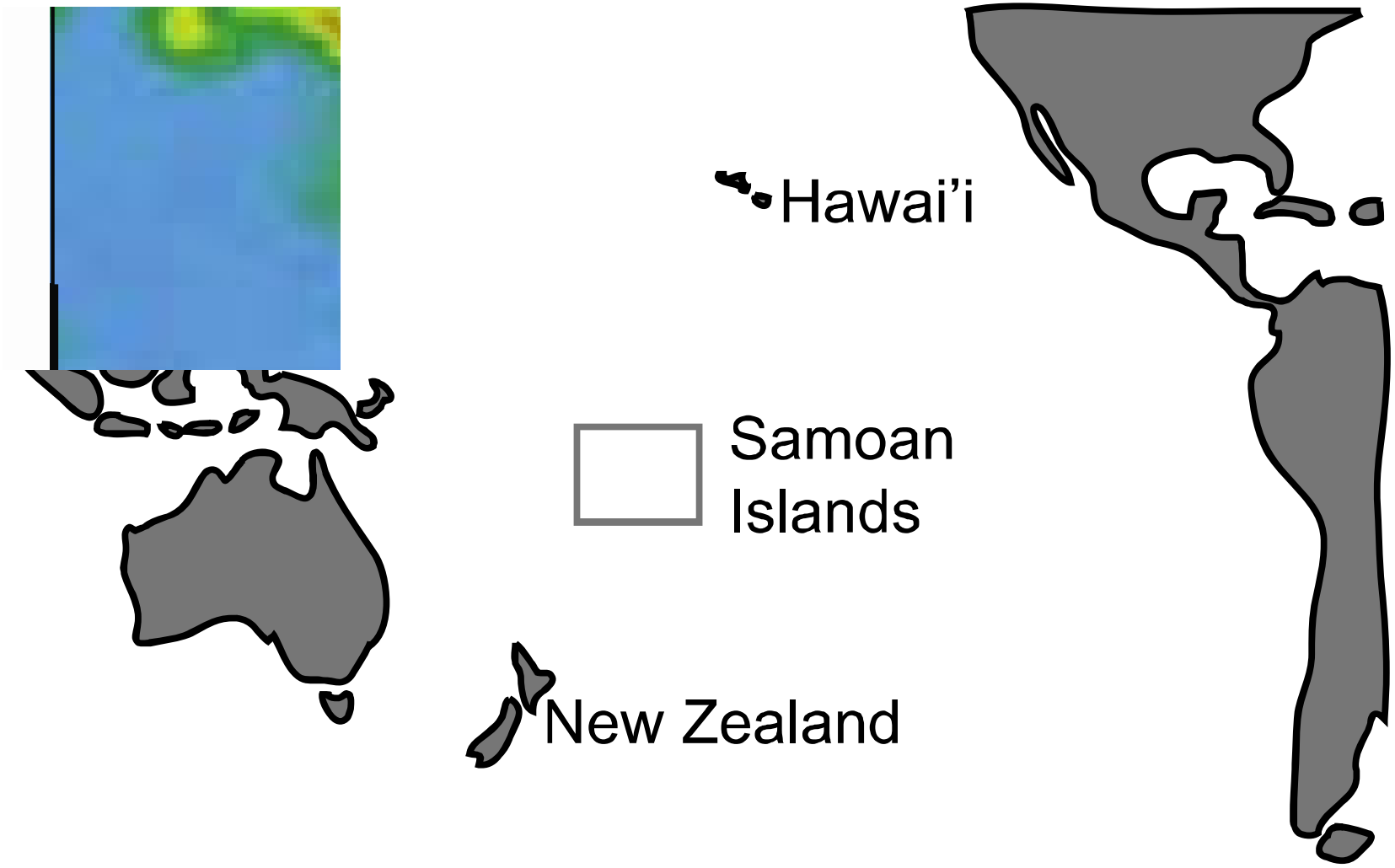
“The Heart of Samoa”
Micro-seismic Monitoring Project

