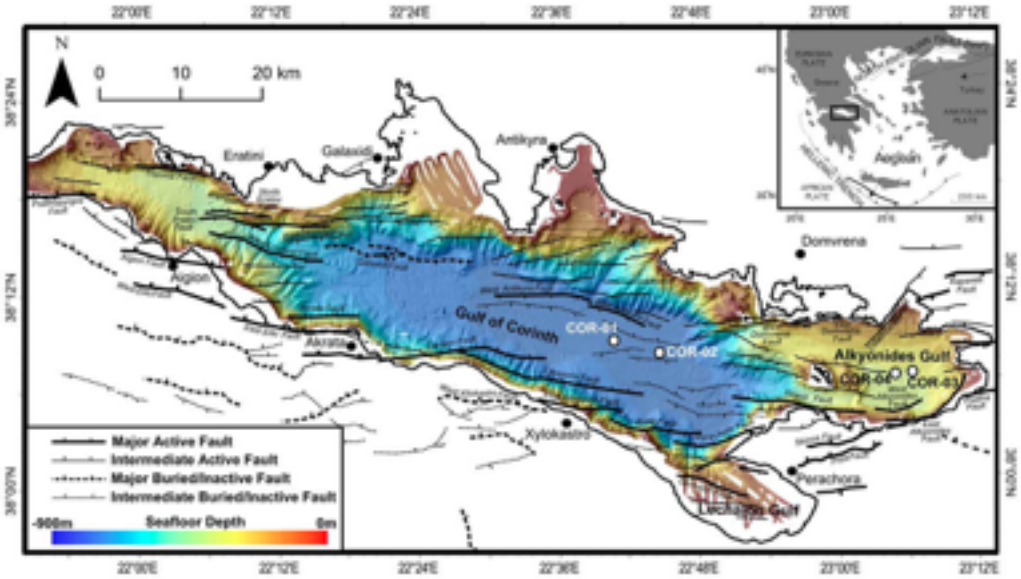
MSP 879-Full: Corinth Active Rift Development (McNeill)

IODP Theme: Earth Connections

Region: Mediterranean Sea (Greece)



Objectives:

- Evolution and surface processes of an active continental rift
- Distribution of tectonic strain in time and space and the timescales of fault evolution in a young rift at high resolution (20-50 kyr and 1-10's of kms)
- Evolution of a rift-controlled, closed drainage system and relative impact of tectonics and climate on sediment flux
- Feedbacks between sedimentation, loading, and tectonics

