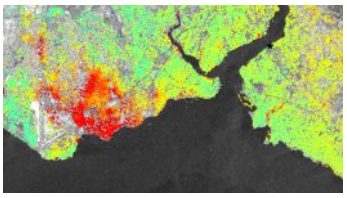
# GMES TERRAFIRMA

*A view from space*

Pan-European Ground Motion Hazard Information Service

May 2006





## Terrafirma in Brief:

**A developing pan-European Service to map and monitor ground movements**

**Sponsored by ESA and the EC**

**Using state-of-the-art radar satellites and processing techniques (PSI)**

**To reveal movements of 1mm/yr**

**Thereby identifying precursors to hazards, vulnerability of ground and the precise extent of instability, when coupled with surface information**

**With a view to improved land-use planning, engineering and loss reduction in relation to subsidence, landslides, mines, tunnelling, earthquake vulnerability**

**Given the enormous costs of these hazards; Italy suffers €1-2 billion loss per year from landslides, and insured losses, alone, exceed €0.7 billion each year in the UK**

**In 2 years, every EU country will have a PSI-processed city from ESA's extensive data archive**

**To stimulate PSI use throughout national hazard mitigation plans**

**In the face of existing hazards and new ones from climate change impacts and population expansion on to marginal land**

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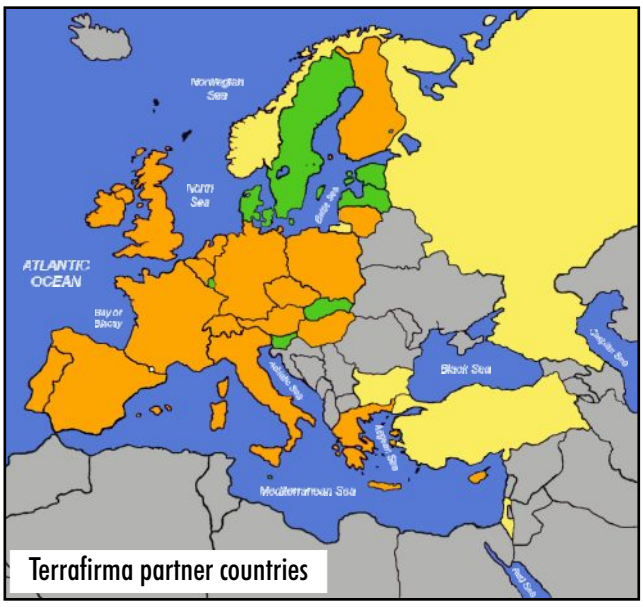
The GMES Terrafirma project, sponsored by the European Space Agency, proposes to deliver a ground movement hazard information service for Europe, with a new technology that utilises radar satellites and a new processing technique (PSI) based on interferometry and stable radar reflectors consistently present over many satellite orbits. This work is aimed at informing specialists, planners and the community at large about the new approach to the assessment of risks from ground movements across Europe and beyond (including, subsidence, landslides, compressible soils, earthquake vulnerability, mines and engineered excavations). It will achieve this through practical examples of how ESA's radar satellites, 800km up in space, can create data that, when coupled with expert knowledge, and ground-based geoscience and engineering information, provides insights into these problems at a level of detail which was technically unprecedented until now. Few cities and towns are without ground movement risks, and Terrafirma is focused on areas where its services can have the greatest impact in leading to a safer, less vulnerable environment, free from the massive economic losses experienced by our societies at present. In Italy, alone, the cost from landsliding is estimated to be €1 - 2 billion, annually.

As we continue to become a more urbanised society, often with construction spilling onto marginal land, the problem worsens, and the need for policy-makers, planners, engineers, and the public, to be better informed, is heightened. Innovative approaches are needed, and this is the niche that GMES Terrafirma is filling. Within two years, every European Union country will have at least one city with satellite radar coverage processed to reveal small ground movements of around 1 millimetre per year. Landslide sites will also be examined. That information will be in the hands of national geoscience centres and engineers for expert interpretation utlilising their own data and expertise. They, in turn, will engage with the relevant authorities in their countries to ensure take up, and action on the hazards which will be seen in great detail and, in many cases, for the first time.

It is intended that these national cities will lead to national initiatives for further studies across each country, and that the examples will be shared across borders to ensure that the community of Europe benefits from the experience of its collective experts and from our European Space Agency's investments in leading-edge technology for practical purposes.




Terrafirma partner countries

**LEGEND**

- Confirmed project partners
- Prospective Stage 2 partners
- Associate partners from Stage 1