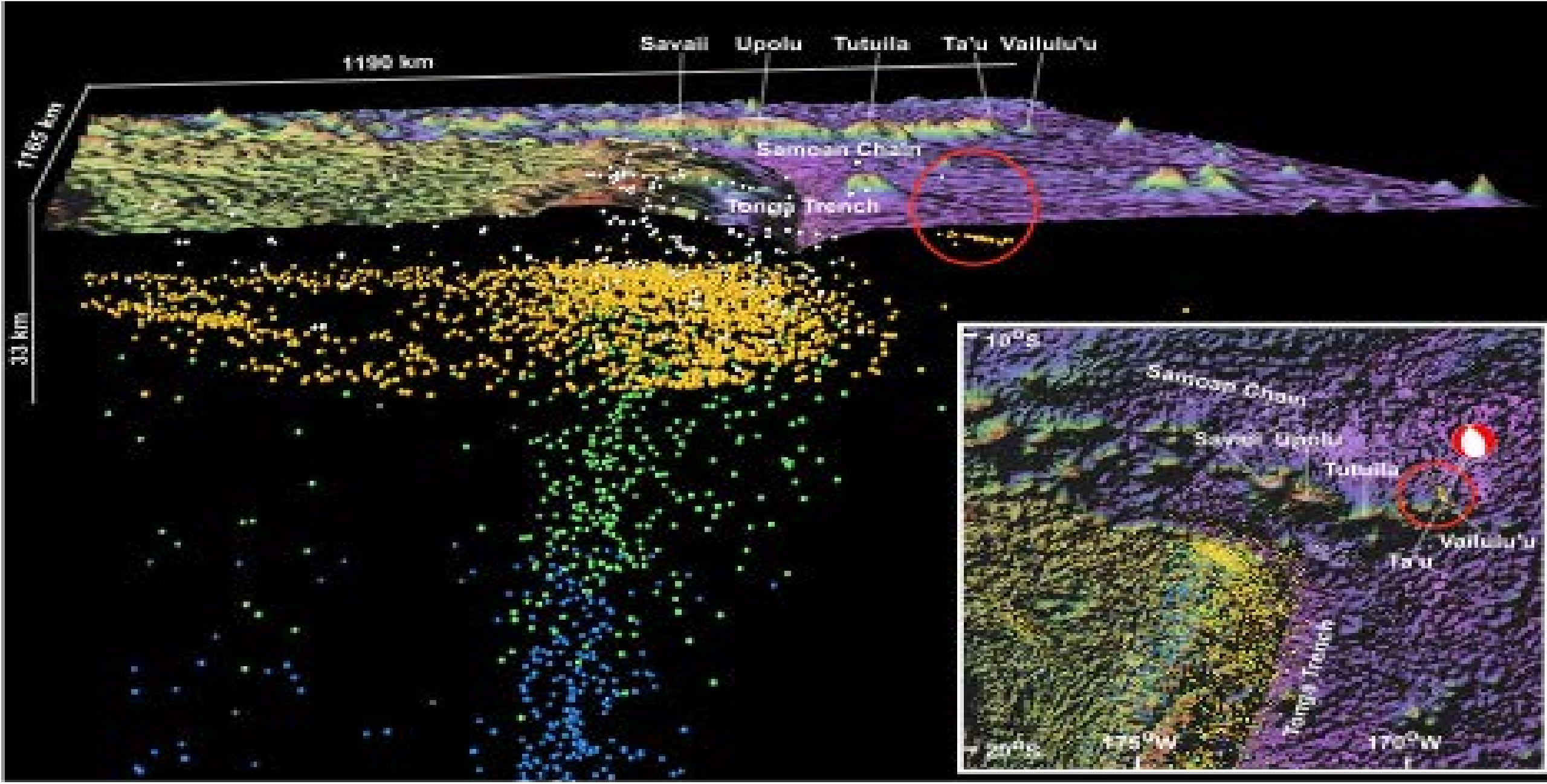
DEPARTMENT OF HOMELAND SECURITY

AMERICAN SAMOA POWER AUTHORITY

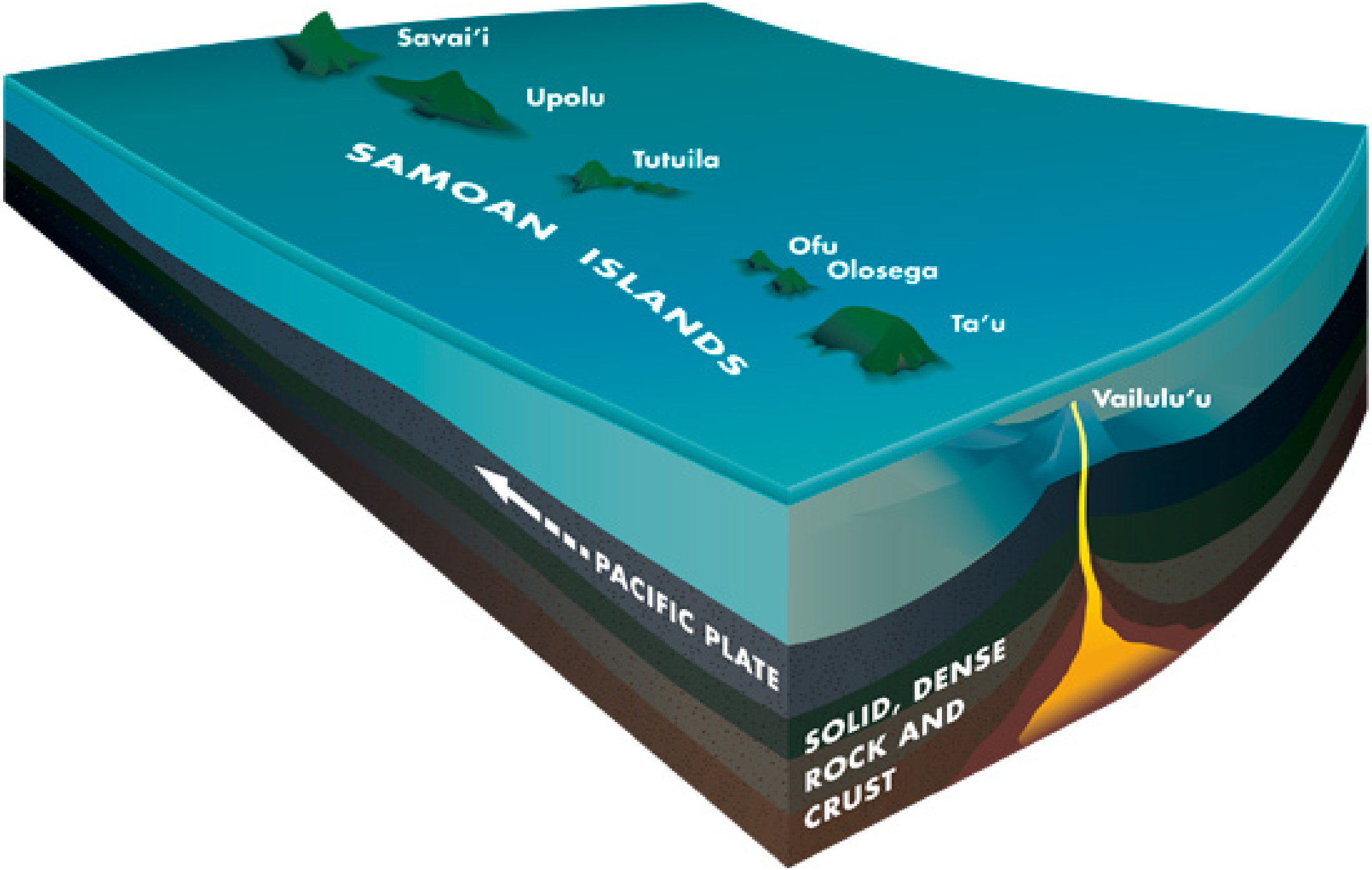
IESE

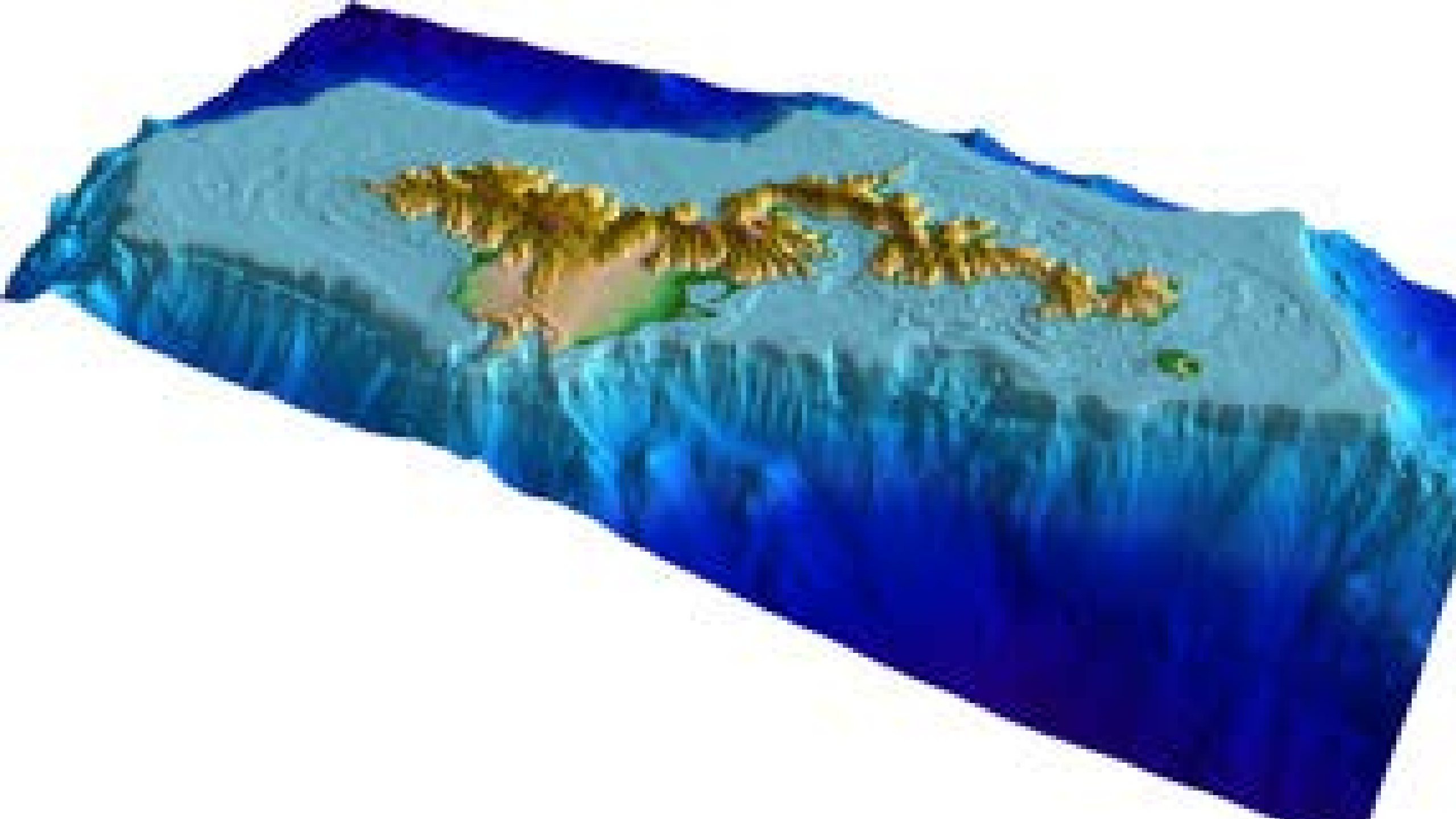

Hawai'i
Samoan Islands
New Zealand

Serene Sunset: Virgin Cove, Sa'anapu, South Upolu. Southwest view of horizon overlying the Northern Tongan Subduction Arc (Photo: Christine Reitze 2012)



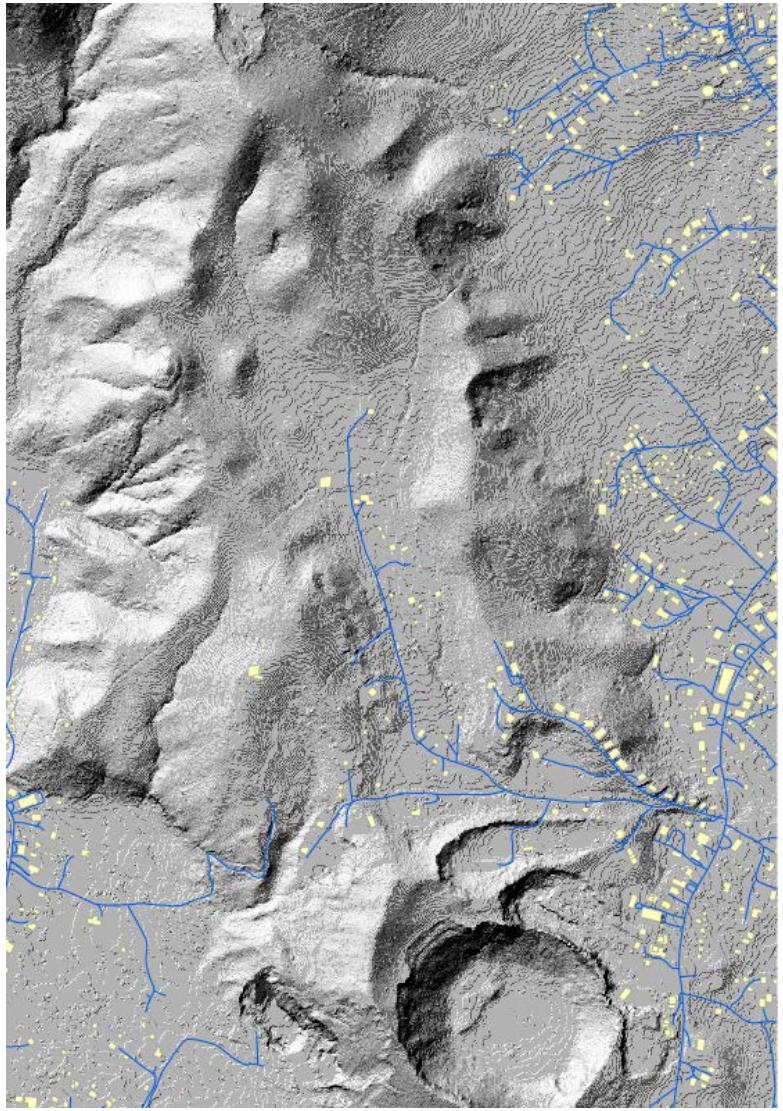
- Apia Station Hypocenters > 4 R.S. 1973 to 2003


Savai'i
Upolu
Tutuila
SAMOAN ISLANDS
Ofu
Olosega
Ta'u
Vailulu'u
PACIFIC PLATE
SOLID, DENSE ROCK AND CRUST