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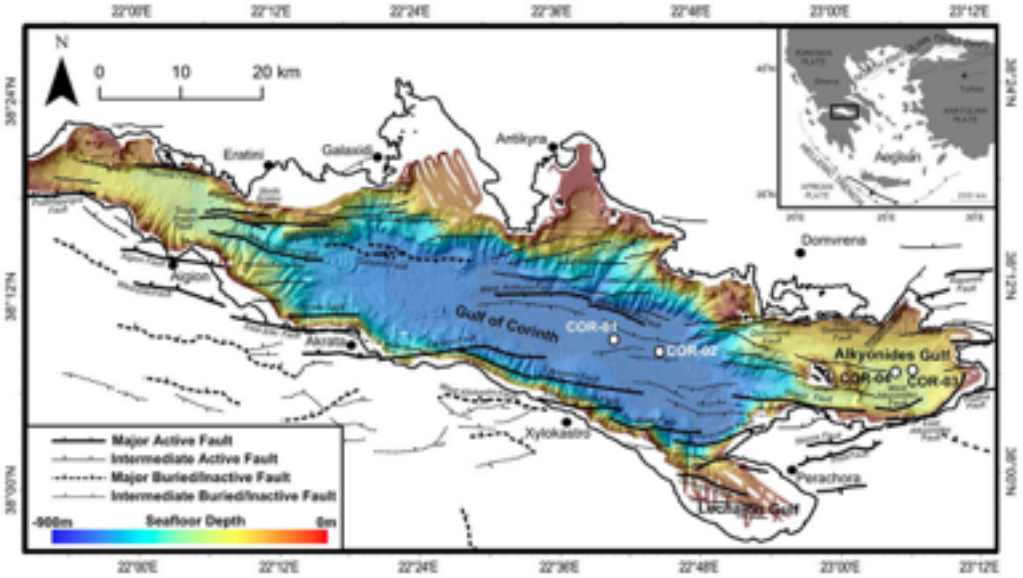
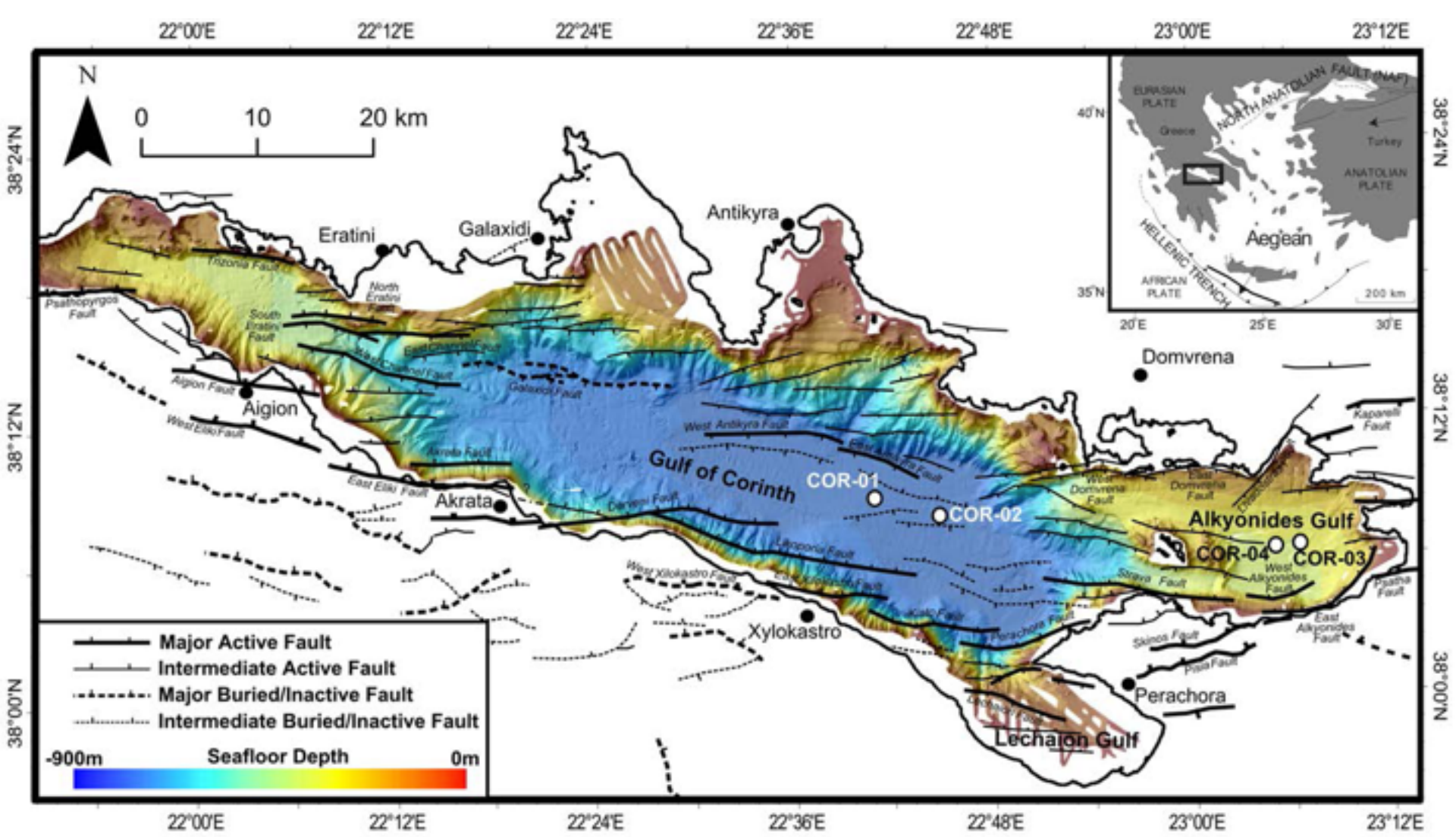


