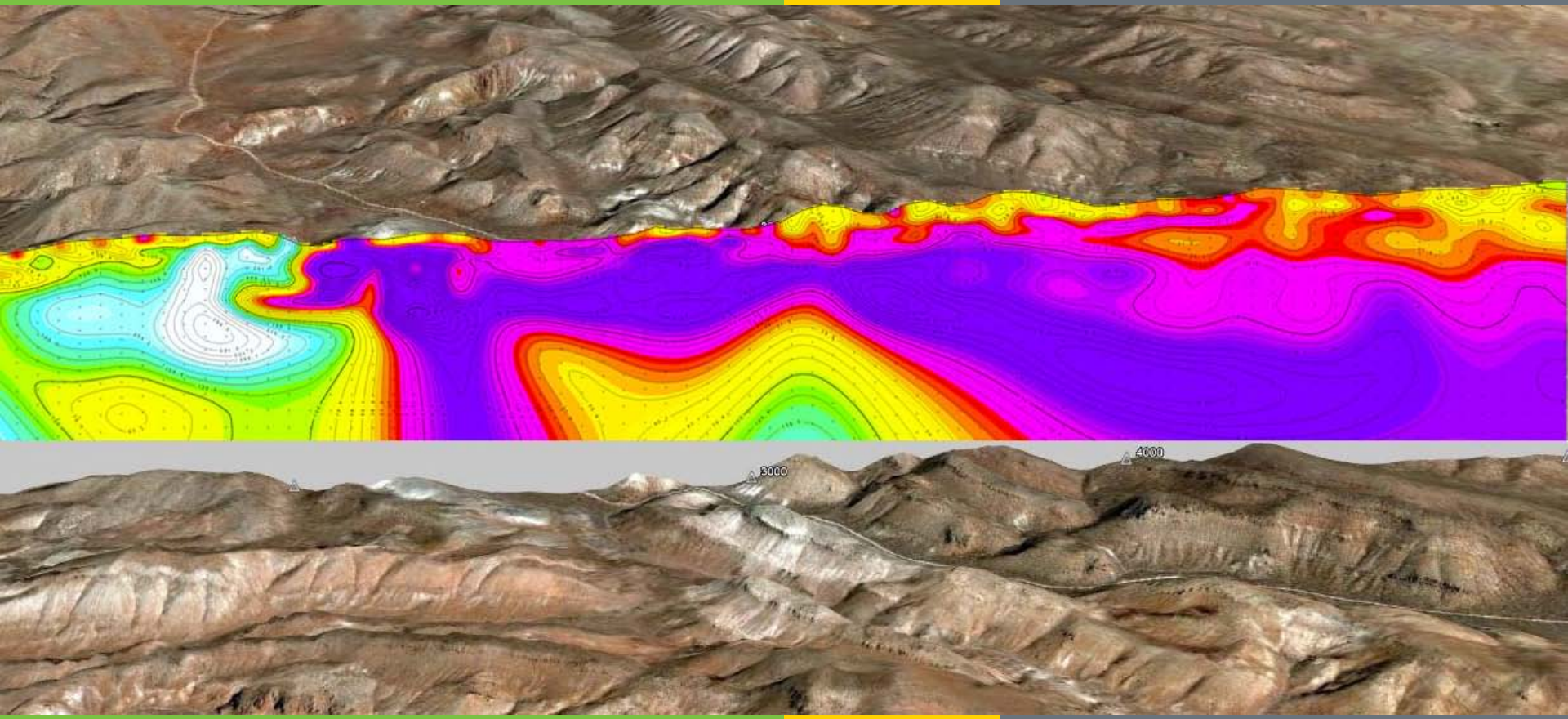


Application of a New Structural Model and Exploration Technologies to Define a Blind Geothermal System: A Viable Alternative to Grid Drilling for Geothermal Exploration: McCoy, Churchill County, NV

May 14, 2010

Dick Benoit, Principal Investigator
James F. Echols (Presenter)
Magma Energy (U.S.) Corp.

