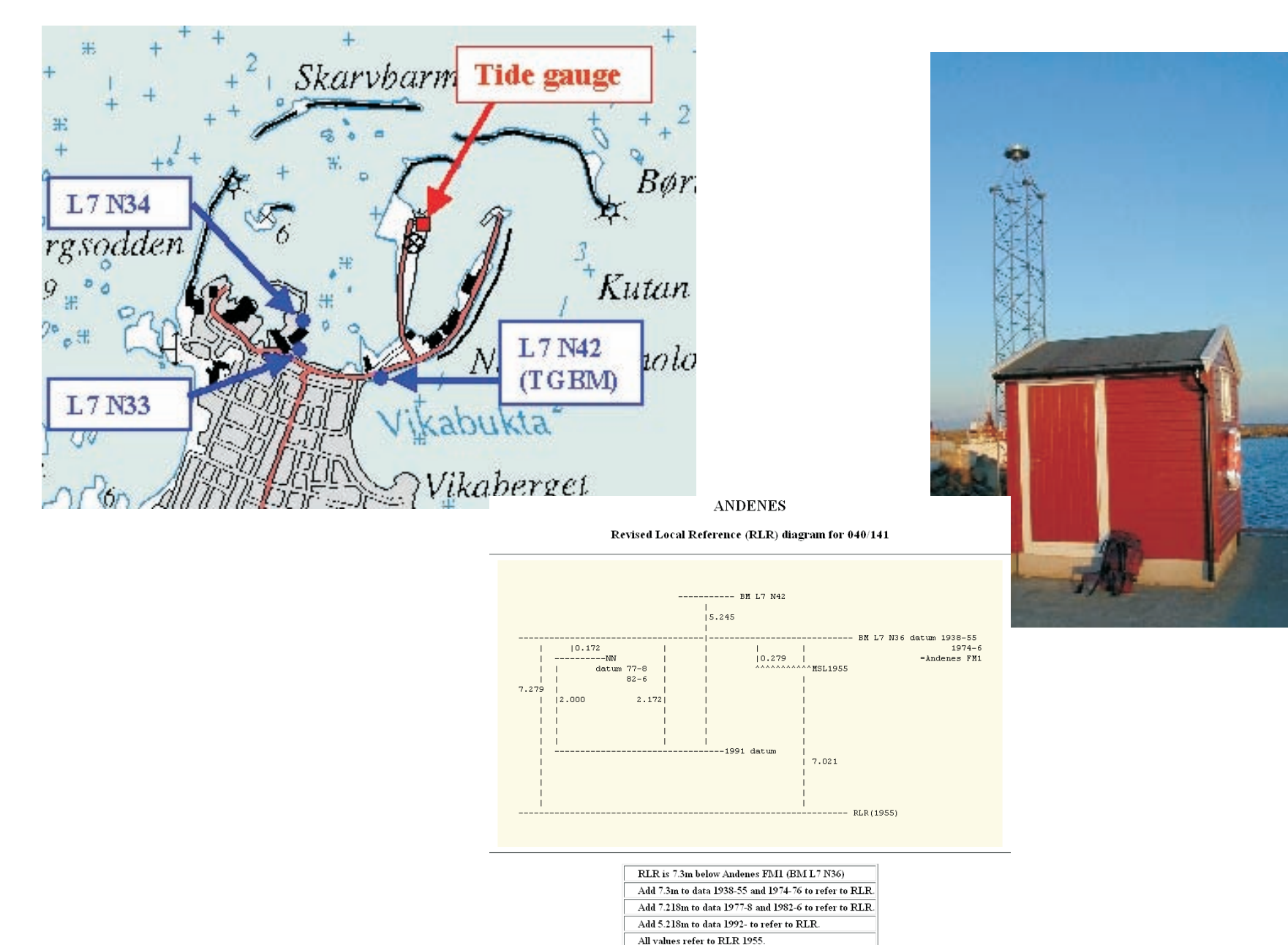
Quality control has a number of key advantages:  
 Maintaining Common Standards  
 Acquiring Consistency  
 Ensuring Reliability