History & Current status at EFB:

879 Full 2014,
External review 2016
forwarded from SEP, June 01, 2016



Drilling:

- 4 primary & 2 alt. sites, 347-862 m WD COR-1 to 4, ***5A, 6A***, 480-750 m penetration depths
- drill ship (JR not possible due to low Rion Bridge and narrow Corinth Canal)

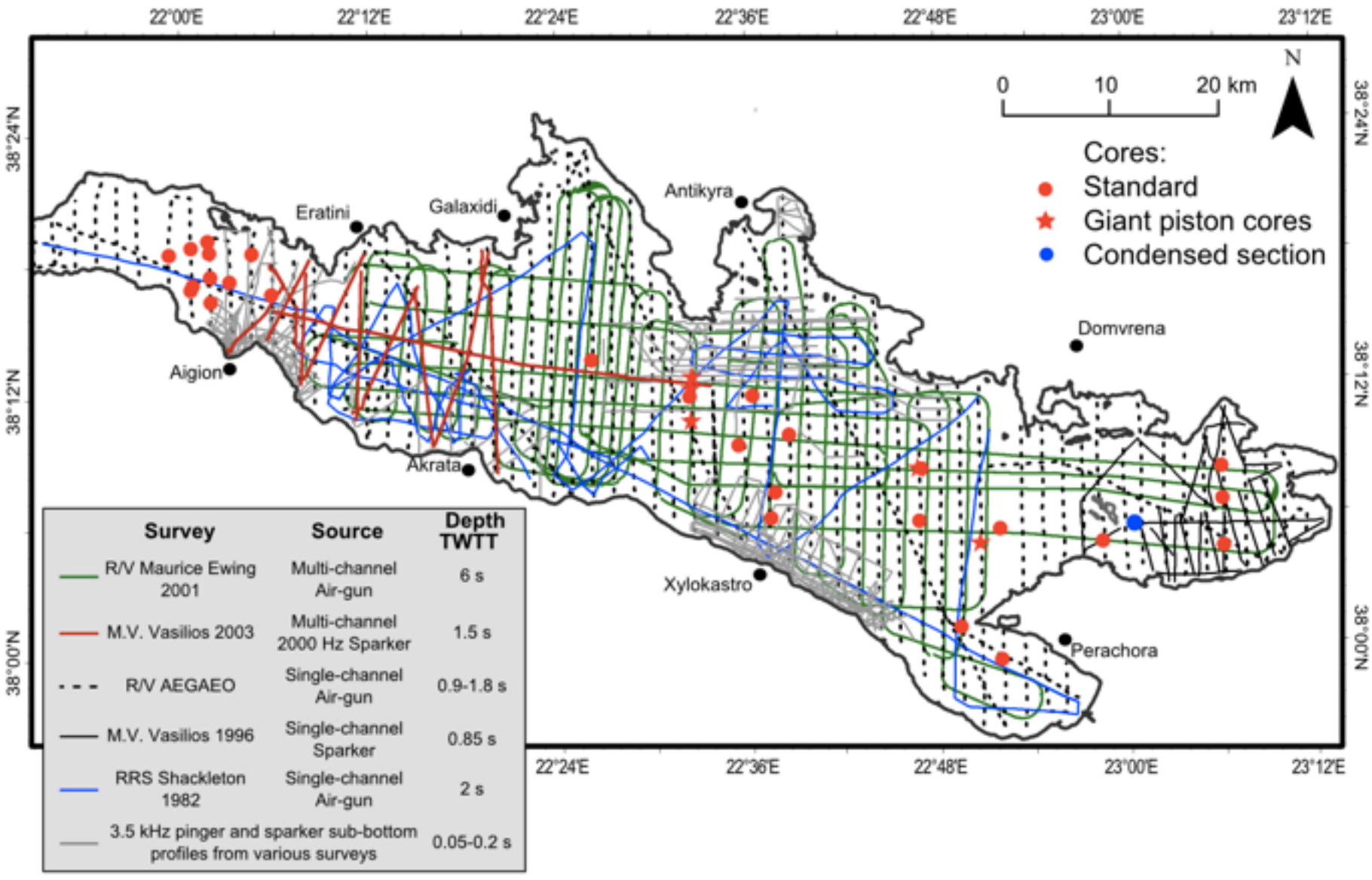
***Hypothesis 1**: Structural style, distribution of strain and strain rates within a rift are spatially and temporally variable over distances of <30-50km and timescales of <1Myr.*