Validation of Innovative Exploration Technologies

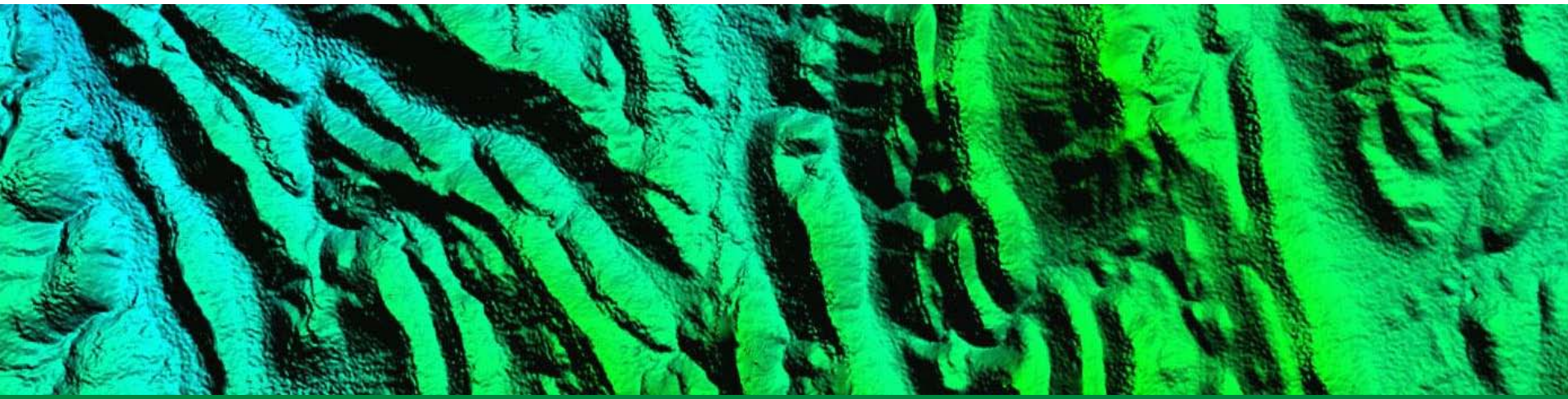
Overview

- Timeline
  - Project start date: 01-22-2010
  - Project end date: 01-22-2012
  - Percent complete: 1.1% by amount spent, but half-way to first well
- Budget
  - Total project funding: $10,039,930.00
  - DOE share: $4,511,945.00
  - Magma Energy share: $5,527,985.00
  - Funding received in FY09: $0
  - Funding for FY10: $589,899
- Barriers: geothermal indicators are from an older system (old and cold); the section above the geothermal system is so fractured that loss-of-circulation and other drilling problems make large diameter holes expensive
- Partners: University of Nevada, Reno

Relevance/Impact of Research

Improve exploration technologies for range-hosted geothermal systems

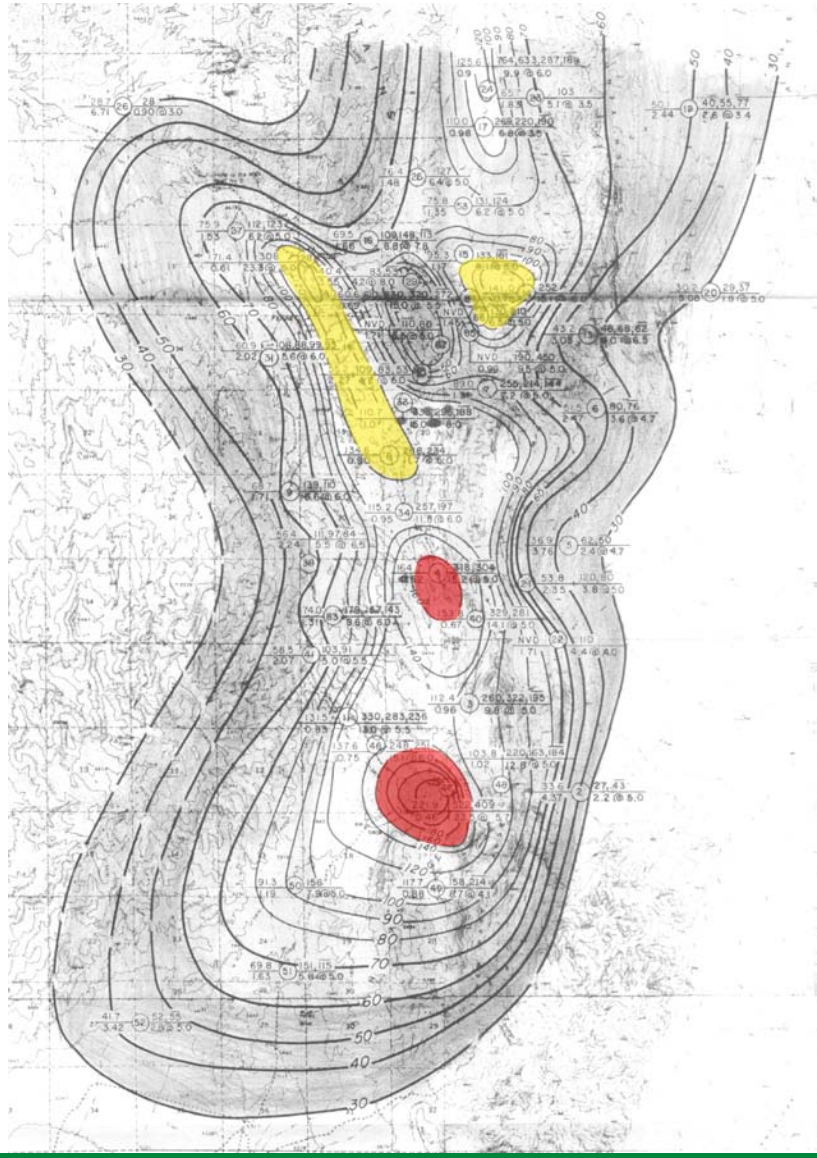
- Employ new concept models and apply existing methods in new ways
- Breaking geothermal exploration tasks into new steps, segmenting the problem differently
- Testing new models for dilatent structures
- Utilizing shallow thermal aquifer model to focus exploration
- Refining electrical interpretation methods to map shallow conductive features
- Identifying key faults as fluid conduits
- Employ soil gas surveys to detect volatile elements and gases common to geothermal systems