Holocene Rift Zone: Recent Volcanism

- **Geologic Mapping**
- **Soil Gas Survey**
- **Magneto Telluric Survey**
- **Core Drilling**
- **Thermal Gradient Survey**
- **Microseismic Monitoring**



AHERN
RENTALS
800-400-1610

BOX 291
1912
1917
D-10.0
R-10.0

Coeur Products
WWW.COREBOX.COM

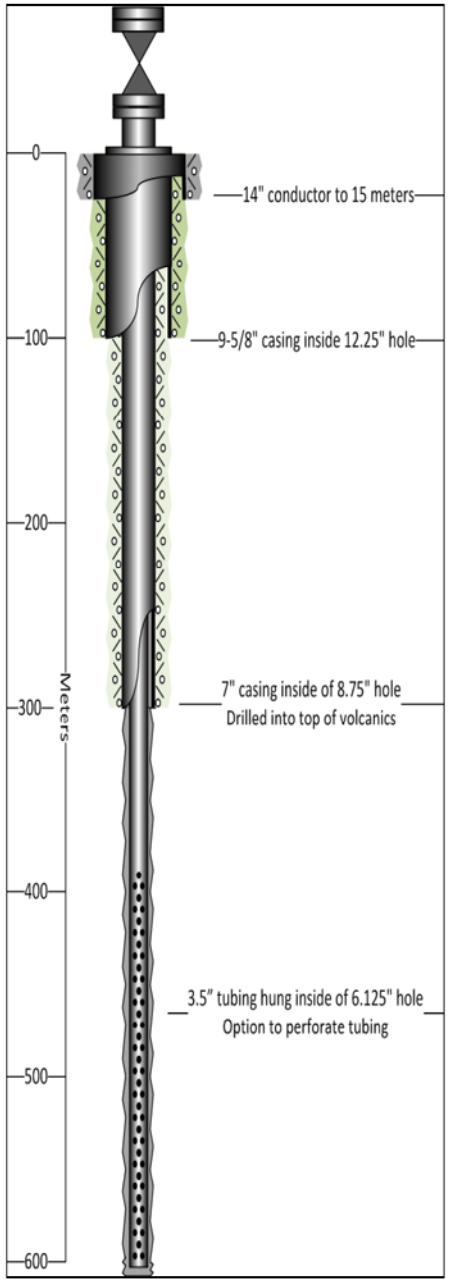
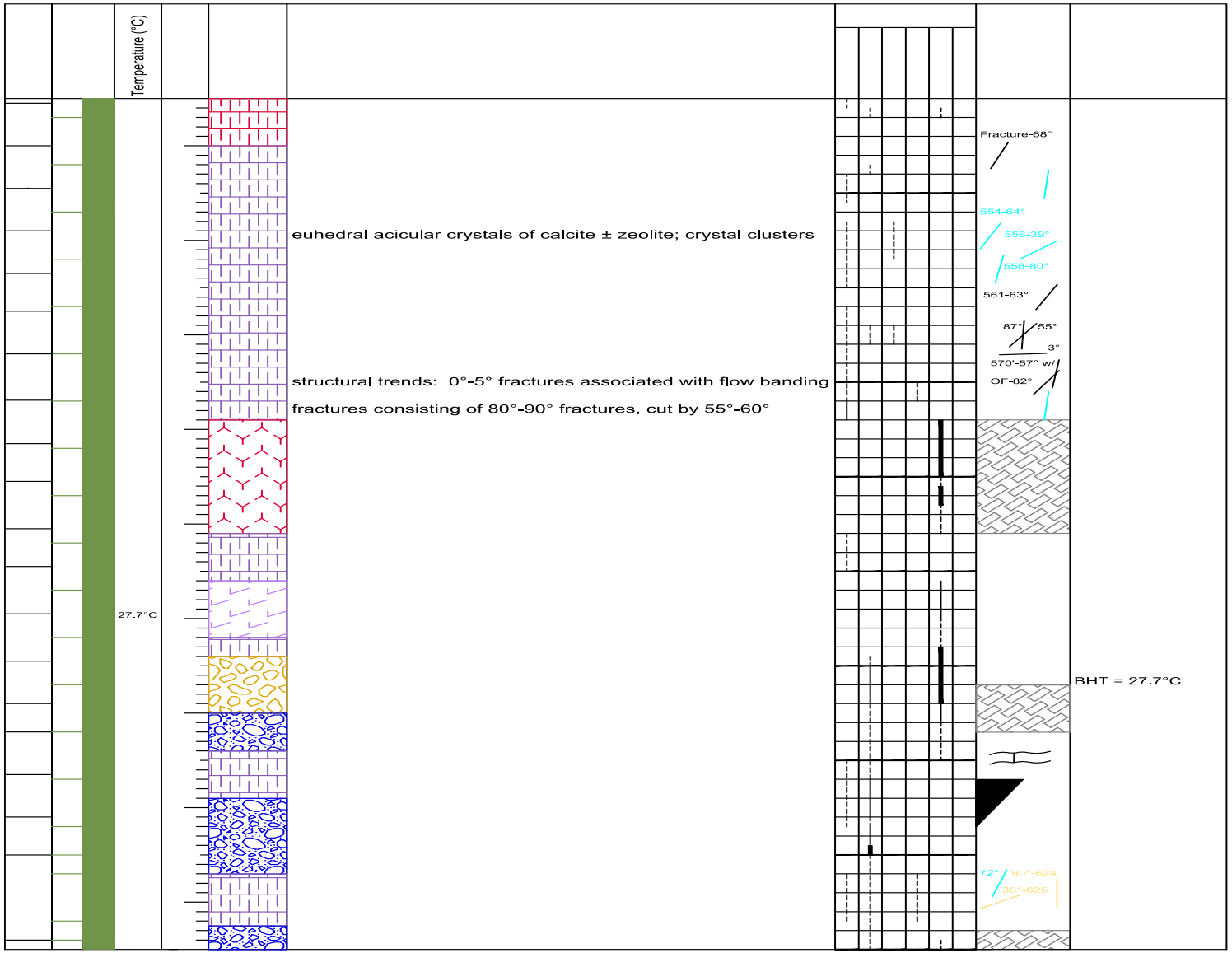
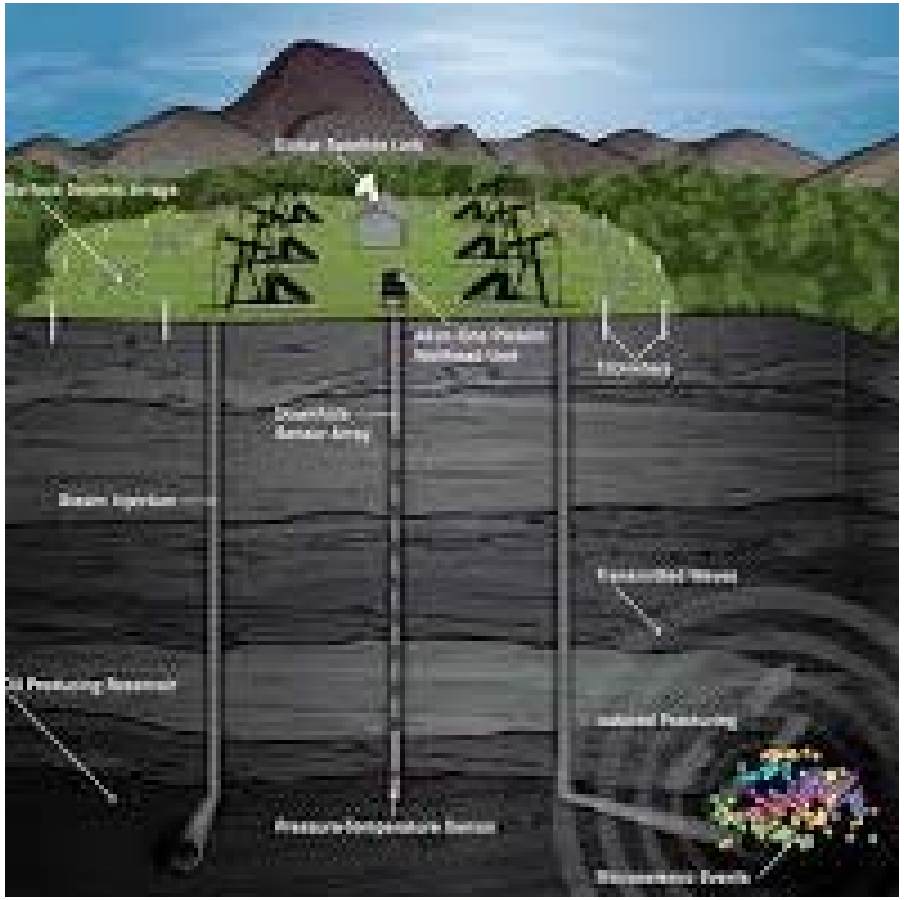


