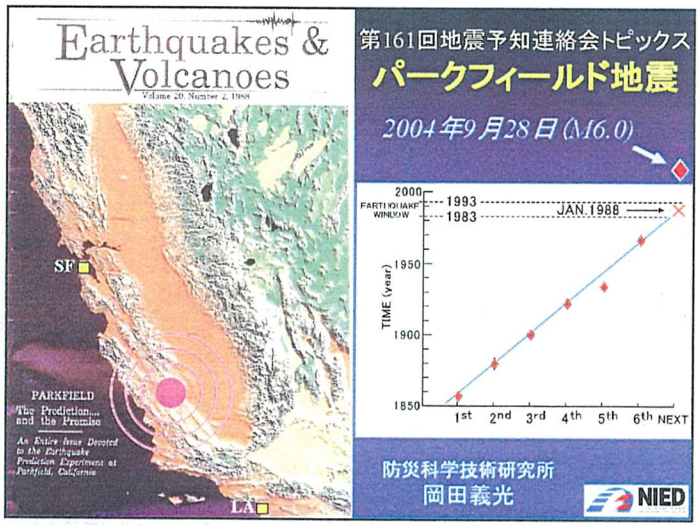
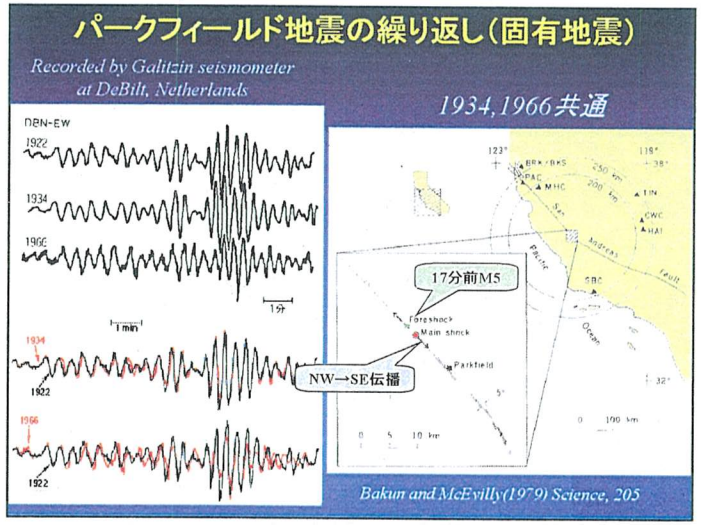
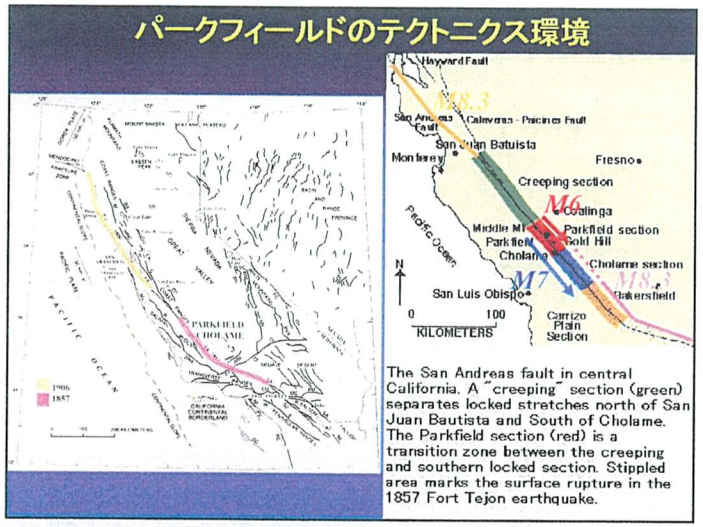
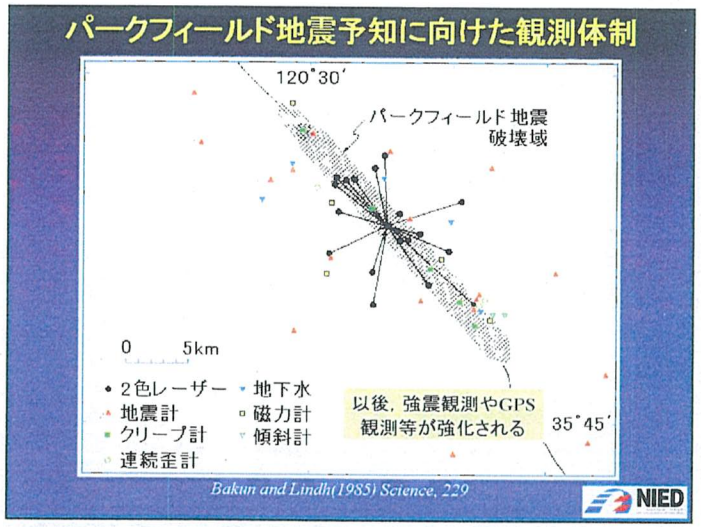
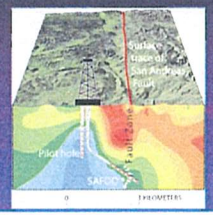