## Metadata

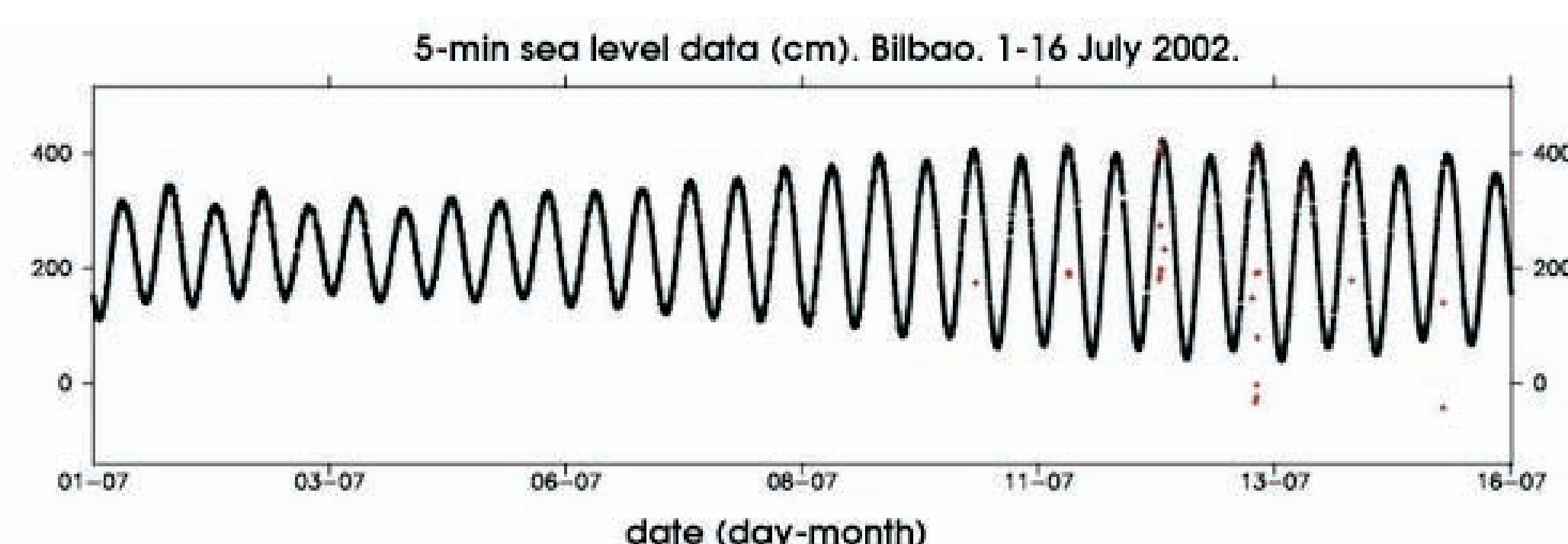
Tide gauge metadata must be compliant with the ISO standard for geospatially referenced data metadata (ISO19115).

More detailed metadata are also required, to allow assessment of the usefulness of a time series for particular applications and to ensure that the data are fully documented, for example:

- Site information (e.g. description of location of tide gauge and benchmarks, datum relationships and history)
- Data sampling/processing procedures
- Instrument information
- Full documentation for all quality-control procedures applied
- Reports on data quality (e.g. problems and resulting resolutions, data changes)



## Automatic checks



**Level 1 quality control must include:**

- Detection of invalid characters
- Confirming correct date and hour values
- Detection of spikes, outliers, gaps
- Stability test (constant values detection)

**And possibly**

- Filtering to hourly values and computation of residuals (including recommendation of filters to use)
- Position (latitude and longitude)