Scientific/Technical Approach

Trace thermal aquifer outflow to deep, hot sources

- AMAX identified four thermal anomalies by thermal gradient
  - Drilled 1,000 ft - 2,500 ft test on each anomaly
  - Found indication of a depth limit to thermal anomaly
  - Lacked a cost-effective approach to locate the deeper source
  - Didn't have alternative model to continue exploring
  - Didn't recognize that shallow thermal aquifers mask the sources of upflow



Schedule

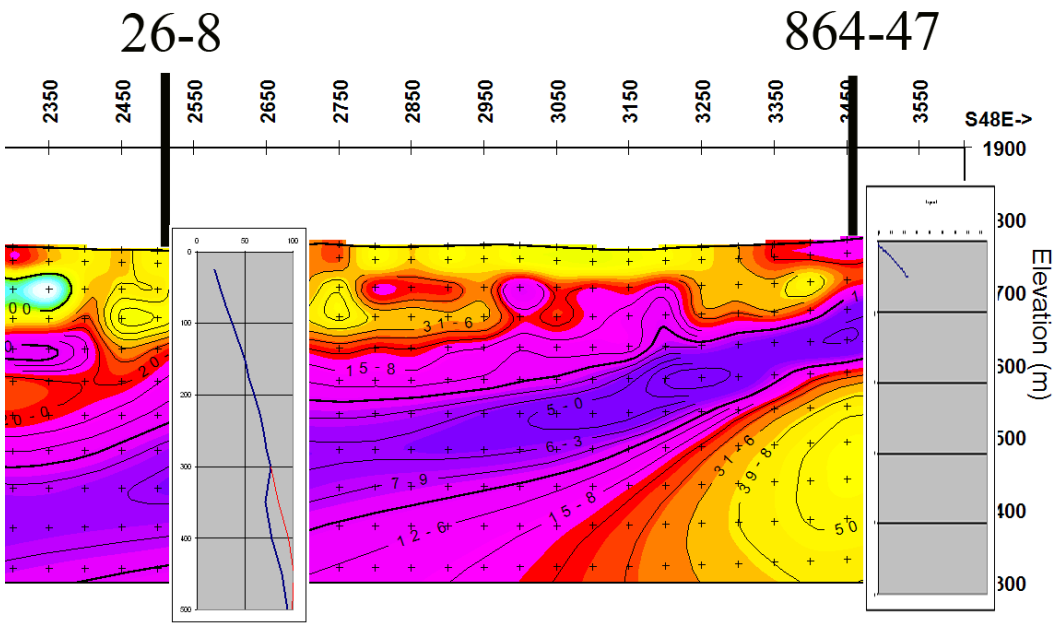
- Geophysical surveys — Jul 2010
- Soil gas survey — Aug 2010
- Geologic surface mapping — Sep 2010
- BLM permitting — 2010
- Data Integration and targeting — Nov 2010
- Review Meeting — Dec 2010
- Deep, angled thermal gradient drilling program — Mar 2011

