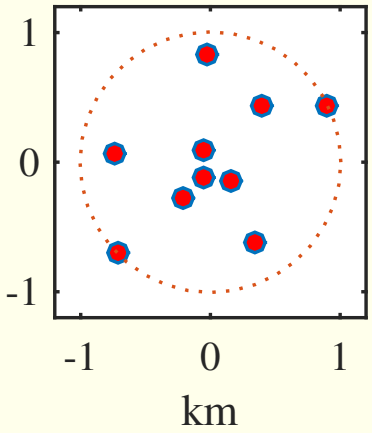
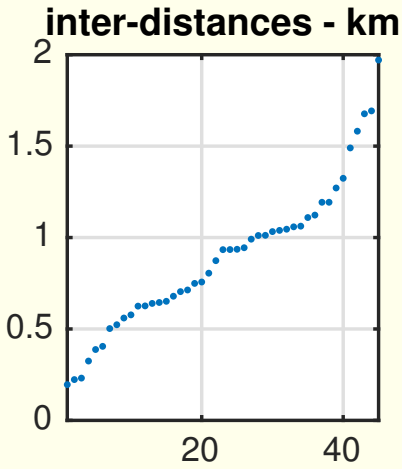
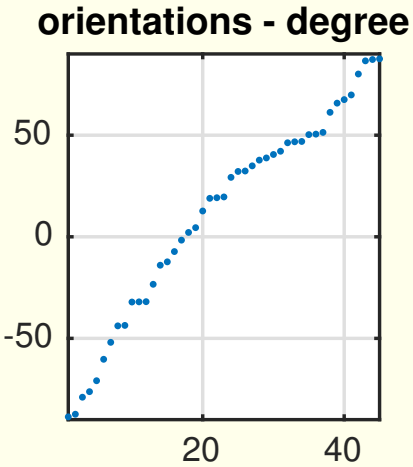
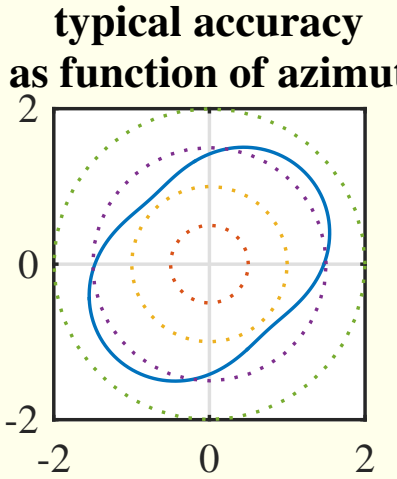
Contents

Features for a station design





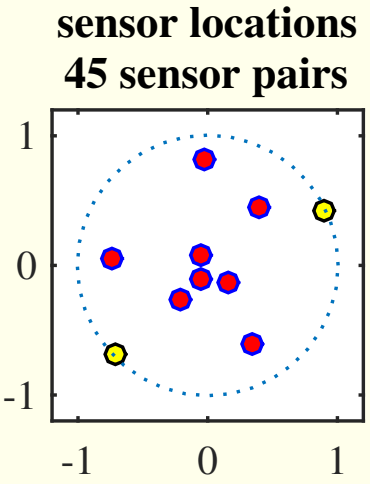


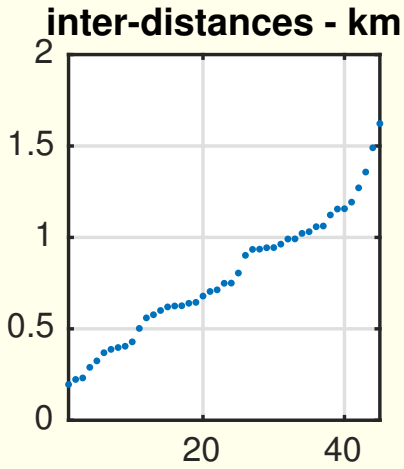


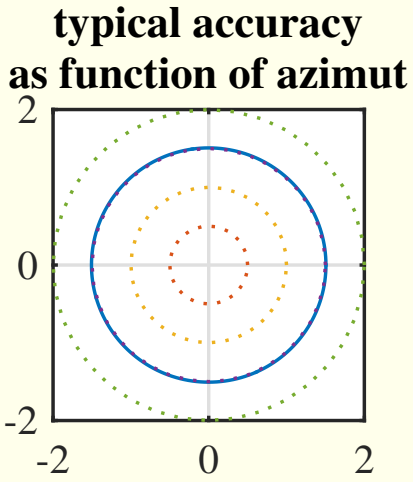
Elements of interest:

