Geophysical Research Abstracts
Vol. 14, EGU2012-9142-1, 2012
EGU General Assembly 2012

Pulses of aeolian activity and westerly winds intensification in the Portuguese coast during cooling climate events

S. Costas, S. Jerez, R. Trigo, R. Goble, and L. Rebelo
Unidade de Geologia Marinha-LNEG, Amadora, Portugal (susana.costas@lneg.pt)

The Portuguese coast is dominated by sediment starved shorelines with severe problems of erosion and land loss. Active trangressive dunefields at present are very rare, yet the presence of stable dunefields covering large areas of the Portuguese coast points to a radically different scenario in the past. Here we investigate the aeolian record from central Portugal to understand the conditions triggering aeolian mobilization.
Ground penetrating radar (GPR) was used to image the stratigraphy of a cliff-top coastal transgressive dunefield and reconstruct former windfield regimes. Using optically stimulated luminescence (OSL) five major phases of aeolian activity were dated at 12.6, 5.6, 1.2, 0.4 and 0.3 ka, and related to coastal instability and enhanced westerlies. These phases were later reconciled to favorable patterns of atmospheric circulation simulated by global and regional climate models capable of describing the relevant atmospheric phenomena at both synoptic and local scales, respectively.
The results prove that major phases of aeolian activity are associated with the onset of cold climate events of global distribution and coincide with reported pulses of aeolian activity in northwest Europe. This implies the dominance of zonal westerlies along the western coast of Europe from Denmark to Portugal during the onset of cold climate events. Thus we focused on the potential role played by the most important large-scale pattern of atmospheric circulation in the northern Hemisphere, the North Atlantic Oscillation (NAO). Model simulations suggest that the pattern of atmospheric circulation during periods of enhanced aeolian activity is compatible with prolonged negative phases of the North Atlantic Oscillation (NAO).