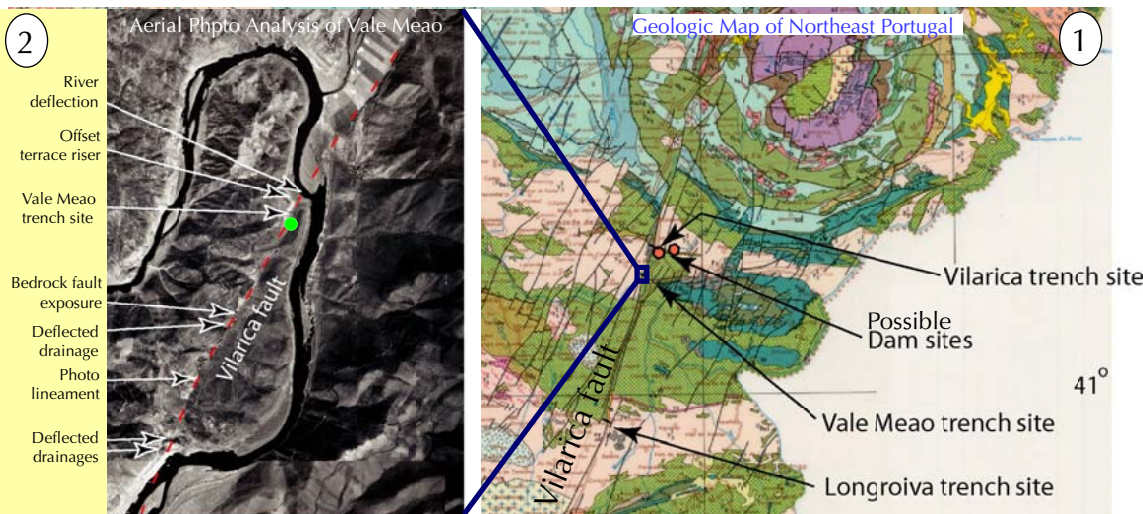




PALEOSEISMIC INVESTIGATION OF THE VILARICA FAULT to Assess the Seismic Hazard to a Proposed Dam in Northeastern Portugal

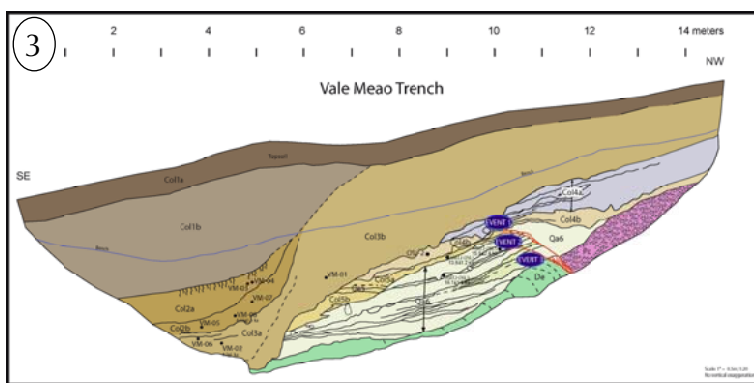
PROJECT DESCRIPTION

Earth Consultants International (ECI) conducted paleoseismic investigations to characterize the seismic hazard potential of the Vilarica fault to a proposed dam in northeastern Portugal (Figure 1). Although the dam would not lie on the fault trace, information on the potential magnitude and return time of earthquakes on the Vilarica fault was needed to help establish seismic design parameters for the dam. As part of this investigation, *ECI* personnel analyzed stereo-paired aerial photography of the Vilarica fault to assess the overall expression of the fault and to map geomorphic features typically associated with active faults (Figure 2). This analysis was then used to identify potential trench sites that would be useful to date and measure slip for past surface ruptures on the fault. Finally, we excavated six trenches and numerous test pits at three different sites to understand the fault's late Quaternary history (Figures 3 & 4).



FINDINGS

Trenches at Vale Meão exposed a section of faulted alluvium and colluvium with at least two and probably three earthquake events since the late Pleistocene (3). The most recent event is dated to between 4.7 and 13.8 ka. The penultimate event occurred just prior to 16 ka, whereas a third event is inferred after 25 ka. Northeast of the Vale Meão site, trenches excavated in late Pleistocene and Holocene alluvium exposed the fault displacing channel deposits dated to about 18 ka. In a succession of closely-spaced parallel cuts and trenches, we traced the margins of the channel into and across the fault to resolve 6-7 m of cumulative slip during the last two earthquakes (4).



IMPLICATIONS

The information developed in this study suggests that the Vilarica fault is capable of producing relatively large earthquakes in the magnitude range of M7.1 - M7.7, although most are probably sized at the lower end of that range. The return period for such events is on the order of 8,000 years and the most recent event occurred between 4,700 and 13,800 years ago. These data imply that a future large earthquake is possible on the Vilarica fault, with a relatively low, albeit poorly constrained, probability.

