# Deep-Water Turbidites as Holocene Earthquake Proxies along the Northern San Andreas Fault System

C. GOLDFINGER[1], A. Morey[2], and H. Nelson[3]

[1]Oregon State University, COAS, Ocean Admin. 104, Corvallis OR 97331. gold@coas.oregonstate.edu, [2]Oregon State University, COAS, Ocean Admin. 104, Corvallis OR 97331. morey@coas.oregonstate.edu, [3]Instituto Andaluz de Ciencias de la Tierra,CSIC,Universidad de Granada, Granada, Spain. odp@ugr.es

New core data show that continental margin channels in Northern California have recorded a Holocene history of regional submarine landslides slides possibly triggered by great earthquakes. The field program was completed in 2002 during a month of at-sea coring with an international science party of 37 on the Scripps vessel R/V Roger Revelle. Thus far in our analysis of the data, we have first tested the turbidite record, applying multiple tests for synchronous triggering of turbidity currents. We use 14C ages, relative dating tests at channel confluences, and stratigraphic correlation to determine whether turbidites deposited in separate channel systems are synchronous, that is they were triggered by a common event. The events recorded along the Northern California margin can be correlated with multiple proxies from site to site between Noyo Channel and the latitude of San Francisco. The evidence that the Holocene turbidite record is primarily an earthquake proxy, is now quite strong. Preliminary comparisons of our event ages with existing and in progress work at onshore coastal sites show correspondence to a remarkable degree, further circumstantial evidence that the offshore record is primarily earthquake generated.

Matching physical property records requires synchronous timing because of the rapid settling time for turbidites, an in some cases the lack of direct connection between the separate channel systems that are sampled. We have recently tested X-Ray fluorescence (XRF) analysis of selected cores to augment existing heavy mineral analysis to "fingerprint" the source provenance, and thus identify simultaneous arrival at a confluence from multiple locations along the fault.

Hemipelagic sediment thickness between events is used as a semi-independent measure of time between events, and thickness patterns down core are also used as a correlation criteria along with multiple other datasets. Hemipelagic thickness is also used to identify event-specific erosion among multiple cores at a single site. If correct, our initial correlations along strike imply rupture lengths for many events of at least 270 km.

We are using OXCAL to build an age model for each key site along the margin, using both 14C results, the timing constraints provided by hemipelagic sedimentation between events, and correlation constraints. OXCAL uses a rigorous Bayesian technique for refining event ages with multiple constraints which can be stratigraphic, historical or other timing, rate limiting, or correlation criteria. Testing this method for 1906 yields 1902 (1880-1910), and 1690 (1660-1720) for the penultimate event. .

This work has great societal relevance for the San Francisco Bay Area, where Holocene recurrence intervals for great San Andreas earthquakes are presently elusive. Results from the turbidite record combined with land paleoseismology can address long term recurrence, possible patterns of

recurrence, segmentation, and segment interaction along the Northern San Andreas.