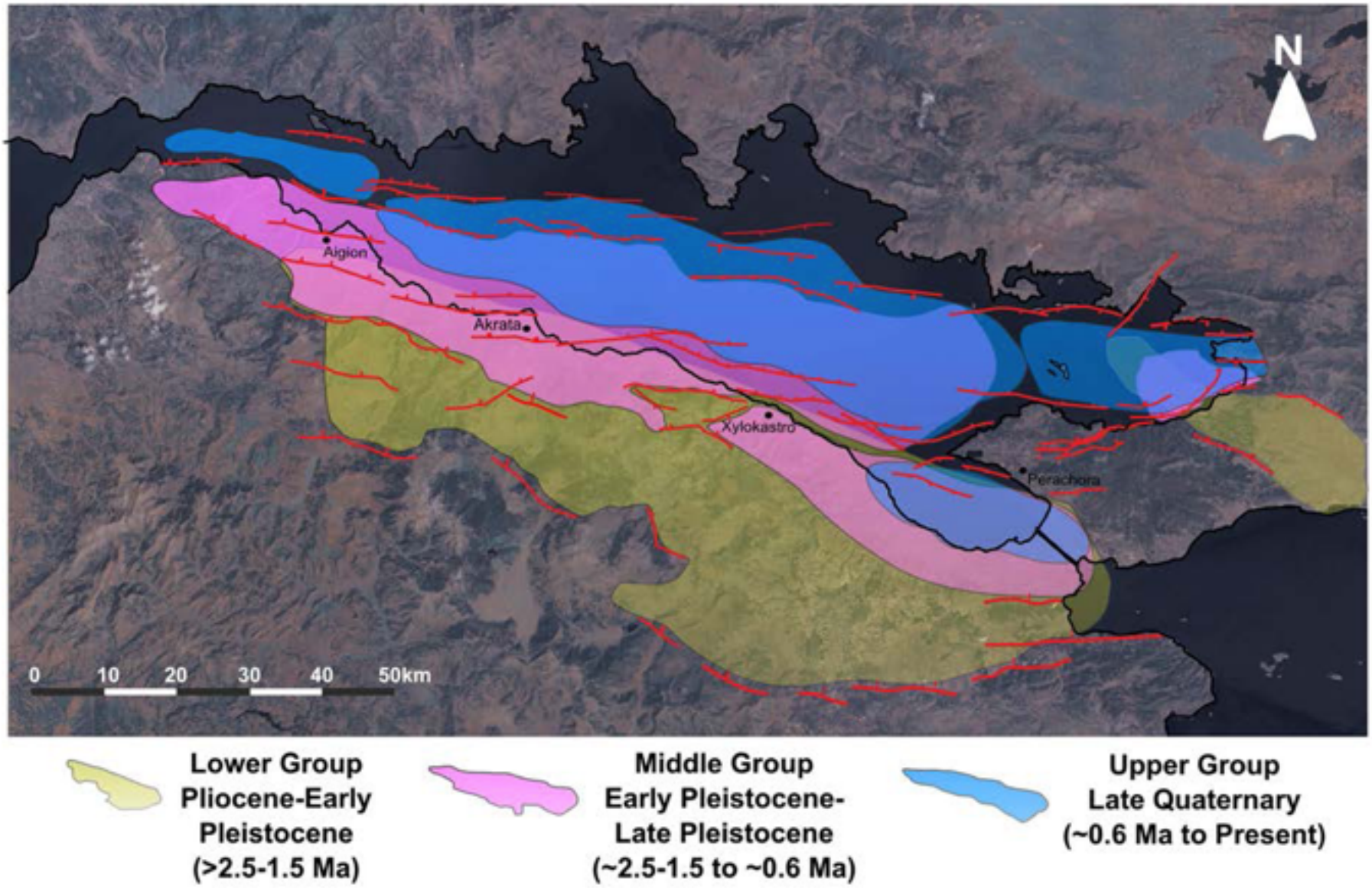
***Hypothesis 2:** Strain localizes within rifts over time leading to active rift narrowing, and this localization of strain is an abrupt, not gradual process but typically synchronous along the rift.*