Figure 4: Proposed Casing and Cementing Design

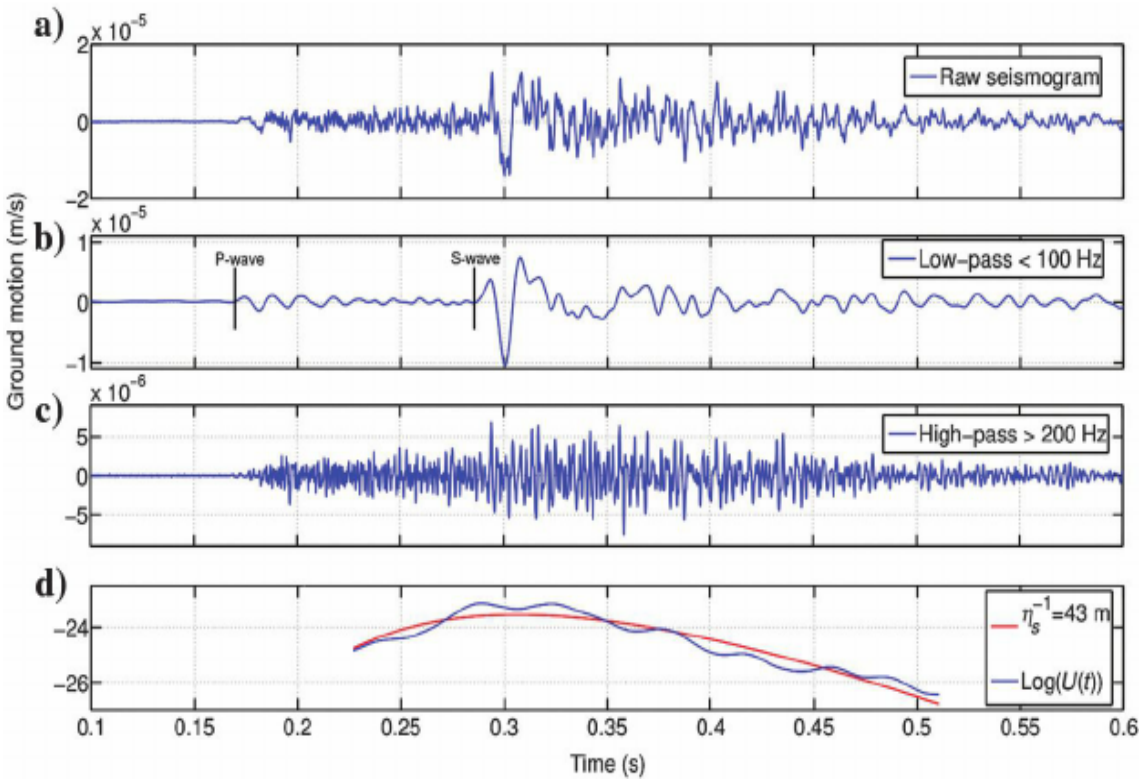


Deep Borehole Microseismic Exploration

- **100 x stronger than surface**
- **Passive listening island & region**
- **Magmatic or fracture location**
- **Economical**
- **Final confirmation low activity**
- **Longterm hazard warning ?**