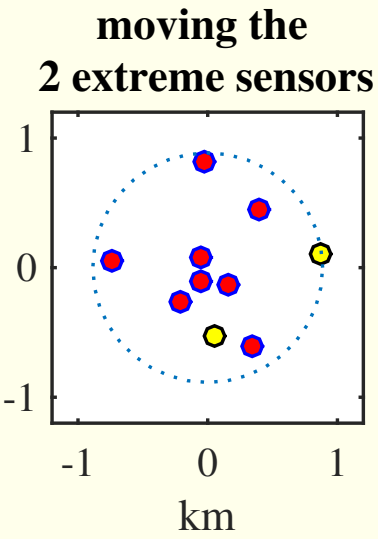
- the aperture
- the relative locations of the sensors
  - → uniformity of . . .
  - → accuracy isotropy

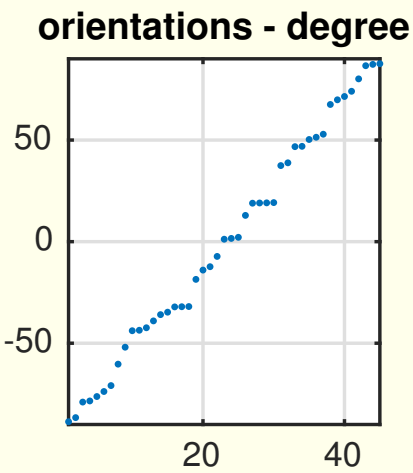
By moving the 2 most distant sensors



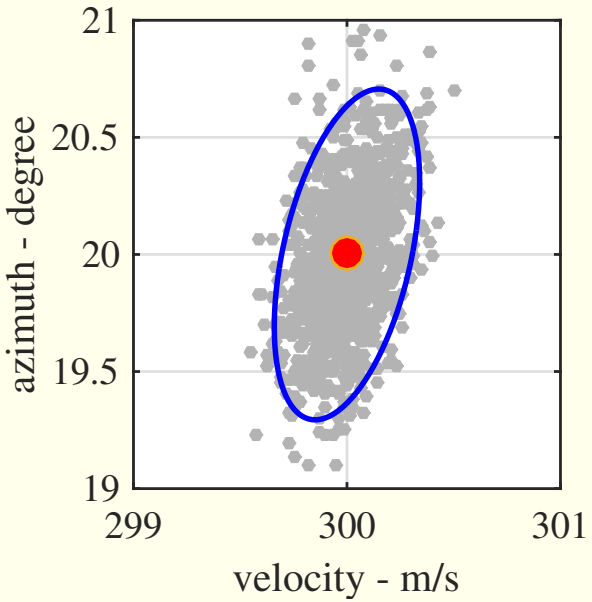








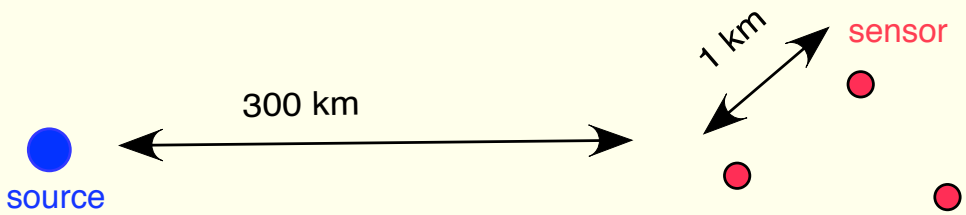
CRB as an index of accuracy



- Depending on the noise we observe different couples of values (grey points).
- A good estimator has to provide a set of values located around the true value with a dispersion as low as possible.
- The CRB provides a lower bound for the dispersion.
- A good estimator converges asymptotically to the CRB.

- the CRB is used to determine the confidence region (ellipse)
- it is worth to notice that the CRB does depend on the true values of the parameters that are unknown. Usually we replace by the estimated value.