Technical Accomplishments

- Assembled and reinterpreted historical temperature data
- Map shallow conductivity feature through CSAMT
- Plan MT survey for summer 2010 to map deep conductivity features

Team Members

- Dick Benoit, PI
- Gary Oppliger, Geophysicist
- Jim Echols, Explorationist
- Mary Ohren, Geologist



Project Management/Coordination

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

	Pre-award Spending Authorization			Effective Date			Fully Exectured Contract	Peer Review Meeting							
	10/09	11/09	12/09	01/10	02/10	03/10	04/10	05/10	06/10	07/10	08/10	09/10	10/10	11/10	12/10
CSAMT Survey															
MT Survey															
Geologic Mapping															
Soil Gas Survey															
Cultural Survey															
Environmental Assessment/BLM Permits	Expl Plan						Field Auth								
Data Integration															
Review Meeting (Go/No-go)															

Project Management Plan

- McCoy property is remote and between 4,800 – 5,600 ft elevation
- Winter weather limits most activities from November to March
- Complete on-the-ground exploration activities in 3rd Qtr 2010
- Identify four drilling targets in three identified anomalies
- Review meeting, Go/no-go decision point in 4th Qtr 2010
- BLM permitting process creates uncertainty in scheduling

Future Directions

FY 2010

- Complete geophysical and geologic currently planned
- Identify at least four drilling targets
- Complete project review by 4th Qtr 2010