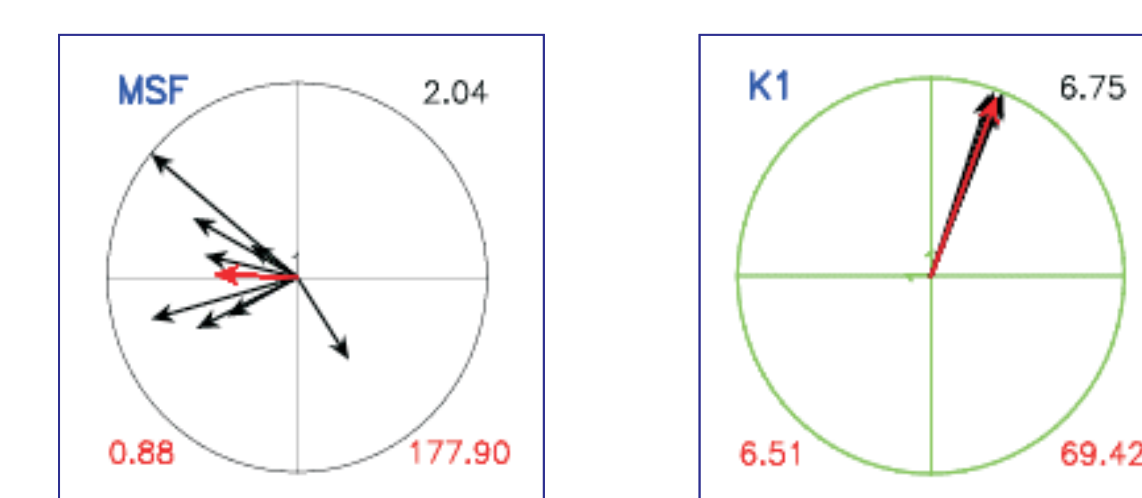
## Scientific QC

**Level 2 full quality control and analysis must include:**

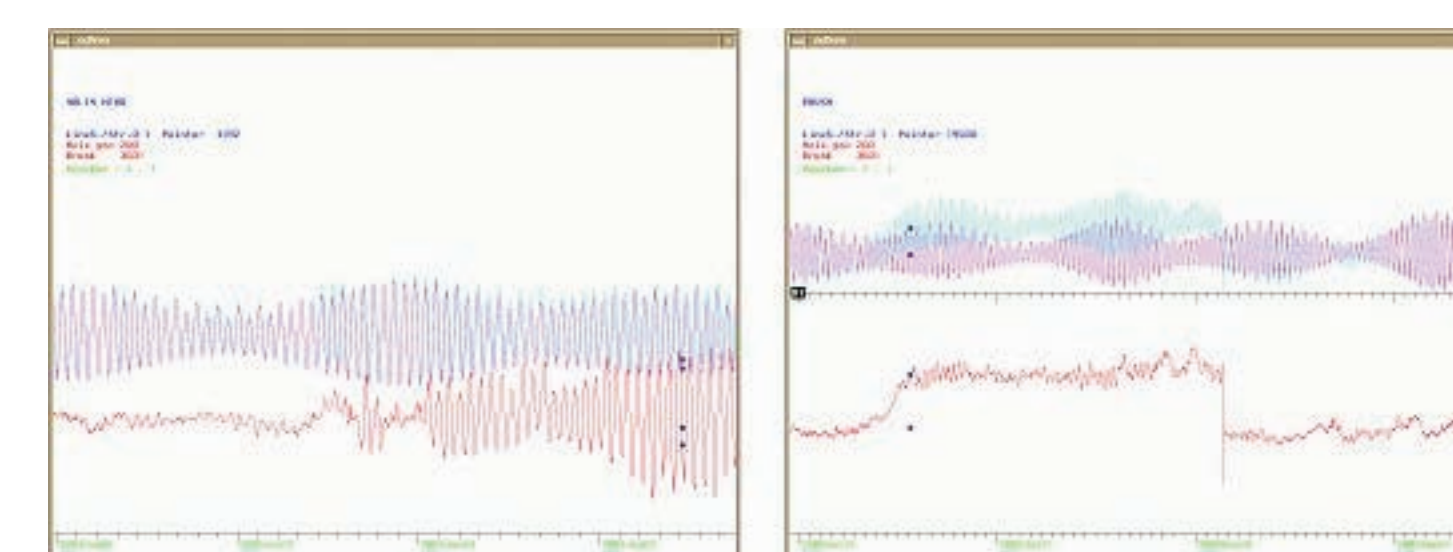
- Tidal analysis; *generation of constituents*
- Computation and inspection of residuals
- Checking of tidal characteristics (diurnal, semi-diurnal, etc)
- Checking for consistency with historical observations
- Generation of basic statistics (highs and lows, extremes)
- Computation of daily, monthly and annual means
- Comparison with neighbouring tide gauges
- Comparison with models or predictions

**Optional extra quality control**

- Correlation coefficients
- Standard Normal Homogeneity Test
- Empirical Orthogonal Functions (EOFs) analysis



The vector representation is useful to observe the annual variations of the harmonic constants; the arrows in black representing the amplitude and phase of each year for the constituent; the arrows in red the mean vector for the vectors of the different years and the values of mean amplitude and phase.



Example of the trace of a clock malfunction and a reference jump in the residuals.

## Summary



The Group of Experts on GLOSS have developed a quality-control manual, which describes standardised methods and tests as outlined above and defines the metadata that must accompany the data. This has been forwarded to the IODE-JCOMM standards process for approval.

For further information visit: [www.gloss-sealevel.org](http://www.gloss-sealevel.org)