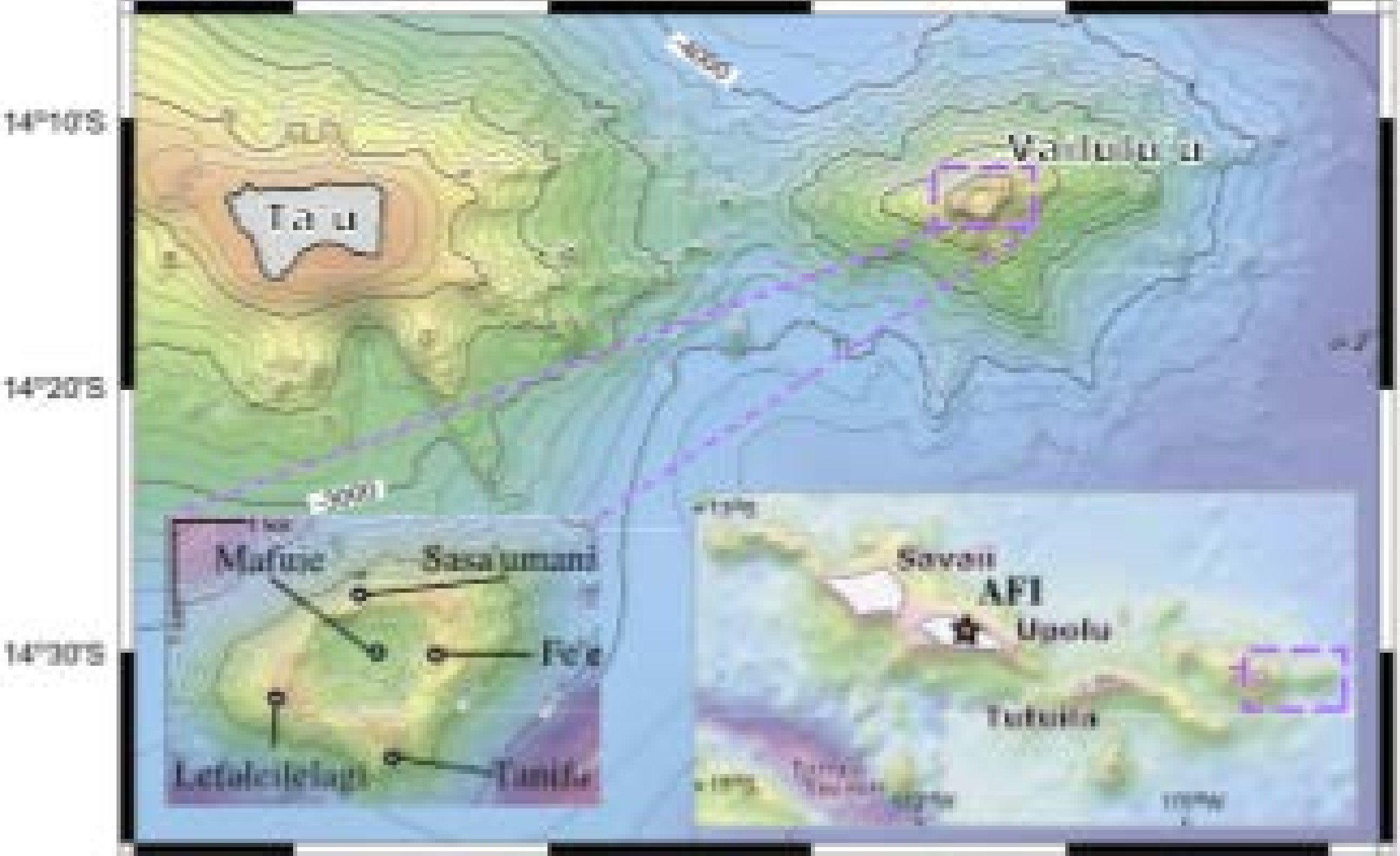
DOWNHOLE MICROSEISMIC

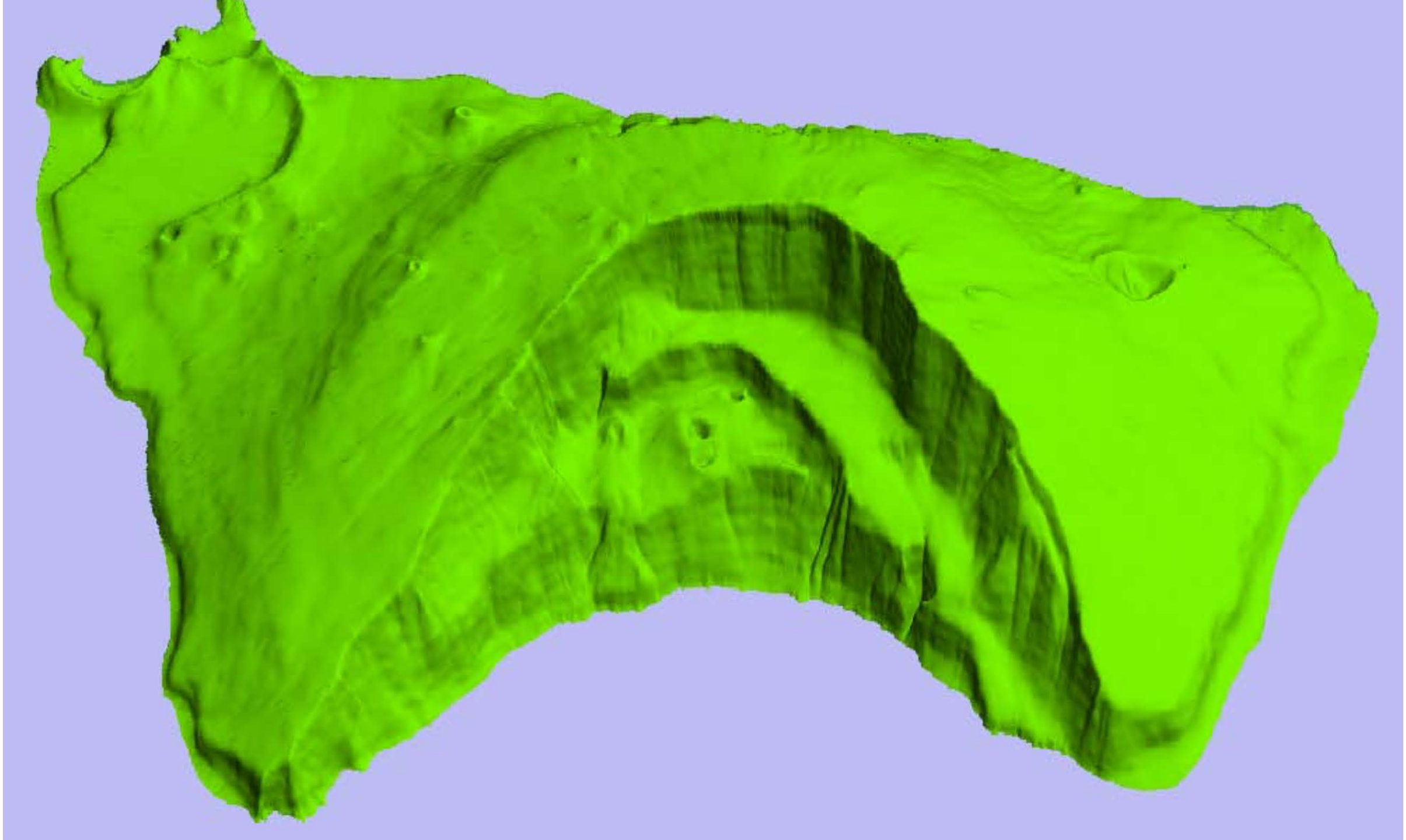


- **100 TIMES HIGHER RECEPTION**

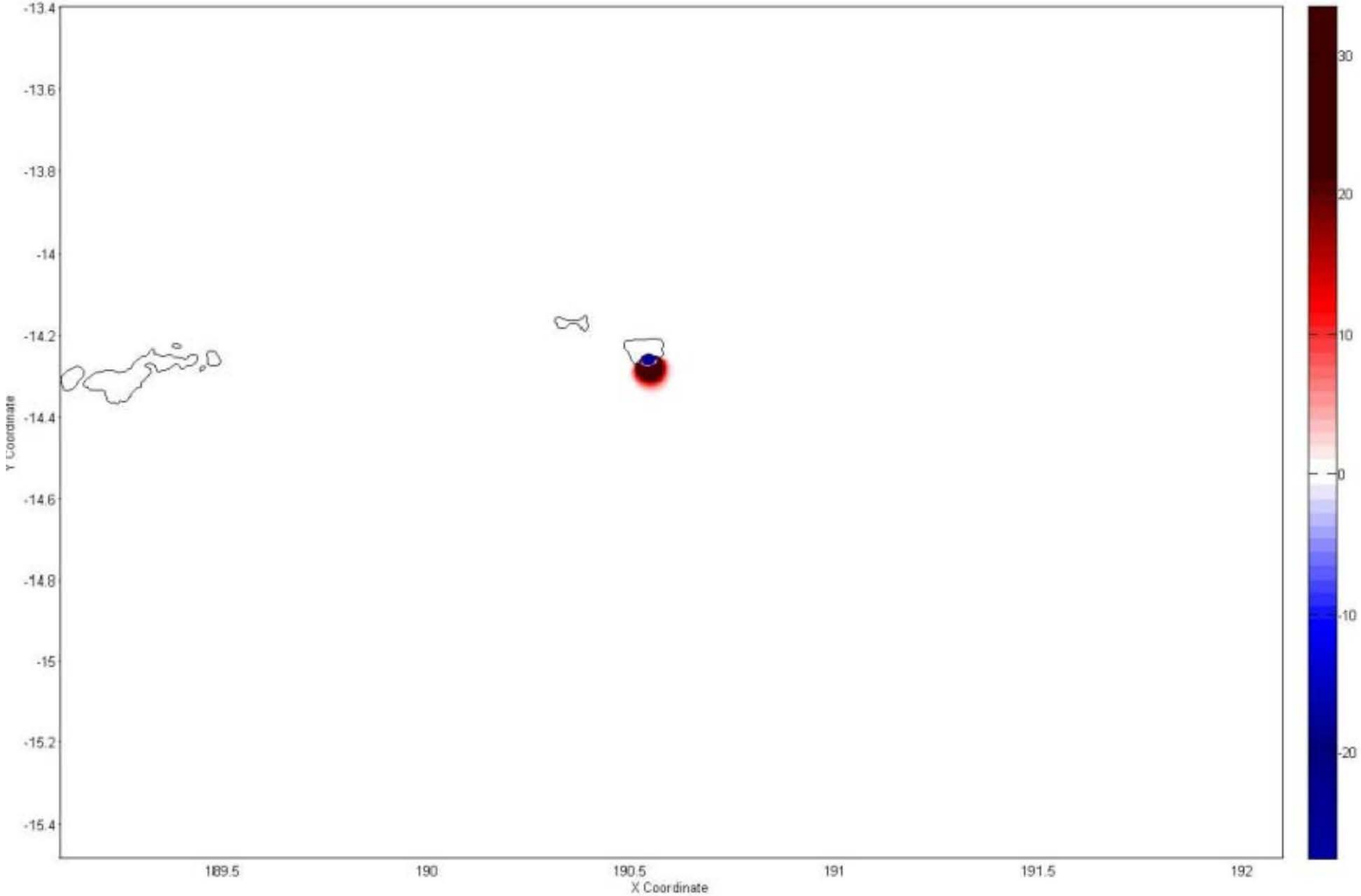
seismic indicators for tsunamigenesis

- earthquake magnitude
- epicenter location
- fault rupture area
- amount of slip or thrust
- orientations of the fault plane


14°10'S
14°20'S
14°30'S
Vailulu'u
Ta'u
Mafuie
Sasa'umani
Fe'e
Lefalcilelagi
Tanifa
Savai
AFI
Upolu
Tutuila



Minutes: 1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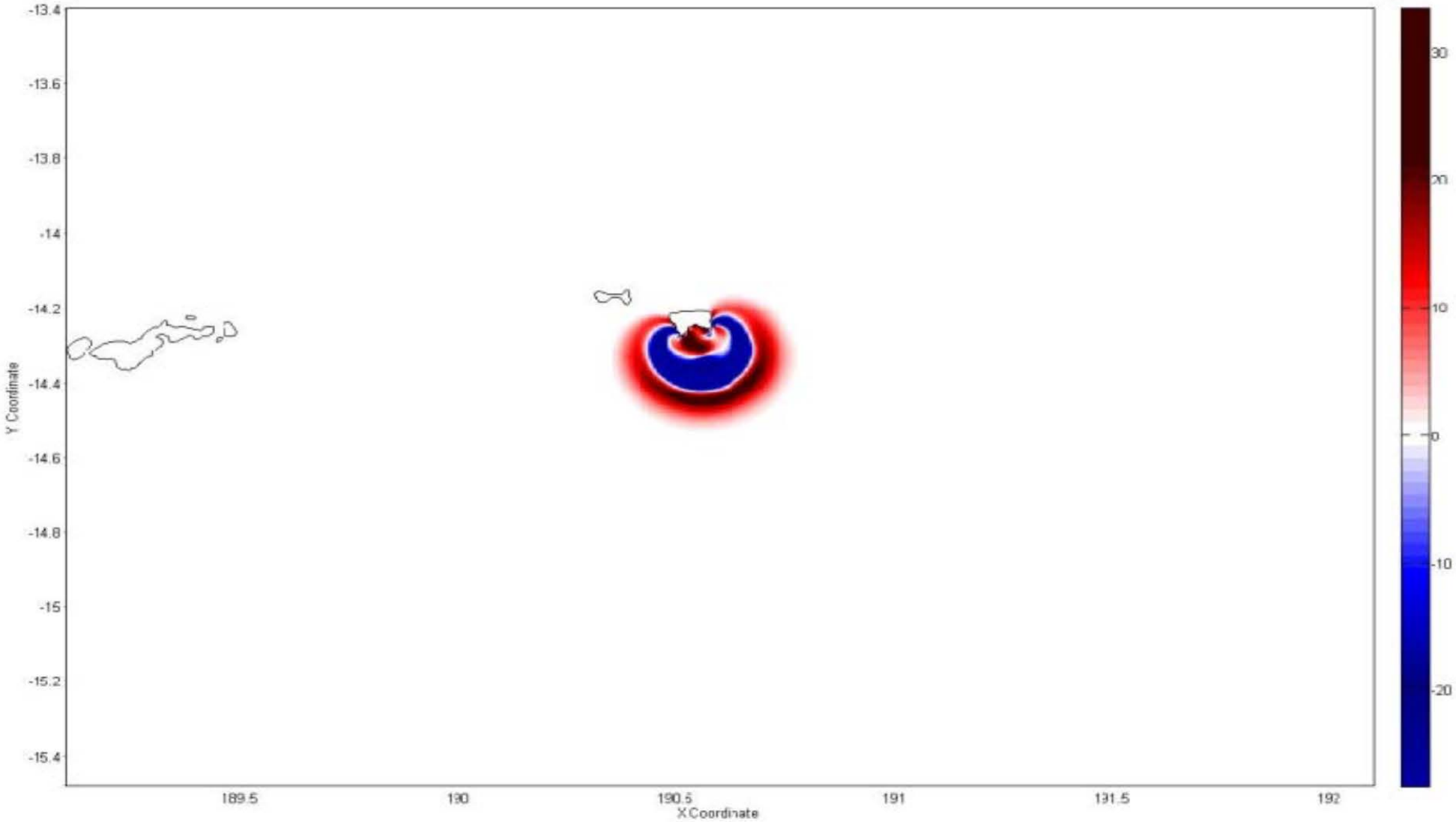
-13.6
-13.8
-14
-14.2
-14.4
-14.6
-14.8
-15
-15.2
-15.4
Y Coordinate
189.5
190
190.5
191
191.5
192
X Coordinate
30
20
10
0
-10
-20

