

# POTENTIAL OF TANDEM MISSION FOR DETECTING AND MONITORING SMALL TERRAIN MOVEMENTS WITH SAR INTERFEROMETRY (TANDEM PROJECT AOT.F303)

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Claudie CARNEC (1), Christophe DELACOURT (2), B n dicte FRUNEAU (3),  
Christine KING (1), Jean-Philippe AVOUAC (4), Jos ACHACHE (1)

(1) BRGM, Research, Geophysics and Geological Imagery Division, Ave. de Concyr, B.P.6009, 45060  
Orl ans Cedex 2, France ; Phone (33) 2.38 64 30 91 ; fax (33) 2.38 64 31 64 ; e-mail :  
c.carnec@brgm.fr

(2) IPGP, B.P.89, 4 Place Jussieu, 75252 Paris C dex 5, France ; e-mail : delac@ipgp.jussieu.fr

(3) Universit de Marne La Vall e, LPMG/CESAM, 2 rue de La Butte Verte, 93166 Noisy Le Grand  
C dex ; e-mail : fruneau@ipgp.jussieu.fr

(4) CEA, LDG, B.P. 12, 91680 Bruy re Le Ch tel, e-mail : avouac@ldg.bruyeres.cea.fr

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## ABSTRACT

Differential SAR interferometry can be considered as unique tool to get surface deformation  
measurements occurred on large areas (say 100 100 kilometers), with a dense grid and a few  
millimeters accuracy.

The TANDEM project AOT.F303 intends to identify and demonstrate the interferometric  
capability of the TANDEM mission in the Natural Risks problematic. It concerns two areas  
of interest : landslides in steep relief and land subsidence in an industrial context. The  
TANDEM mission should first offer the opportunity of detecting local movements on  
couples acquired one day apart, for which displacements are too high to be observed on  
standard orbital cycles of 35 days (i.e. landslides). Furthermore, it should offer a regular  
temporal sequence of phenomena of lower amplitude, but spatially moving in time (i.e.  
subsidence).

The possibilities to measure land subsidence by means of SAR interferometry have been  
investigated in the southern part of France. The preliminary results obtained on this test site  
were based on 35 days repeated ERS-1 passes [Carnec et al., 1996]. The use of image pairs  
taken 1, 3 or 35 days apart, combined with a Digital Elevation Model (DEM), showed the  
possibility of making a map of the topometrical deformation that affected the site between  
the dates of the successive images, and without needing any artificial targets. Mapping of the  
ground movements and their corresponding fringe patterns has made it possible to extract the  
movement characteristics. The existing monitoring and surveillance systems in the field,  
such as the benchmark network, further enable the verification of the interferometric results  
through direct comparison of the data. The study has been carried out by taking the seismic  
activity of the area into account and assessing the influence on ground movements. Finally,  
the interferometric results are optimized through a kinematic approach to the phenomenology  
using the temporal series of interferograms and through modelling the active movements.

Carnec, C., Massonnet, D., King, C., 1996, Two examples of the use of SAR interferometry on  
displacement fields of small spatial extent, GRL, vol. 23, no. 24, 3579-3582.

Keywords: ESA European Space Agency - Agence spatiale europeenne, observation de la terre, earth observation, satellite remote  
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