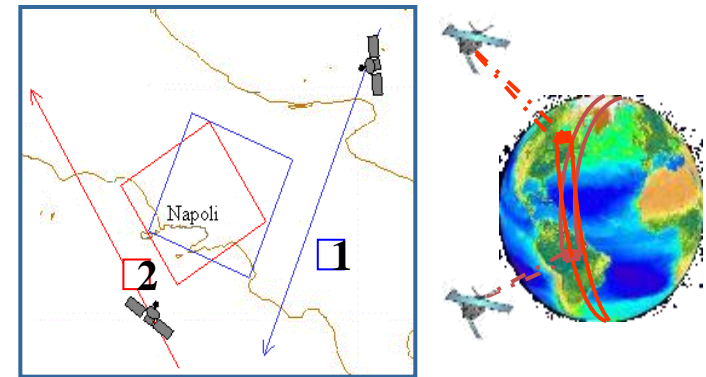


# Minerbio subsidence monitoring - Technologies

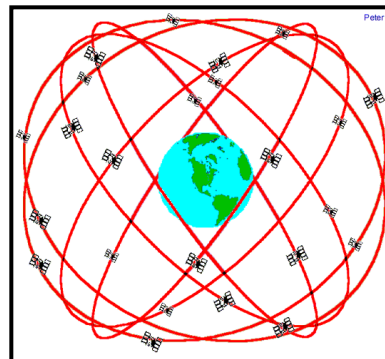
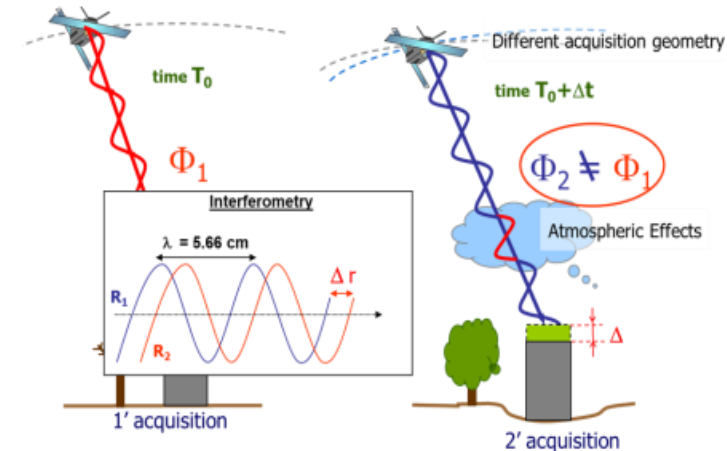
## SAR technology

- Integrated system of plano-altimetric measures with satellite images interpretation ( Interferometry PS Radar)
- Data are detected every 24 days by two acquisition modes (ascending and descending orbits), therefore with double dataset in PS numbers and velocity range in two different directions: vertical and planar (N-S and W-E).



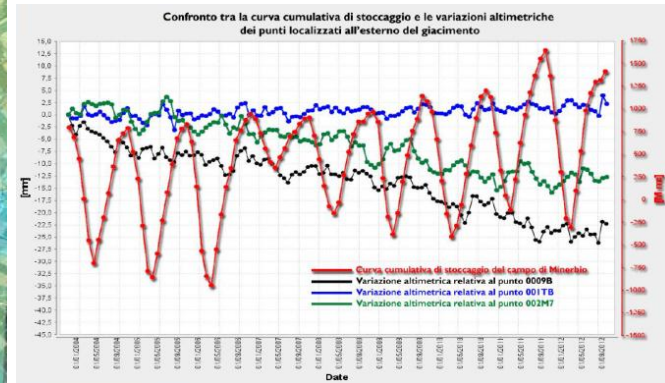
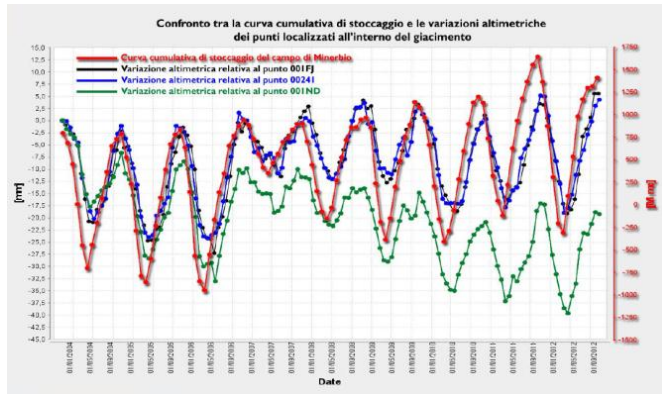
## CGPS technology

- CGPS System (Continuous Global Positioning System) is constituted by 24 satellites distributed on different orbits, more than 20.000 km high on Earth surface
- The system is managed in remote mode, with high-reliability over a long time



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# Minerbio subsidence monitoring - Results



Vertical displacements in the inner field area (7,5-20 mm) are in phase with storage curve peaks. This phenomenon is not observed in the area outside of the gas field.

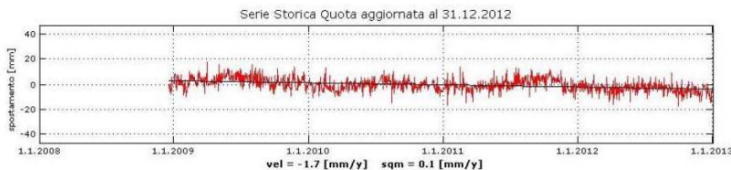
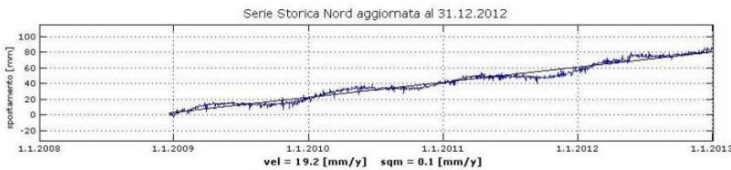
This evidence is related to the rheological elastic behaviour of the cap-rock sediments, as also showed by the results of the geomechanical model.

The subsidence rate, compared to the regional trend, show mean values of - 0,46 mm/y from 2003 to 2012.

CGPS data acquisition (December 2008 - December 2012) recorded altimetric values of -1, 7 mm/y.

The final results of subsidence monitoring in Minerbio field doesn't show anomalous situations even in overpressure gas storage conditions ( $P=107\%P_i$ ).

Results of 3D modelling scenarios show a negligible impact on the ground surface, with deformation gradients that remain well below the most restrictive admissible limits for the civil buildings.



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