Minutes: 3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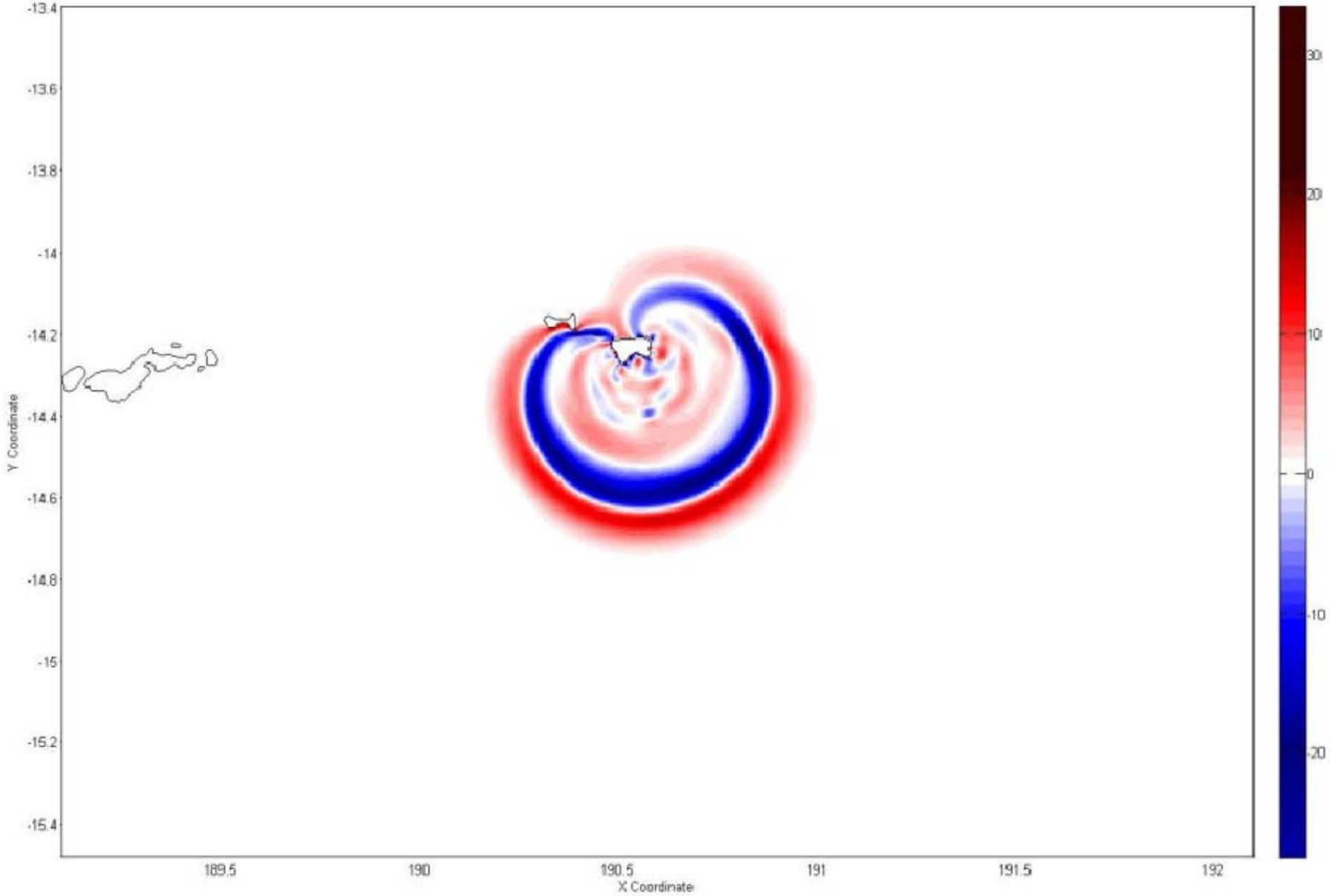
-13.6
-13.8
-14
-14.2
-14.4
-14.6
-14.8
-15
-15.2
-15.4
Y Coordinate
189.5
190
190.5
191
191.5
192
X Coordinate
30
20
10
0
-10
-20

Minutes: 5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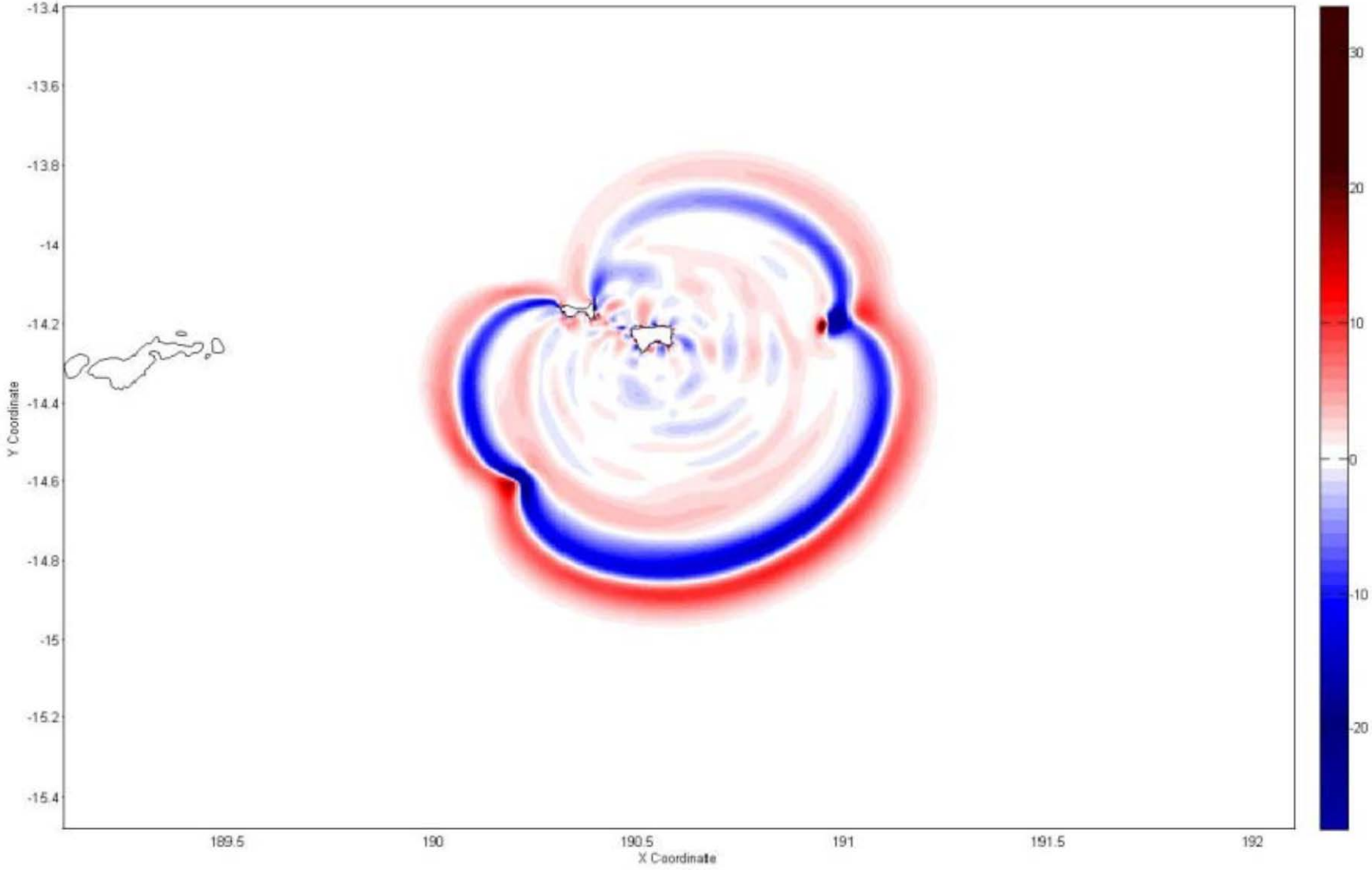
-14.4
-14.6
-14.8
-15
-15.2
-15.4
Y Coordinate
189.5
190
190.5
191
191.5
192
X Coordinate
30
20
10
0
-10
-20

