

**Meteosat low resolution data processing
for quality control and correction
of middle resolution data in geological mapping**

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Low resolution imagery has very little use in geological remote sensing except for low scale regional analysis. Based on a few findings on middle resolution Landsat and Aster images (linear radiometric alterations ; ...) we implemented a workflow in order to check if low resolution time series taken around the acquisition date of middle resolution data could help to separate time invariant regional features from atmospheric effects that lead to misinterpretations in the structural analysis.

The first test was done in the sandy desert of the El Borma area (Tunisia / Algeria border) where available work published in the January 2006 issue of the Journal of African Earth Sciences led to geological mapping based on variations of reflectance not explained by regional geology. A first check on the whole cloud free collection of Landsat 7 images from 1999 to 2003 led to a first conclusion : those patterns were seen only on 1 image (over 89), the one chosen for the reference study (December 28th, 2002). So we took all available Meteosat 7 data between December 27th and December 29th and especially compared the local situation at 9:30 am (the closest available image to the Landsat acquisition hour). On those images we did two types of processings :

- Principal Component Analysis was performed on all the channels.
- Directional filtering was performed on the VIS6 visible channel.

The results show that only the December 28th image is affected by those subtle 45° patterns. The analysis of the various Meteosat channels and the quick-looks of the Meris image strongly suggest a high altitude effects (possibly a jet stream) which disturbs local radiometry on the Landsat 7 image. This correction work expresses the power of low resolution data to get a first view of the area and to give complementary information for middle and high resolution data analysis.

Such an operational workflow is possible because time series collected by low resolution sensors are available for free and contain huge amounts of data allowing to select the exact interesting dates and hours. Due to the acquisition date of the Landsat 7 data, we had to use Meteosat 7 (old generation) imagery but we also applied the workflow on summer 2006 MSG data (with 12 channels and improved spatial and temporal resolution) to do quality control over Aster, Spot 5 and Formosat2 data over the same petroleum basin.