Earthquakes & Volcanoes
Volume 20, Number 2, 1988
SF
PARKFIELD
The Prediction... and the Promise
An Entire Issue Devoted to the Earthquake Prediction Experiment at Parkfield, California
LA
第161回地震予知連絡会トピックス
パークフィールド地震
2004年9月28日(M6.0)
EARTHQUAKE WINDOW
1993
1983
JAN.1988
TIME (year)
2000
1950
1900
1850
1st
2nd
3rd
4th
5th
6th
NEXT
防災科学技術研究所
岡田義光
NIED


パークフィールド地震の繰り返し(固有地震)
Recorded by Galitzin seismometer at DeBilt, Netherlands
1934,1966共通
DBN-EW
1922
1934
1966
1min
1分
17分前M5
Foreshock
Main shock
Parkfield
NW→SE伝播
Bakun and McEvilly(1979) Science, 205

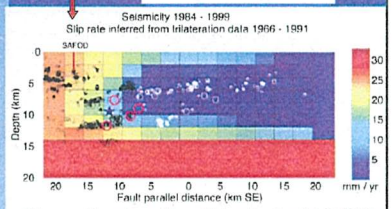

パークフィールドのテクトニクス環境
Hayward Fault
San Andreas Fault
Calaveras - Paciones Fault
San Juan Batuista
Monterey
Fresno
Creeping section
M6
Coalinga
Parkfield section
Gold Hill
Cholame
Cholame section
M7
M8.3
Bakersfield
San Luis Obispo
Carrizo Plain Section
0
100
KILOMETERS
Pacific Ocean
N
PARKFIELD
CHOLAME
1966
1857
The San Andreas fault in central California. A "creeping" section (green) separates locked stretches north of San Juan Bautista and South of Cholame. The Parkfield section (red) is a transition zone between the creeping and southern locked section. Stippled area marks the surface rupture in the 1857 Fort Tejon earthquake.


パークフィールド地震予知に向けた観測体制
120°30'
パークフィールド地震
破壊域
0
5km
35°45'
2色レーザー
地震計
クリープ計
連続歪計
地下水
磁力計
傾斜計
以後，強震観測やGPS観測等が強化される
Bakun and Lindh(1985) Science, 229
NIED

SAFOD（San Andreas Fault Observatory at Depth）



掘削地点

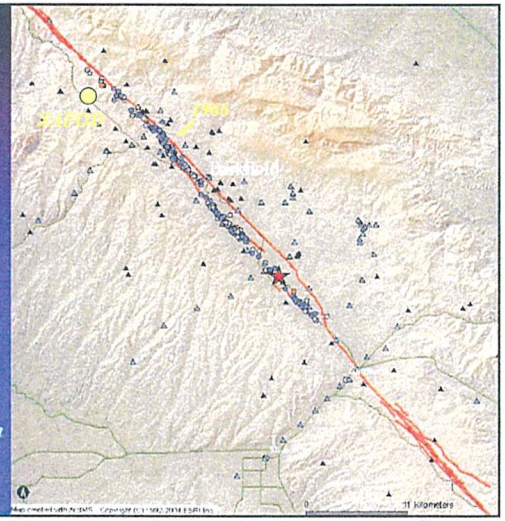


Microearthquakes, slip model and potential SAFOD drill hole. (from: Jessica Murray (Stanford), Felix Waldhauser (LDEO) and Bill Ellsworth (USGS)).

2004年 パークフィールド地震

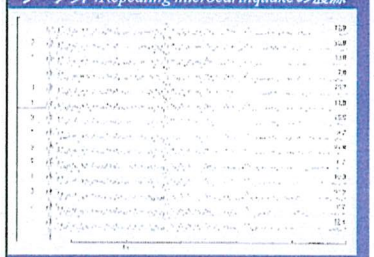
2004/09/28 17:15UTC
11km SSE of Parkfield
Depth: 7.9km
Magnitude: 6.0 Mw

★ *Mainshock*
○ *Aftershock*
▲ *Seismic station*

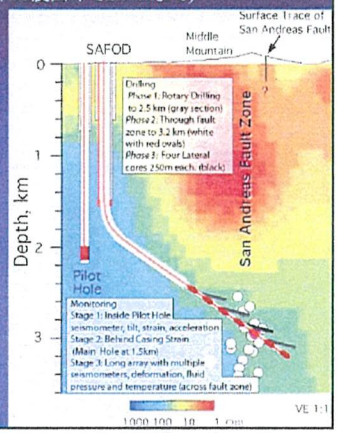


SAFOD

2002夏　ﾊﾟｲﾛｯﾄﾎｰﾙ(2.2km垂直)　孔底で地震・歪・傾斜・加速度・水圧・温度をﾓﾆﾀｰ
2004.6.11~10.6　第1期掘削(1.4kmまで垂直，55度曲げて2.5kmまで)
　ケーシングの裏でレーザ式歪観測
2005.6. 1～ 第2期掘削
　（断層貫通，深さ3.2kmまで）
2007夏～　第3期掘削
　（4本の分岐孔で250mコアリング）
ターゲット:Repeating microearthquakeの震源



Nadeau et al.(1994) BSSA, 84



各パークフィールド地震の特徴

	前震	本震	備考
1857.1.9	???	???	FortTejon(M8.3)の前震
1881.2.2	???	???	
1901.3.3	???	???	
1922.3.10	なし	NW→SE	
1934.6.8	17分前M5	NW→SE	
1966.6.28	17分前M5	NW→SE	12日前：地割れ 9時間前：パイプ破損
2004.9.28	なし	SE→NW	

NIED