



## METRO LINE 9 BARCELONA - SPAIN

### Monitoring the construction of the 42 km line 9 metro tunnel and stations

The city of Barcelona decided to complete its metropolitan network with the construction of the line 9 of the metro. The monitoring of the ground subsidence related to the works was entrusted to SolData.



The monitoring, being undertaken on the level of the line 9 route (that is to say of the city), shows other movements independent of the building works have been observed, such as the 7.5mm/year subsidence of the new wing of the International Airport.



Profile of the Metro line 9



View of the Barcelona International Airport

In addition to the automated monitoring provided by 600 different Cyclops' positions, the monitoring by ATLAS satellite radar interferometry was implemented by SolData along the tunnel route:

- Processing of the stock images providing the history of the ground compaction from 1995 to July 2003;
- Identification of the Permanent Natural Reflectors: 180,000 points over 160,000 km<sup>2</sup>, that is to say an average of one point every 35 m ;
- From July 2003, about ten new images par year are processed in order to follow the settlements of the Permanent Reflectors every 35m.

Our ATLAS module, developed with the IGN (French Geographical Institute), enables us to calibrate the satellite data with the field measurements made on the monitored area.

Thanks to ATLAS, SolData can monitor sensitive structures with a +/- 3 mm precision.

CLIENT :	GENERALITAT DE CATALUNYA
JV :	SOLDATA IBERIA T5IIC
CONSULTANT :	PAYMACOTAS
DURATION :	AUGUST 2003 - AUGUST 2007
<b>TECHNICAL DESCRIPTION :</b>	
<ul style="list-style-type: none"> <li>• Subsidence follow-up with the ATLAS satellite processing channel</li> <li>• Precision radar interferometry applied to ENVISAT images</li> <li>• Calibration on 600 CYCLOPS' positions monitoring in real time over 18,000 buildings</li> <li>• Centralisation of all GEOSCOPE measurements.</li> </ul>	