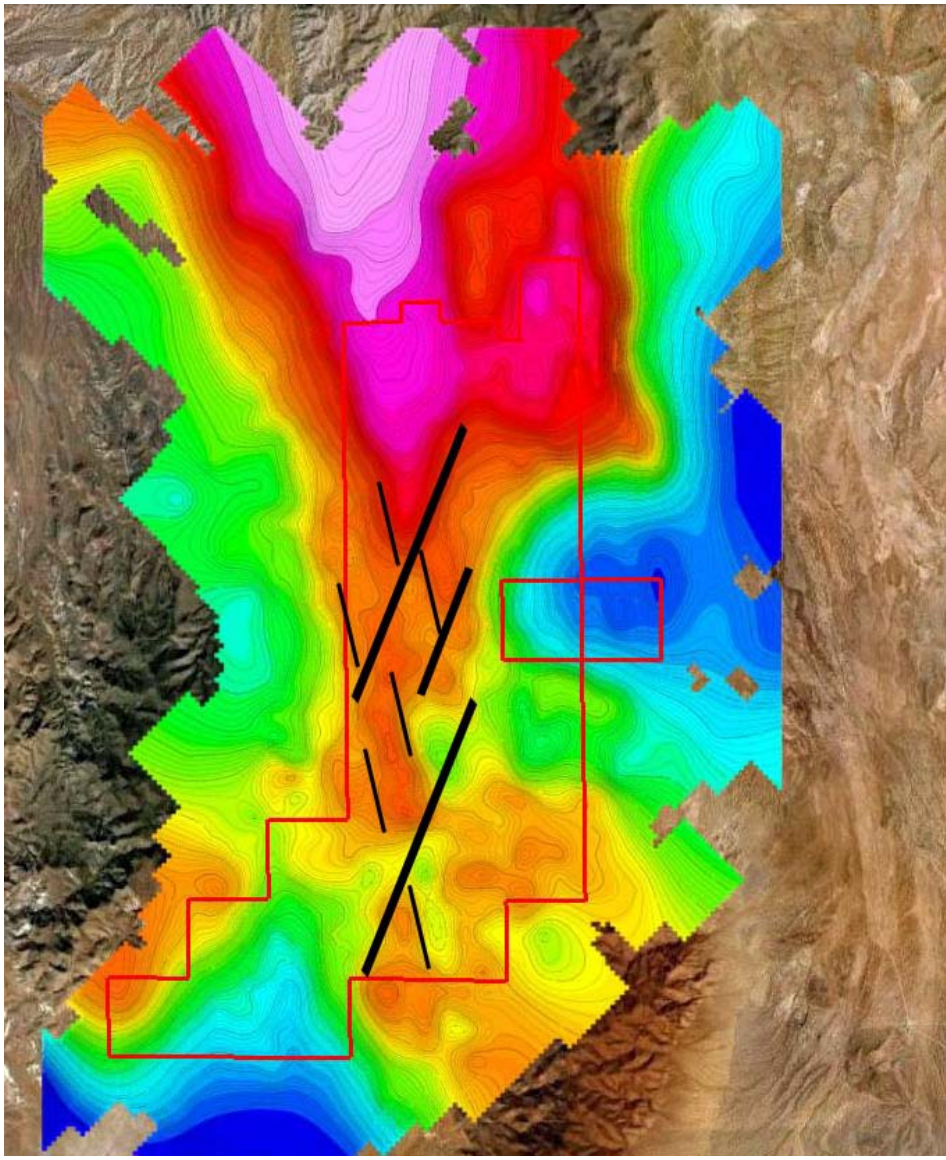
FY 2011

- Be ready to drill deep-angled thermal gradient wells by Spring 2011

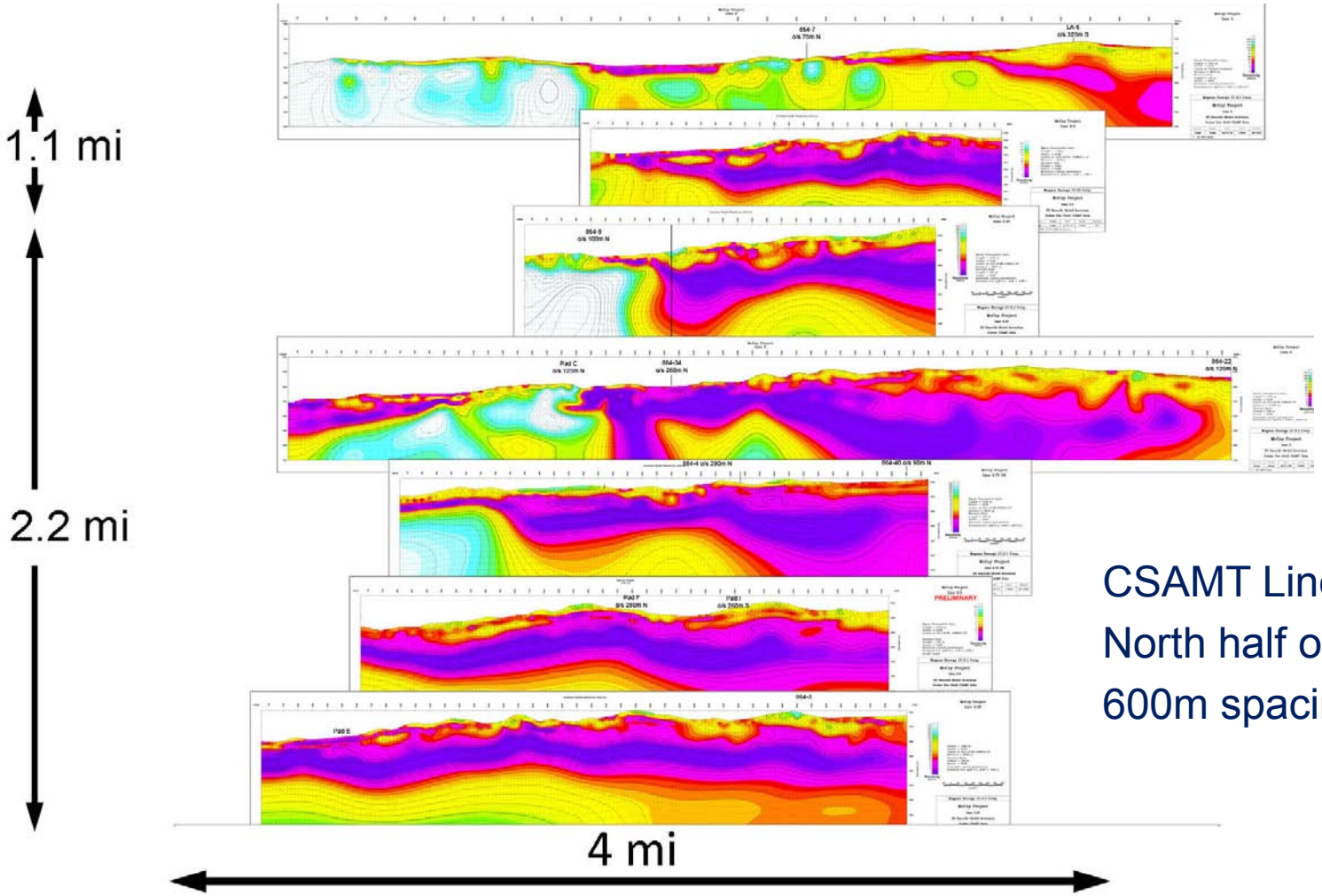
Summary

Finding hidden geothermal systems requires a synthesis of methods

- Incorporate a structural model that accommodates dilatent faults
- Map the shallow thermal aquifer to find potential upflow zones
- Targeted MT surveys to find deep conductive features
- Drill deep, angled thermal gradient wells to target fluid-bearing faults

