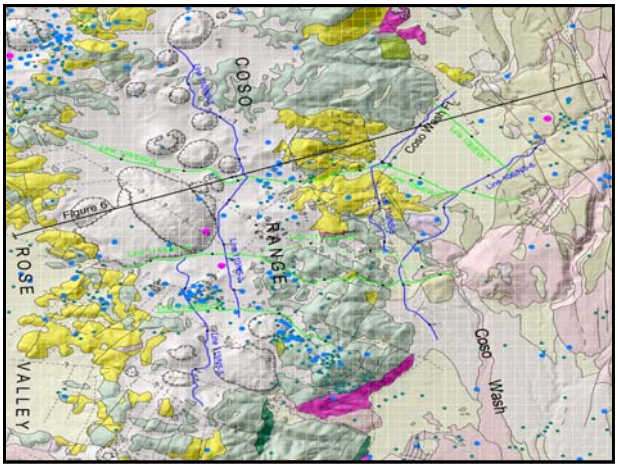
OUTLINE

- INTRODUCTION
- DATA PROCESSING
- 3-D RESULTS
- Migrated Reflection Imaging
- DISCUSSION

NEW SEISMIC IMAGING OF THE COSO GEOTHERMAL FIELD, EASTERN CALIFORNIA

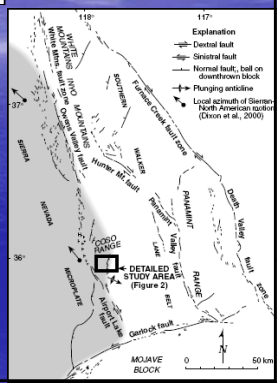
Jeffrey Unruh
William Lettis & Associates, Inc., 1777 Botelho Drive, Suite 262, Walnut Creek, CA 94598
Satish Pullammanappallil and William Honjas
Optim LLC, University of Nevada, Reno 89557
Francis Monastero
Geothermal Program Office, China Lake NAWC, CA 93555

Third Paper Presentation
Asaad E. Al-Zawwad
214303
20-Dec-2006



INTRODUCTION

- This paper presents new seismic images of the Coso geothermal field in eastern California
- 45 line-km of 2-D reflection acquired in the central Coso Range to image structure in the crystalline rocks that host the geothermal field



DATA PROCESSING

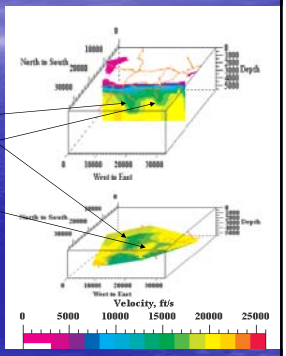
- The processing consists of the following steps:
- 1) P-wave first arrivals in the seismic data for individual lines are inverted to obtain the shallow 2-D velocity structure along the line. The inversion is performed using SeisOpt @2D.
- 2) Kirchhoff pre-stack seismic images are developed for each line by using the velocity tomograms as a basis for migrating the reflection data.
  - Preprocessing of the data (muting, filtering, etc) was performed prior to the migration.

INTRODUCTION

- The data were processed using a combination of detailed velocity modeling and Kirchhoff pre-stack migration to obtain accurate, depth-migrated images of the subsurface structure
- The goal of this study was to image moderately to steeply dipping brittle faults and fractures that may control permeability and localize production in the field.
- To image deeper structures and assess their relationship to shallow faults that accommodate active strike-slip faulting and extension in the central Coso Range.

