

YESOU H.*, BRAUX C.**, ROUZEAU O.**, CLANDILLON S. *, ROLET J.*** and de FRAIPONT P.*

* SERTIT , Service Régional de Traitement d'Image et de Télédétection, Parc d'Innovation , bd Sébastien Brant 67400 Illkirch, France Ph : 33 (0)3 88 65 51 95 ; Fax: 33 (0)3 88 65 51 99

e-mail: herve@sertit.u-strasbg.fr ; URL adress: <http://sertit.u-strasbg.fr>

BRGM, Direction de la Recherche, Département Géophysique et Imagerie Géologique, BP 6009 - 45060 ORLEANS Cedex 2 - France - Ph: (33) (0)2 38.64.34.34

e-mail: KING@dr.brgm.fr

Within the frame of the Project Pilot PP2-F10, an appraisal of the performance for geological feature mapping potential for ore exploration survey of ERS-1 and fused optical data/ ERS was carried out over the South Armorican Shear Zone (Brittany, Western France)

In a first step an assessment of raw ERS and multitemporal colour composites was done. On the ERS-1 data, textural variation and contrast are so weak that geomorphologic and tectonic features are not accentuated. It was not possible to extract an usable lineament map, interpretation of these data would been hazardous. Then, in order to provide an informative image, from nine descending ERS data, a multilook multitemporal image was produced, a 27 looks equivalent. In this image, the good restitution of geometric information, such as the agricultural parcelling, with a effective spatial resolution in the same range than high resolution optical data, allowed good interpretative results with the mapping of the regional foliation, shear zones and of the late fracturing networks. It have to be pointed out that the multitemporal multilook image technique seems very promising because it is a no so expensive procedure allowing the production of improved ERS data usable at relative fine scale (1/ 50 000 or 1/100 000) with a good confidence

In a second step, the merging the multitemporal multilook image and a multispectral data, derived from the mixing of a Landsat TM data and a SPOT panchromatic image, was achieved using both photographic techniques and Principal Component Analysis. The fused images provide enhanced colour composites, combining information derived both from radar and optical data, and allowing an accurate extraction of the geological information. A lineament map were produced. Mapped features are the same than those observed on the maps derived either from the ERS multilook multitemporal image or from a merged Seasat-SPOT data obtained in a previous study: N°70 foliation, N°90-100° shear zone and N160-180° late fracturing. Therefore, with a finest level of detail.

In a third step an assessment of ERS derived products for ore exploration was carried at the BRGM via a multisources analysis though a GIS analysis using the SYNERGIS software. The lineament map derived from the multitemporal multilook ERS image was compared with a previous lineament map derived from Landsat TM image. Then both data were compared with geophysical and geochemical data. Two types of remarks can be drawn. Firstly, from a methodological point of view, ERS interpretation provide more diversified information than Landsat TM data. That could be linked with two points ; the ERS multitemporal image present an improved resolution and also with the followed approach. The Landsat data were analysed during a operational survey, when the investigation of the ERS data was more deeper due to the exploratory aspect of the programme. From a geological point of view, there is a good complementarity between the ERS and Landsat data. The Landsat TM data provide a clear information concerning the early structures such as the South Armorican Shear zone, that is pointed out also by the good correlation between As anomalies and lineaments derived from Landsat TM data. The ERS lineament map provides a dense information over all the studied area, and a precise mapping of the late fracturing networks the SASZ. This fact is confirmed by the statistics analysis and by the correlation between the Pb anomalies and lineaments derived from ERS data.

From this assessment programme, it have be pointed out that ERS added value products, such as multitemporal average image, are very interesting for the studies and analysis of geological structural features and that the synergism between optical and SAR data have to be promoted.