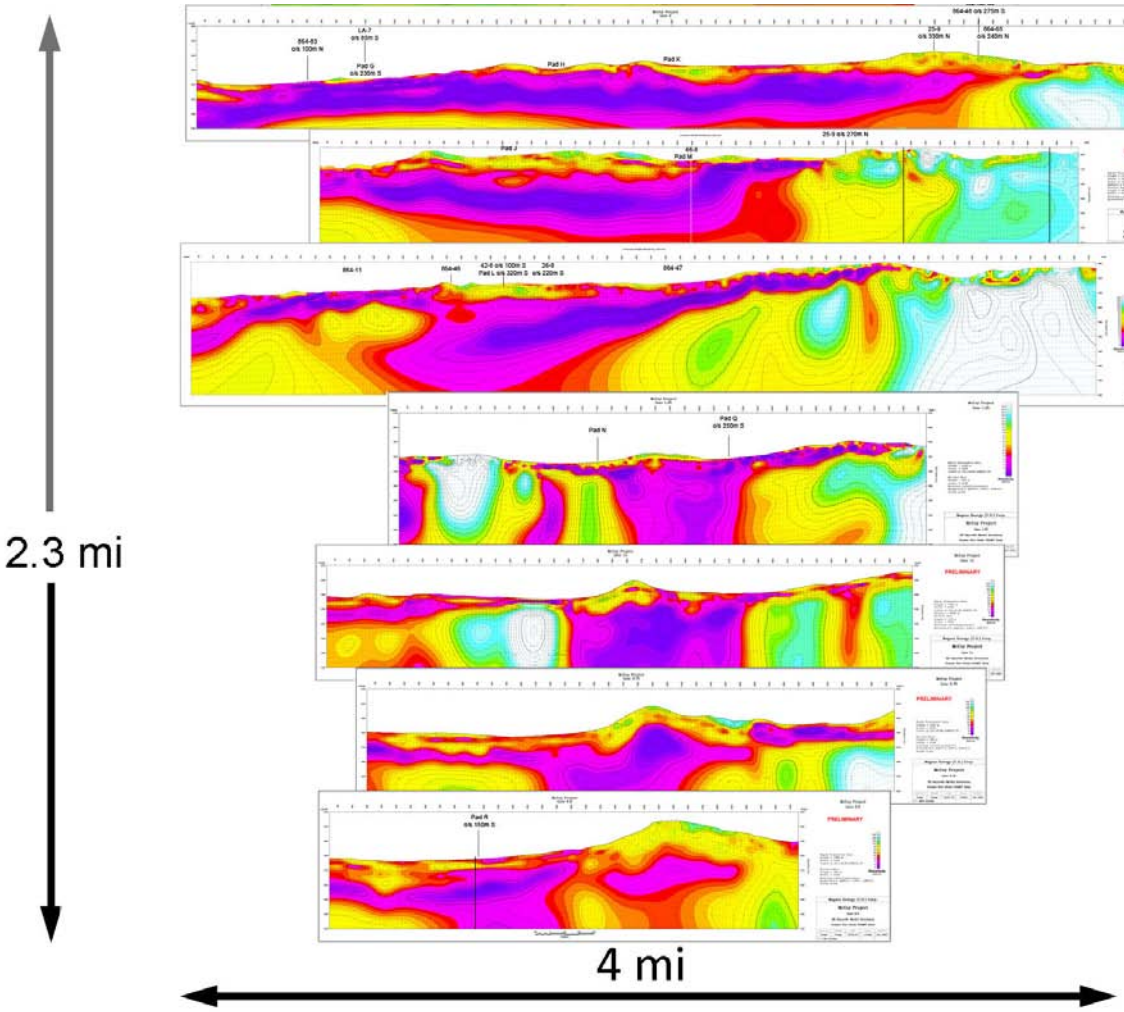


Supplemental Slide (1)



CSAMT Lines
North half of survey
600m spacing

Supplemental Slide (2)



CSAMT Lines
South half of survey
600m spacing