Combining magnetic and seismic reflection data for characterization of inner shelf sand nourishment areas

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Main aim: evaluate potential sand borrow areas for beach nourishments in the Portuguese west coast, by characterizing the sedimentary record of four areas in the Portuguese inner shelf (ET, BM, FF, CC)

Surveys comprised: ultra-high resolution multichannel seismics, magnetics, multibeam bathymetry and backscatter and parametric echo-sounder, acquired along high resolution orthogonal grids.

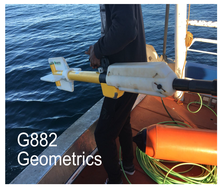
Here we present magnetic data and its interpretation combined with acoustic data.

The **residual anomaly** ampltitudes are very low (2-10 nT), and reflect either the intra-basement structure or supra-basement sedimentary features such as buried channels and coastal barriers.
The lower wavenumber **regional anomaly** varies between areas but in general expresses deeper geology, too deep to be observed by our high-resolution seismics.

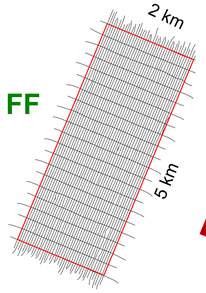
Individual dipolar anomalies were checked for a relation with shallow features, eventually archeological artifacts.

Magnetic surveys:

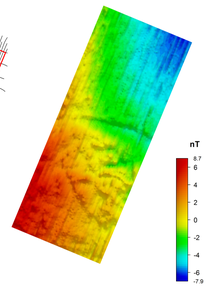
- magnetometer: G-882 Geometrics
- ship: Diplodus, IPMA (17.5 m)
- lines spacing: 50 m
- tielines spacing: 250 m
- ET, BM, FF: 10 km^2
- CC: 5 km^2



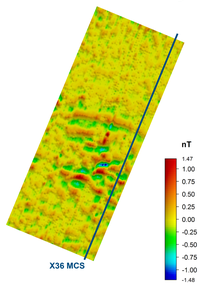
Survey lines



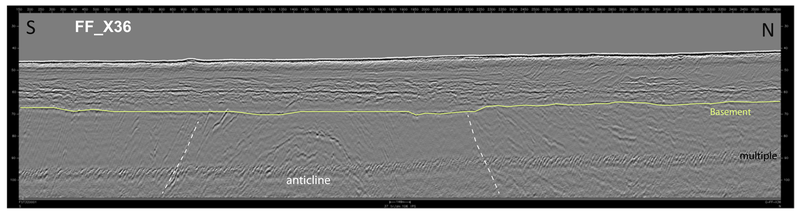
Anomaly



Residual Anomaly



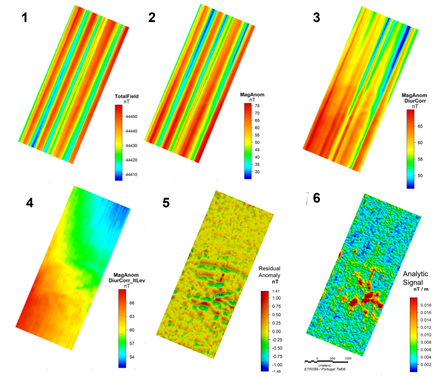
Geological meaning



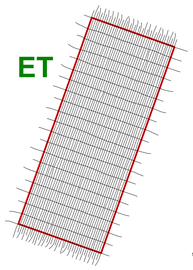
FF: residual magnetic anomaly is due to **intra-basement deformation structures** (fold hinge).