Loss of coherence



- usually the sensors of the same station are very far from the source of interest, several hundreds of km compared to 1 km.
- however the signals arriving on the two sensors are not fully coherent. But in the absence of clear explanations a "black box" model is considered:

$$\log \mathrm{MSC}(f) \approx -\beta f^2 \times d^2$$

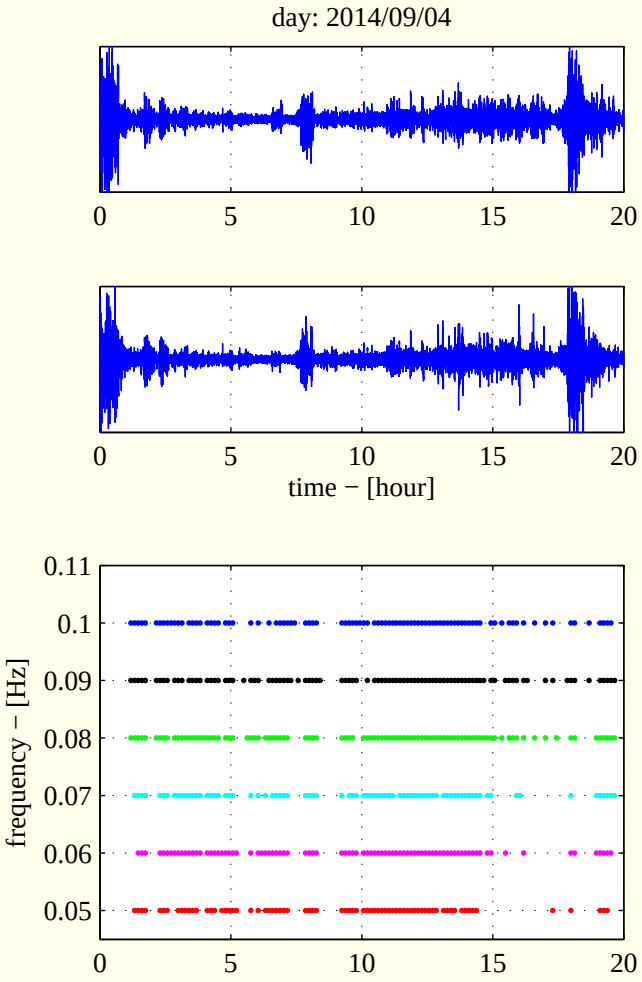
where d is the distance between deux points of observation, f the frequency and β a LOC decay factor.
This simple model does not take into account the orientation of the sensor axis w.r.t. the direction of arrivals.

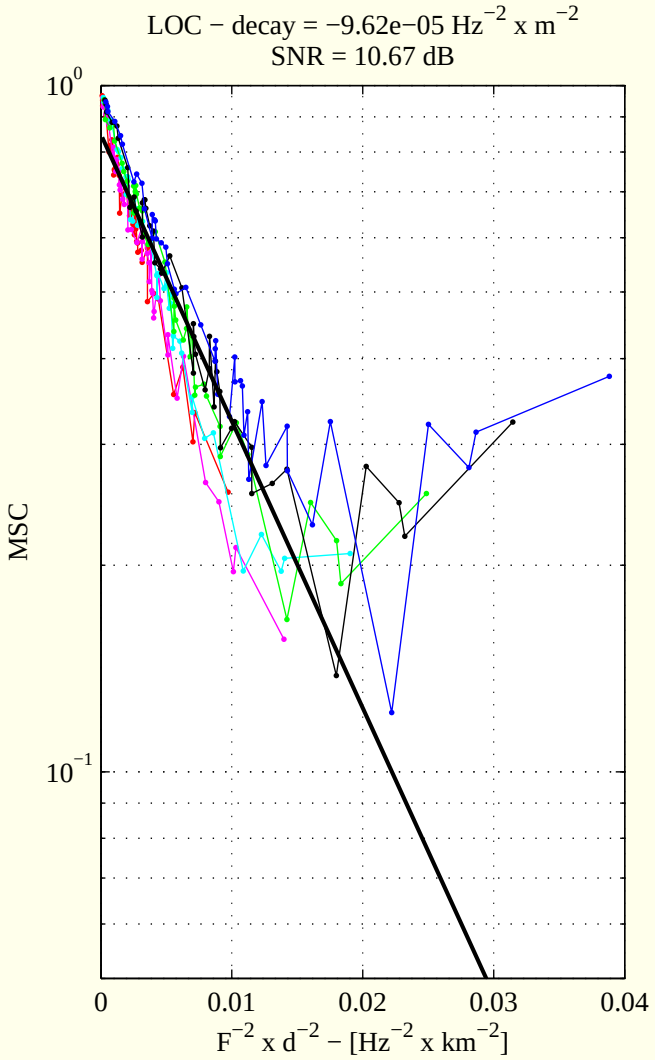
Protocol

- For a given frequency in the selected bandwidth of interest B and for a given time window T, we perform the MSCs for each pairs of sensors. If the two closest sensors have an MSC over 0.8 in a certain T/F cell, we keep this T/F cell for all combinations of interdistances.
- We average on the duration of the file.

