Contents

Station design

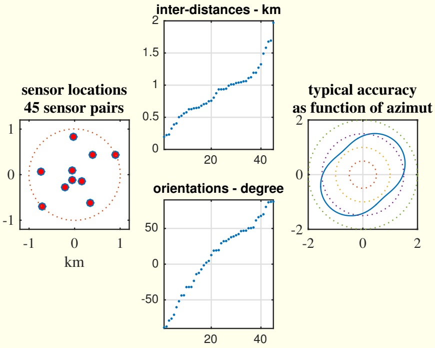

Figure: 45 *sensors pairs*

In a station design the two following elements could be of interest:

- the aperture
- the relative locations of the sensors
    - the uniformity of the inter-distances
    - the isotropy w.r.t. the DOA accuracy

Coherence

We consider a plane wave "not fully spatially coherent" and we assume that the loss of coherence (LOC) is given by

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

where d is the distance between 2 points of observation, f the frequency and β a LOC decay factor.

CRB

- Cramer-Rao bound (CRB) provides a lower bound to the variance we can expect in the estimation of a parameter of interest (POI).
- If the two POIs are the azimuth and the horizontal velocity, the CRB is a 2 by 2 positive matrix.
- CRB is a function of the true azimuth and the true horizontal velocity, the LOC parameter β, the SNR, the geometry of the station.

IS37, with 10 sensors then 45 interdistances

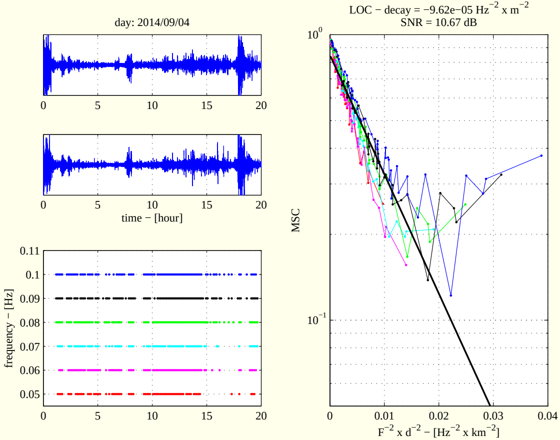

Figure: *Top: signals on about 20 hours. Middle: the 11 selected frequencies. A dot means that the MSC on the 3 nearest sensors if over 0.8 for the time window. Bottom: the 11 curves of the MSCs as a function of the interdistances.*

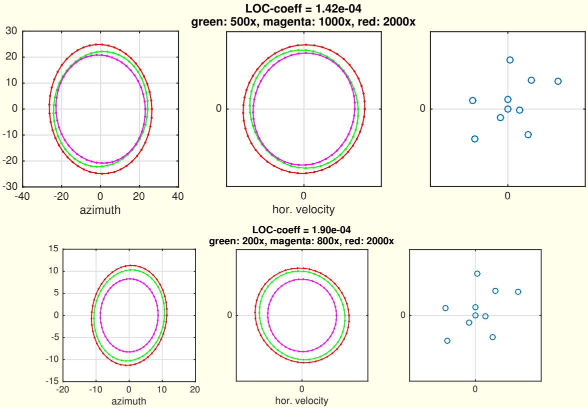

Figure: *500, 1000, 5000 are the aperture multiplicative factor of the I37 template reported on the RHS of the figure. LOC factor is $\beta = 0$ and $\beta = 1.9e^{-4}$. Maximal frequency 0.18 Hz.*

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