Minutes: 7


-13.4
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-13.8
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-14.2
-14.4
-14.6
-14.8
-15
-15.2
-15.4
Y Coordinate
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191
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X Coordinate
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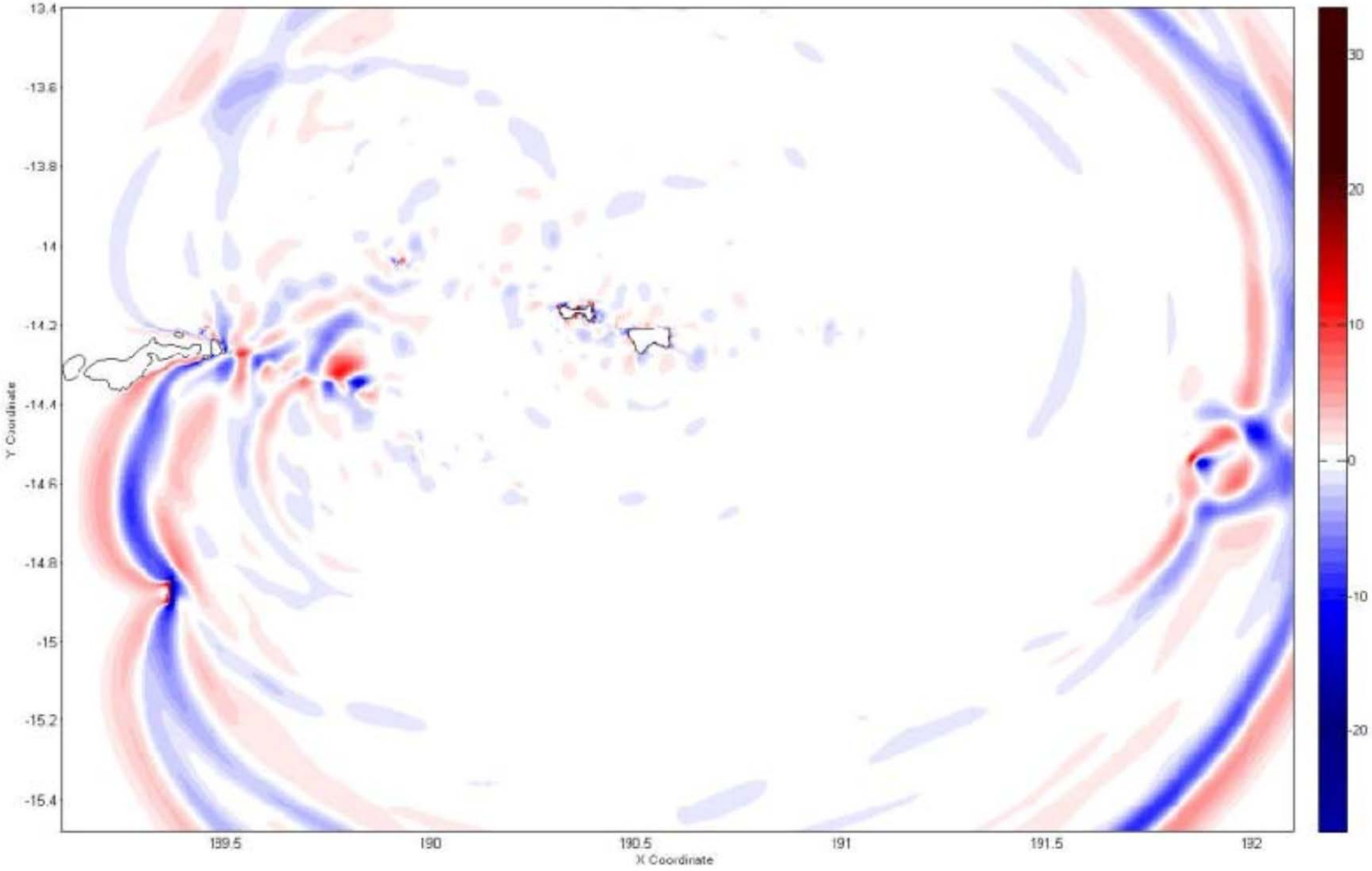
-20

Minutes: 16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-13.6
-13.8
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-14.2
-14.4
-14.6
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-15
-15.2
-15.4
Y Coordinate
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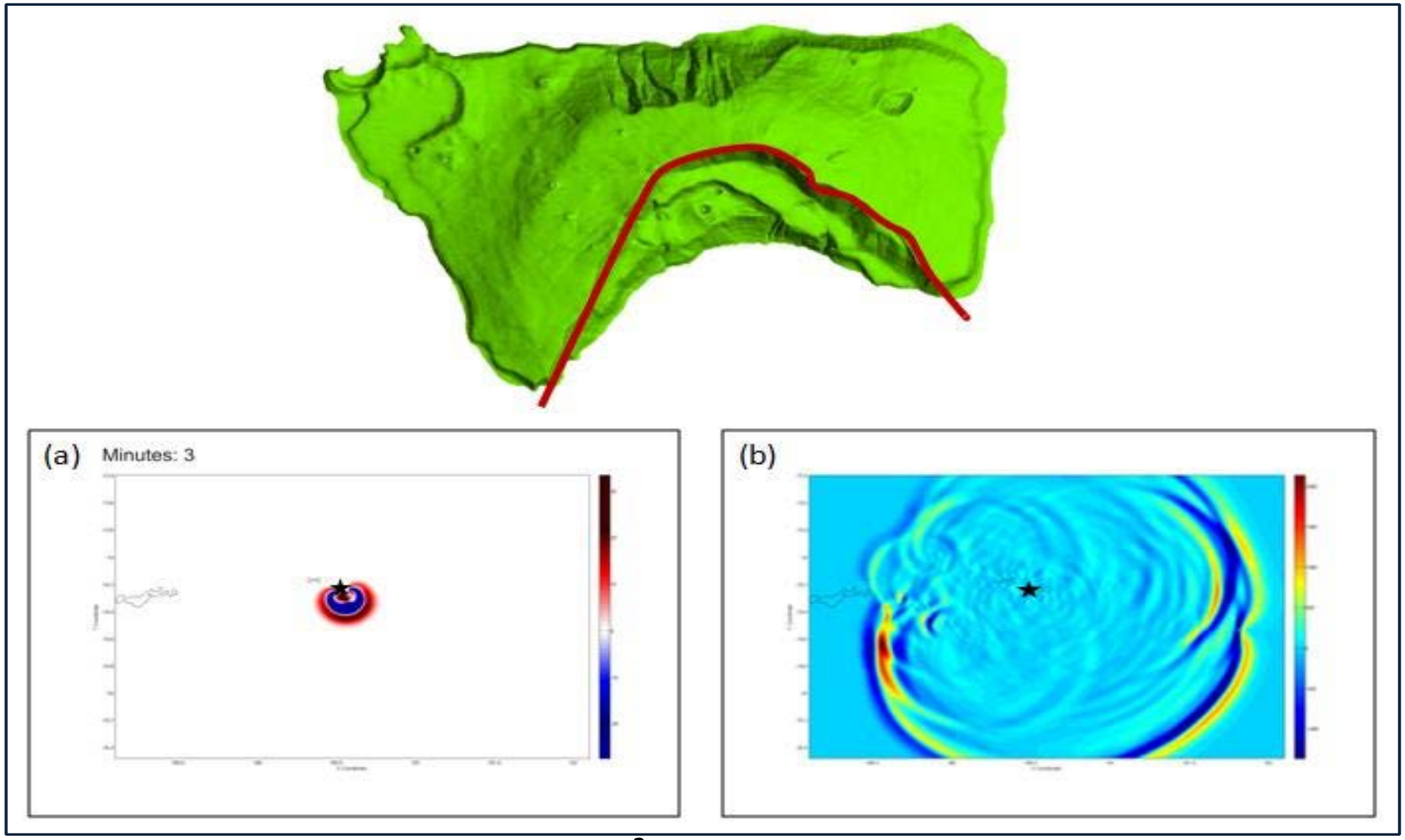
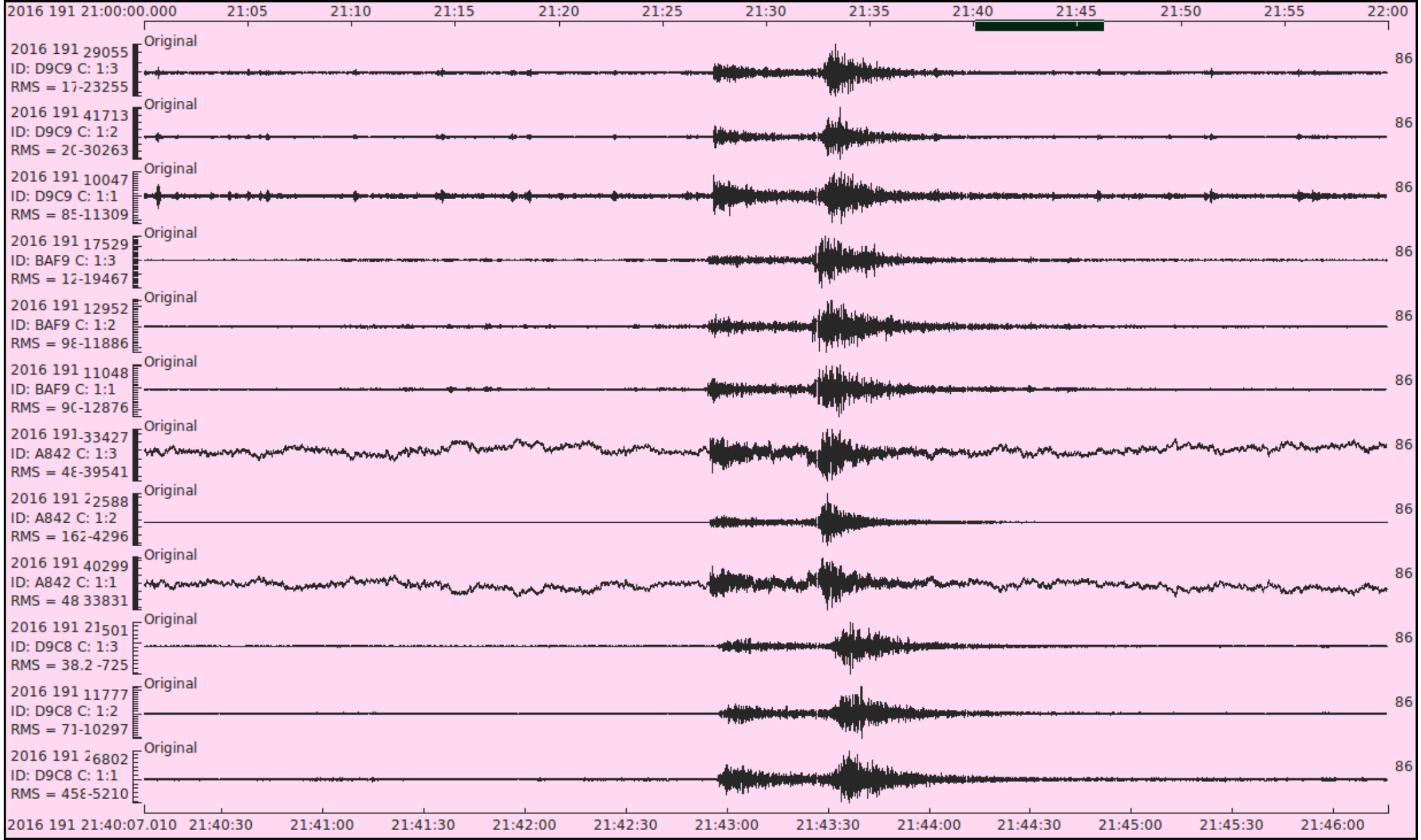


Figure 7: Southern Ta'u flank collapse ≥ 30 km^3. Red line depicts the scarp (~1 km elevation). (a) modeled landslide-tsunami propagation at 3 min; (b) modeled maximum tsunami flow direction. Black star in (a) and (b) represent Ta'u. (from Williams et al., 2012).