***Hypothesis 3**: Fault linkage timing and rate of linkage is a function of strain rate.*

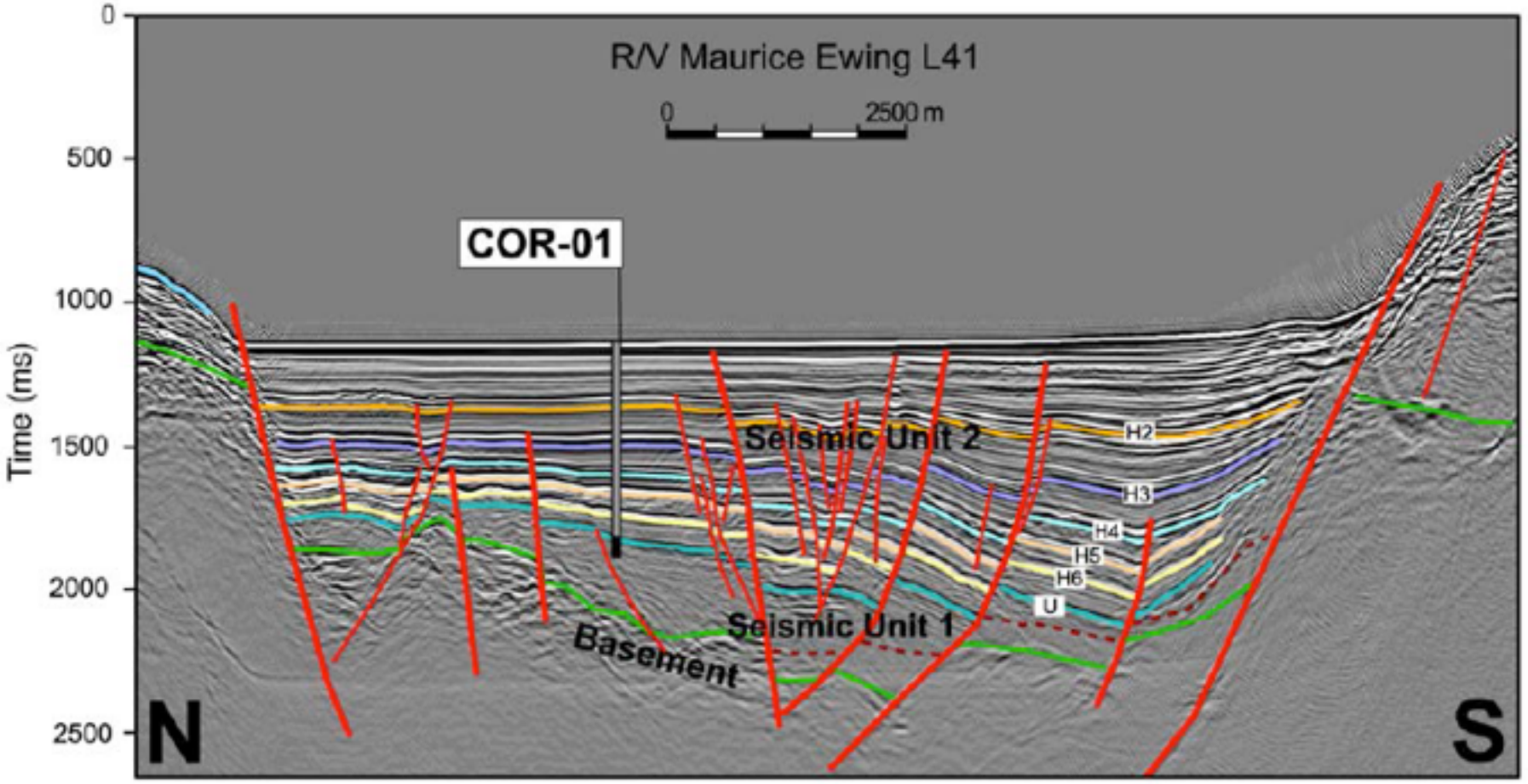
***Hypothesis 4**: Millennial to orbital timescale changes in climate and vegetation control sediment flux into a continental rift basin, but longer term (~0.5-1.0Myr) increases in clastic input into a rift depocenter reflect tectonic control of drainage systems by the growth of rift Margin topography.*