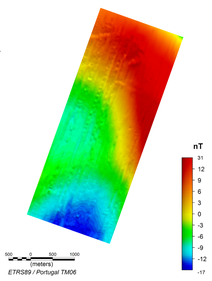
Top of basement: 52 - 55 m

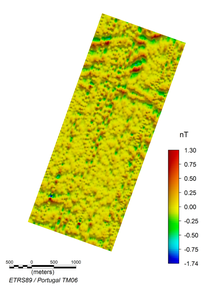
FF: example processing steps

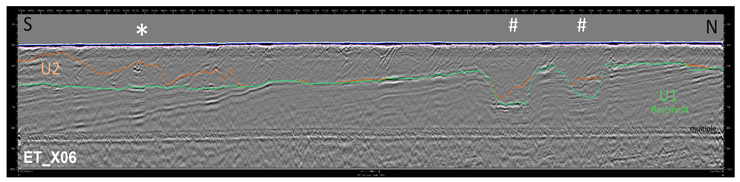


ET

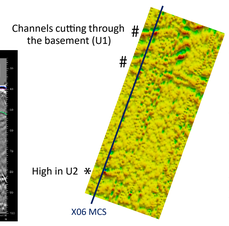


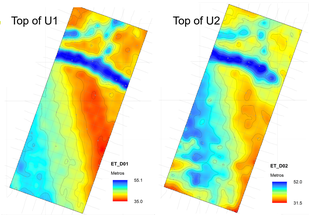




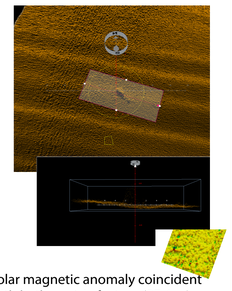


ET: variations in the residual anomaly reflect **sedimentary features above the basement**: buried channels (#) and a structural high in unit U2 (*)



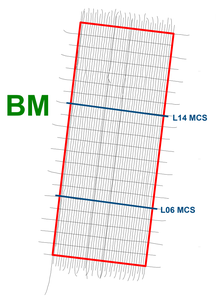


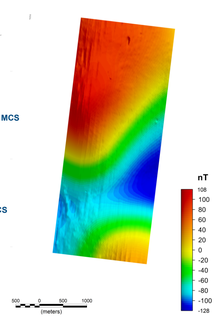
Gridded seismostratigraphic units

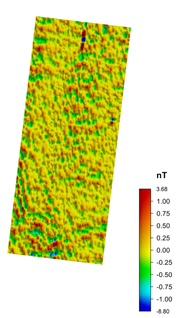


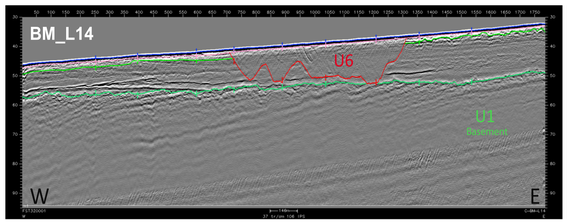
Dipolar magnetic anomaly coincident with bathymetric feature (27.4 m)

BM

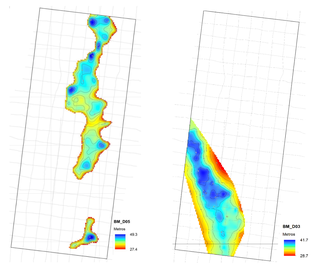






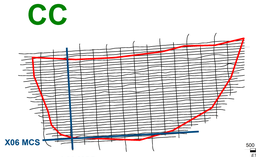


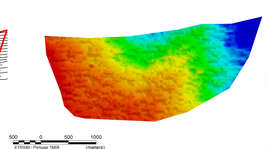
BM: variations in the residual anomaly reflect **sedimentary features above the basement**: old, buried channel system (U6) and coastal barrier (U3)

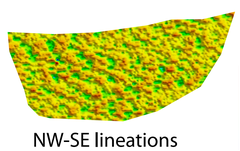


U6: buried channels
U3: buried coastal barrierr
Gridded seismostratigraphic units

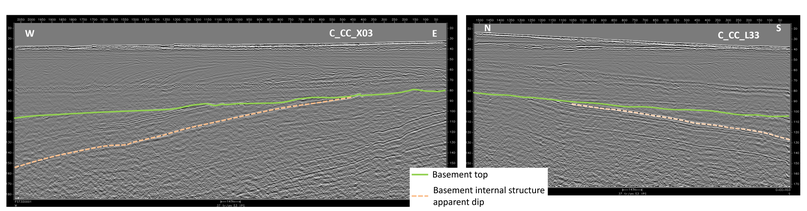
CC







NW-SE lineations on the residual anomaly



CC: the residual anomaly relates to the **basement internal structure** (basculated reflectors), which strikes NW-SE and dips to SW.

Inferred from the intra-basement apparent dip to S and W in the X03 and L33 orthogonal lines