IESE Seismic Installation Costs		TRB Rev. 4.14.2016		
Components	each	months	COST (USD)	FY 2016
SLISE Analysis			15,175	
3 borehole seismic stations	3		87,545.50	April
Shipping & Installation (INC.)			-	
Telemetering,network , training			16,517.50	June
4 surface station rental 3 months	4	4	14,000.00	June
Surface Station Purchase	2	6	13,360.00	June
Data processing, analysis, report		3	25,475.00	June

C848
FRAGILE



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Window Scale: TRACE
Displaying: Counts

PQL II - Print
2016:210 08:38:36

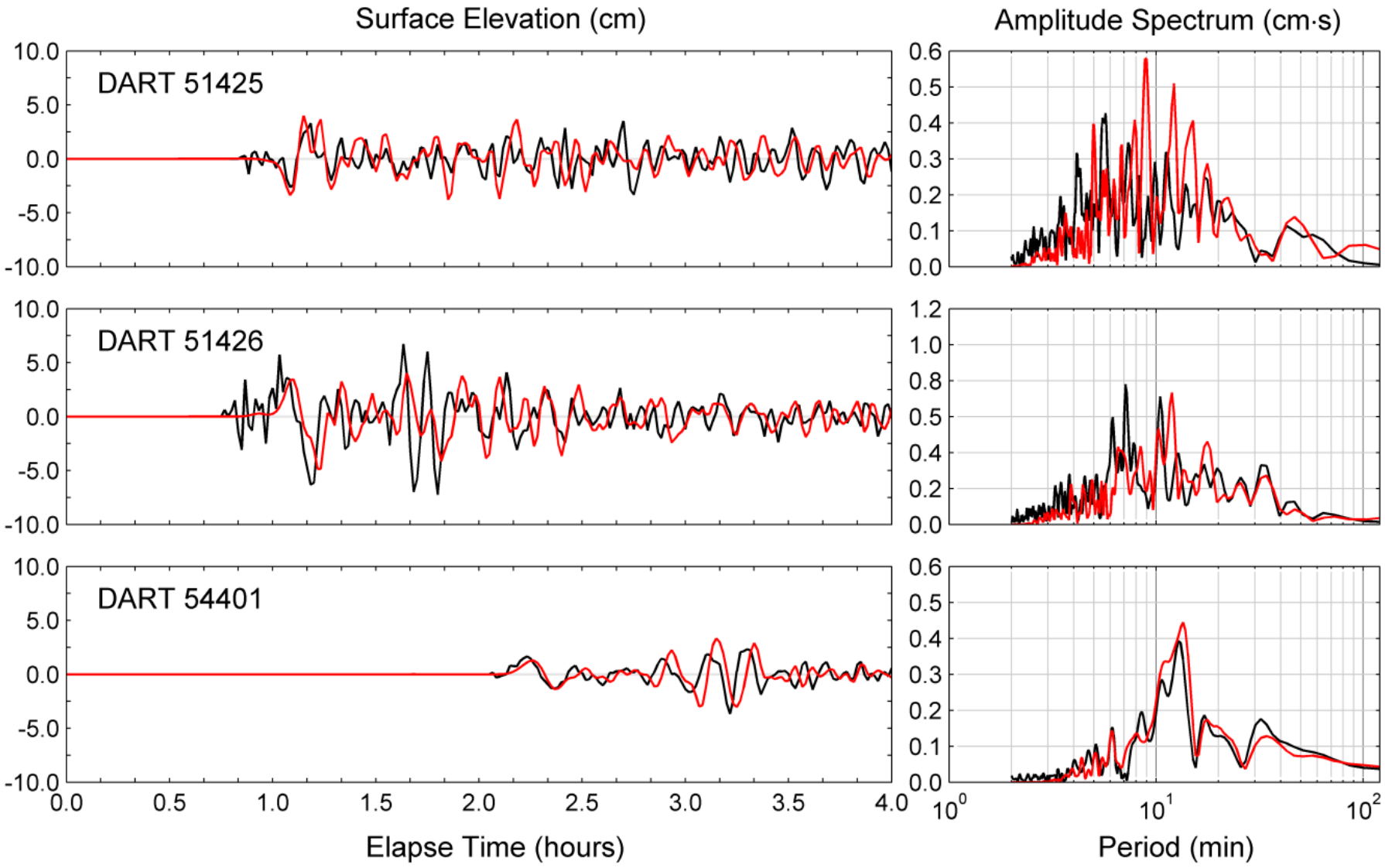
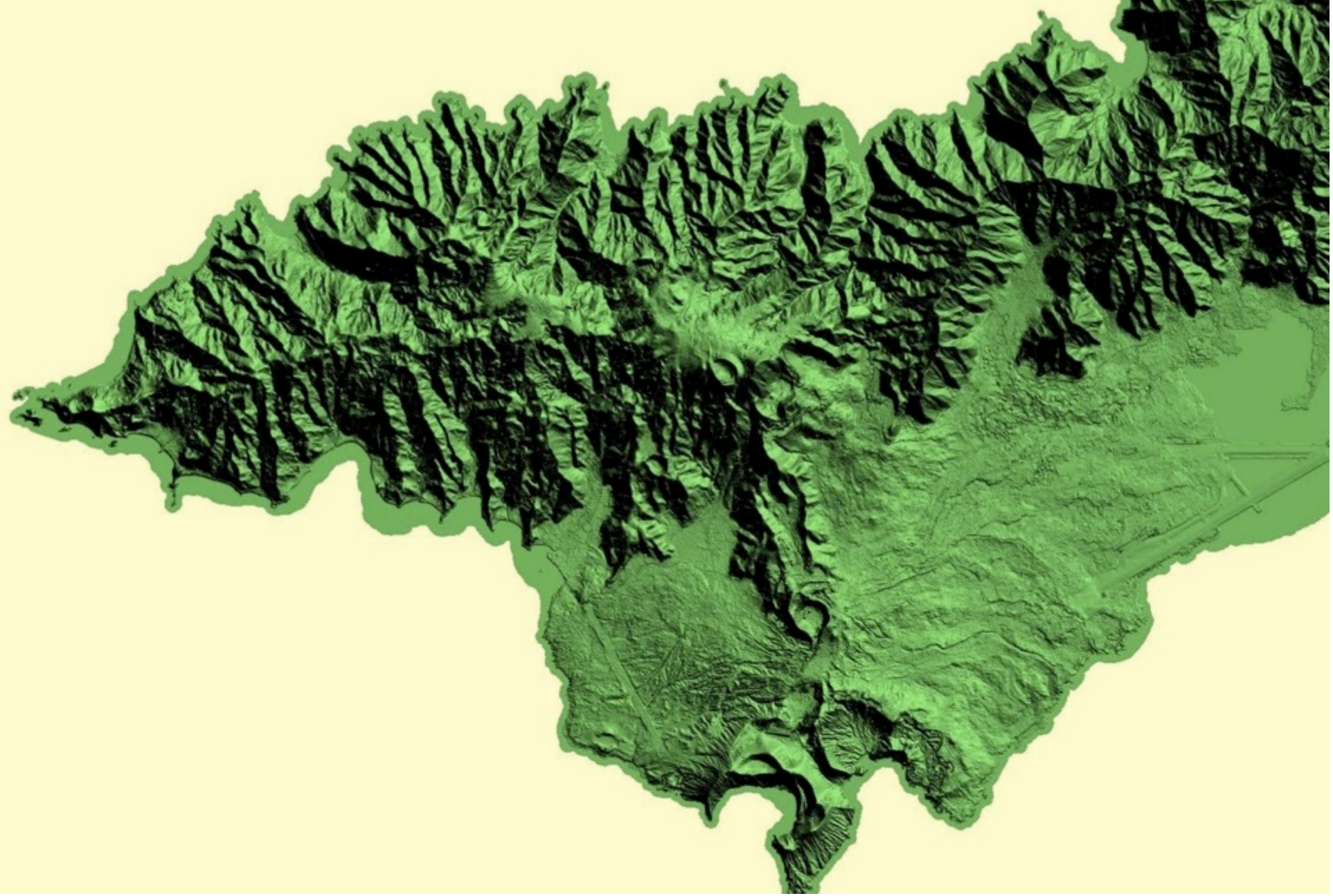


Figure 30: Time series and spectra of surface elevations at DART buoy water level stations. ——— (black), recorded data; ——— (red), computed data.



QUESTIONS ?

T06
T05
T04
T01
T03
Proposed location T07
Proposed location T08
Possible location
Proposed location T09
T02