***Hypothesis 5**: Changes in magnitude and rate of sediment mass transfer (through erosion and sediment deposition) cause changes in fault and rift evolution, such as localization of strain and fault death.*


22°00'E
22°12'E
22°24'E
22°36'E
22°48'E
23°00'E
23°12'E
38°24'N
38°12'N
38°00'N
N
0
10
20 km
Cores:
Standard
Giant piston cores
Condensed section
Eratini
Galaxidi
Antikyra
Domvrena
Aigion
Akrata
Xylokastro
Perachora
Survey
Source
Depth TWTT
R/V Maurice Ewing 2001
Multi-channel Air-gun
6 s
M.V. Vasilios 2003
Multi-channel 2000 Hz Sparker
1.5 s
R/V AEGAEO
Single-channel Air-gun
0.9-1.8 s
M.V. Vasilios 1996
Single-channel Sparker
0.85 s
RRS Shackleton 1982
Single-channel Air-gun
2 s
3.5 kHz pinger and sparker sub-bottom profiles from various surveys
0.05-0.2 s



3 proposed rift phases of the Corinth Rift system and currently resolved distribution of the rift basins for each phase with regional fault map overlain


R/V Maurice Ewing L41
0
2500 m
COR-01
Seismic Unit 2
Seismic Unit 1
Basement
H2
H3
H4
H5
H6
U
N
S
Time (ms)
0
500
1000
1500
2000
2500

Deliverables + integrated marine and onshore datasets:
(1) Early rift development history to present
(2) The first comprehensive and high resolution record of spatial and temporal strain distribution within an active rift
(3) A record of fault linkage and fault array development constraining numerical and analogue models **(4)** A model of the impact of tectonics, climate and sea level on rift surface processes and sediment supply **(5)** New constraints on fault slip rates and geohazards **(6)** A Quaternary Eastern Mediterranean climate and sea level fluctuation record.

These results will be readily transferrable to other active rifts and to the deeply buried elements of mature rifted margins, and will significantly improve modeling approaches.