- Bandwidth $\begin{bmatrix} 0.05 & 0.11 \end{bmatrix}$ Hz,
- Time window duration $T = 500$ seconds,
- Time duration about 20 hours, i.e. about 144 windows.
- In the selected bandwidth the acceptance rate is ..

IS37, with 10 sensors then 45 interdistances





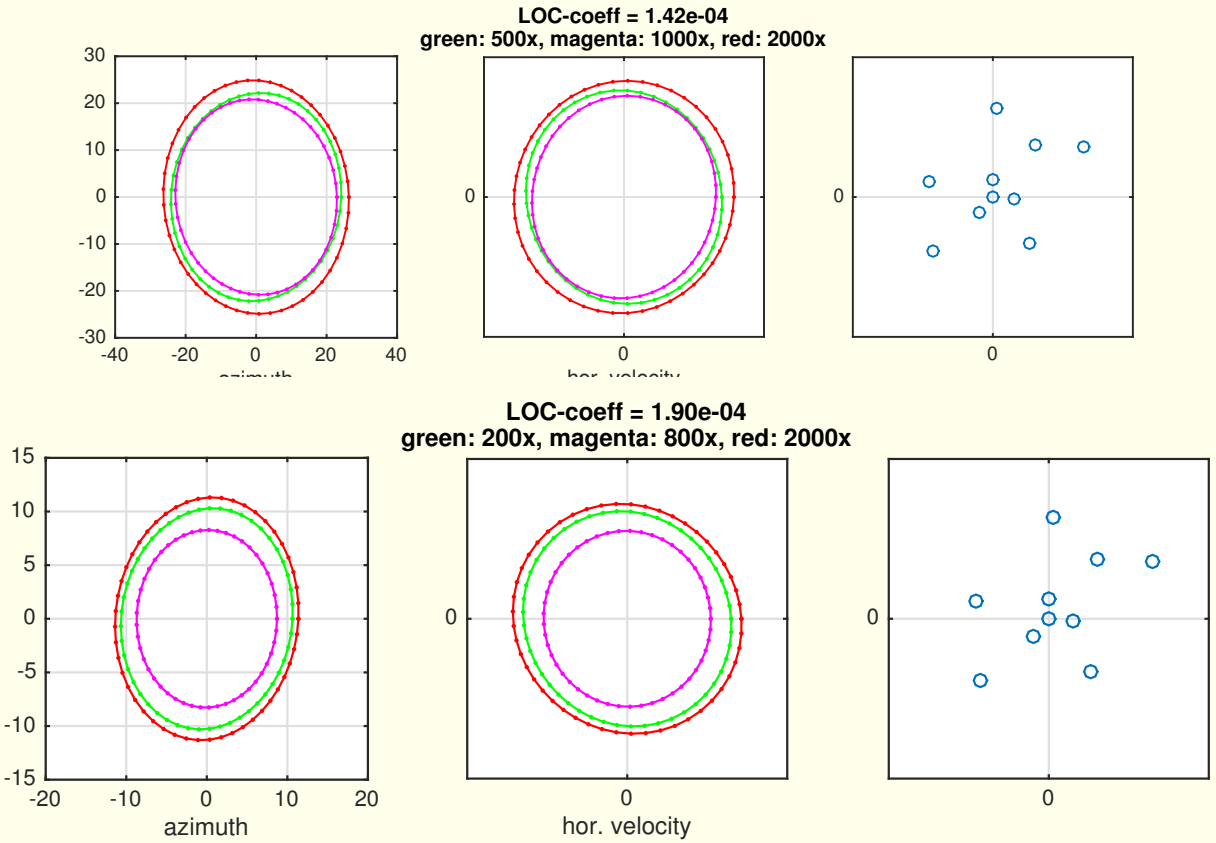


Figure: *500, 1000, 5000 are the aperture multiplicative factor of the I37 template reported on the RHS of the figure. LOC factor is* $\beta = 0$ *and* $\beta = 1.9e^{-4}$*. Maximal frequency* 0.18 *Hz.*

In presence of LOC, we see that the precision passes by a optimum for $R = 1000$.