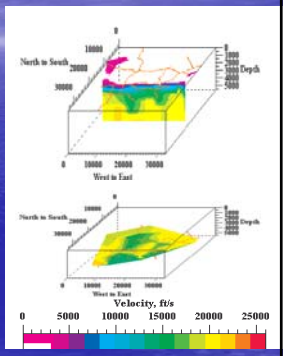
3-D RESULTS

- Two low velocity zones
- Main production area
- East Flank
- Low velocities with 4.6 km/s (15,000 ft/s) crystalline bedrock velocities of about 6.1 km/s (20,000 ft/s)



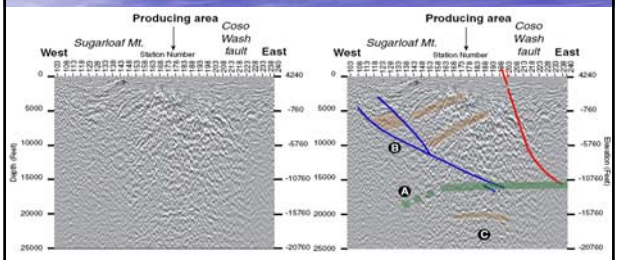
3-D RESULTS

- They interpolated the shallow velocity structure between individual 2-D seismic lines to develop a 3-D model of lateral velocity variations beneath the geothermal field.
- SlicerDicer, ver. 3.0.3, was used for 3-D visualization of the 2- D data



Migrated Reflection Imaging

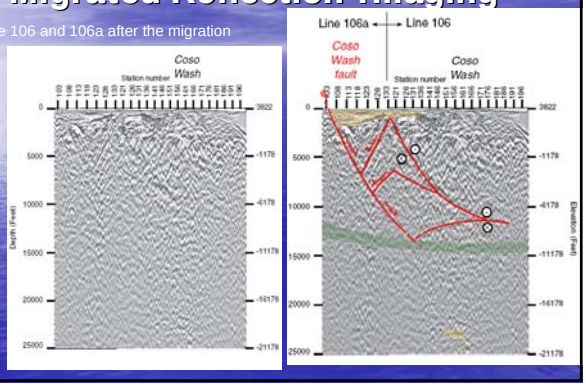
East-west depth-migrated line 109



(A) imaged on lines 106 and 106a(Previous fig). Moderately east-dipping reflectors west of the Coso Wash fault (B) also appear to terminate against the 4 km reflecting horizon. West-dipping reflectors (C) appear to terminate against the B reflectors.

Migrated Reflection Imaging

Line 106 and 106a after the migration

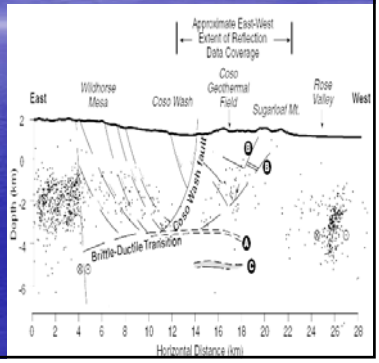


DISCUSSION

Reflector (A) lies at or near the base of seismicity and is interpreted to be the local brittle-ductile transition zone beneath the Coso field. Brittle faulting accommodated by the southeast-dipping Coso Wash fault and antithetic faults of Wildhorse Mesa is confined to the upper 4 km above the brittle-ductile transition.

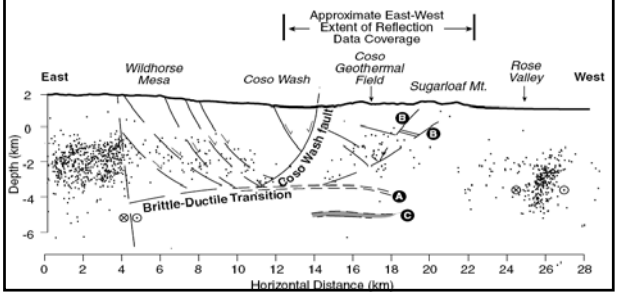
East-dipping reflectors west of the Coso Wash fault (B) underlie Sugarloaf Mt. and some of the youngest volcanic domes in the Coso Range. These reflectors may be moderate to low-angle normal faults or magma conduits.

The high-amplitude reflector at 6 km depth beneath the geothermal field (C) is interpreted to be a lens of fluid or a magmatic sill



DISCUSSION

Interpreted relationship between major features imaged on lines 106 and 109, mapped geology and seismicity (events recorded by the Southern California Seismic Network).




Thank you