S548.6

Robbins
10/22/87

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Global Laser Solution: SL7.1

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IMPROVEMENTS TO CURRENT SOLUTION

FORCE MODEL

- GRAVITY: GEM-T1
- EARTH & OCEAN TIDES: GEM-T1
- SOLAR RADIATION PRESSURE: ECLIPSE BY MOON

ANALYSIS TECHNIQUES

- ALONG TRACK ACCELERATION EVERY 15 DAYS
- SOLAR RADIATION COEFFICIENT EVERY 15 DAYS
- RANGE ERROR MODEL ESTIMATION CAPABILITY

DATA REDUCTION

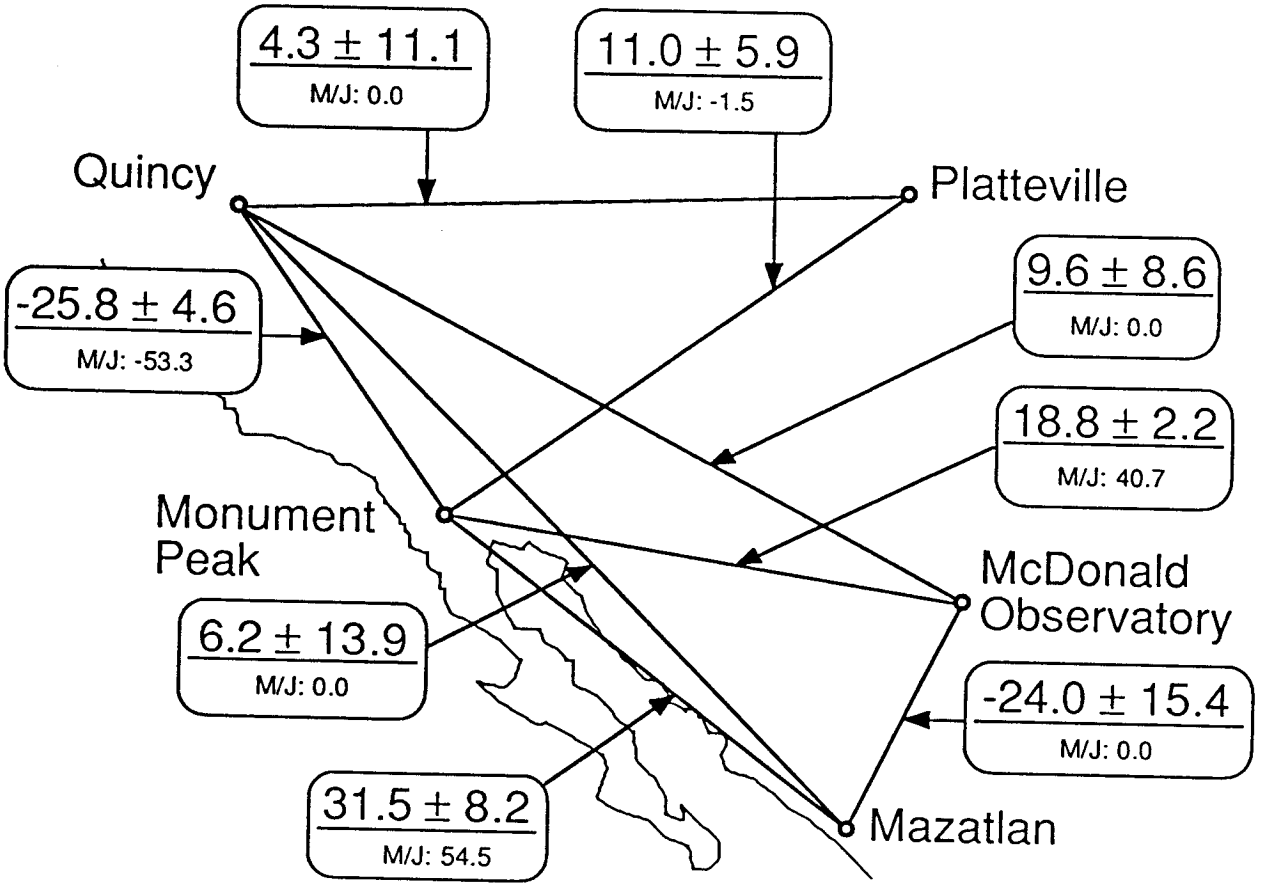
- IMPROVED DATA EDITING BY PASS
- OBSERVATIONS FROM MAY 1976 TO JUNE 1987

REFERENCE SYSTEM

- MINSTER-JORDAN AM0-2

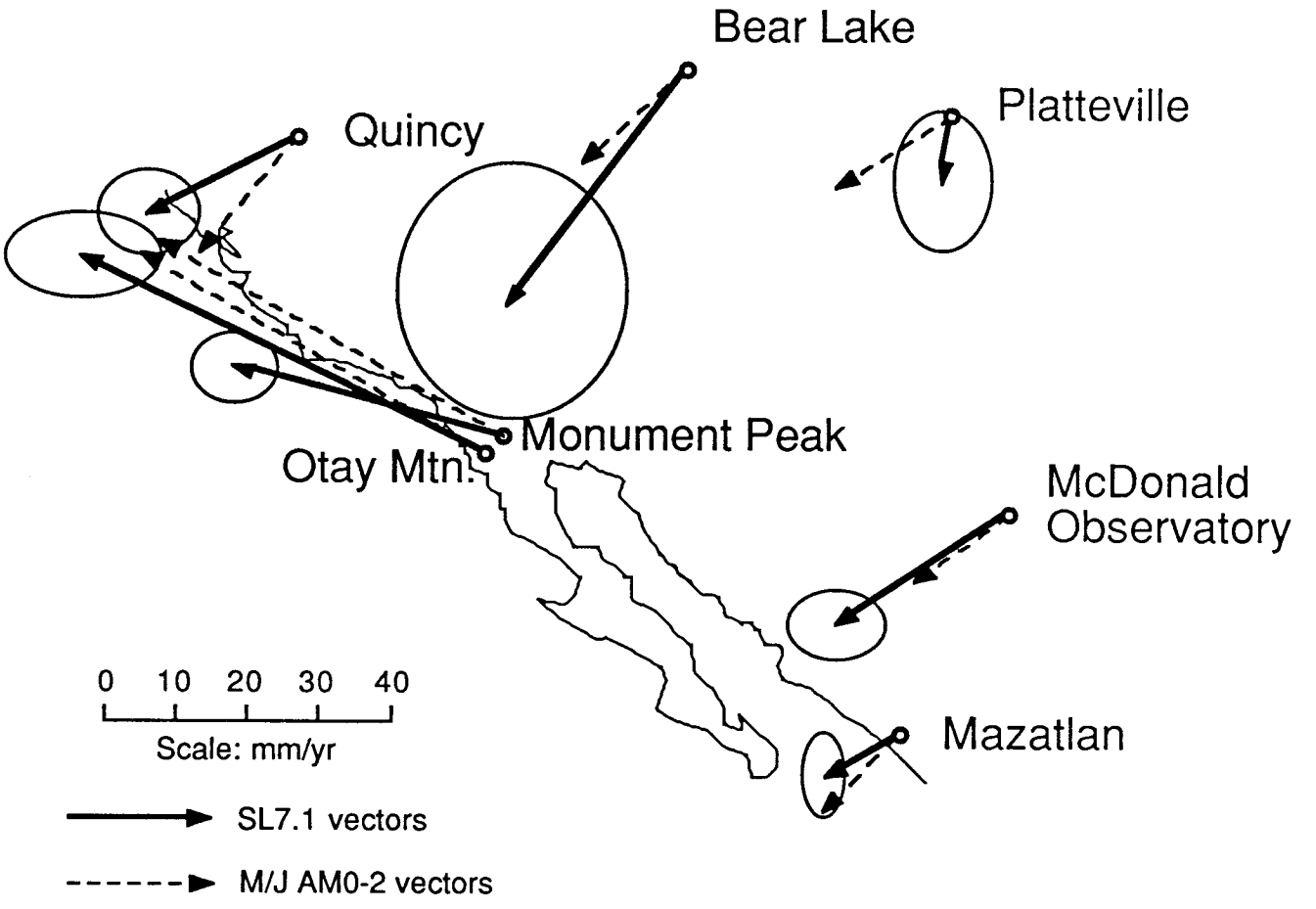
SLR Observed Plate Motion Rates for Western North America

(all measurements in mm/yr)



SL7.1 solution 871013

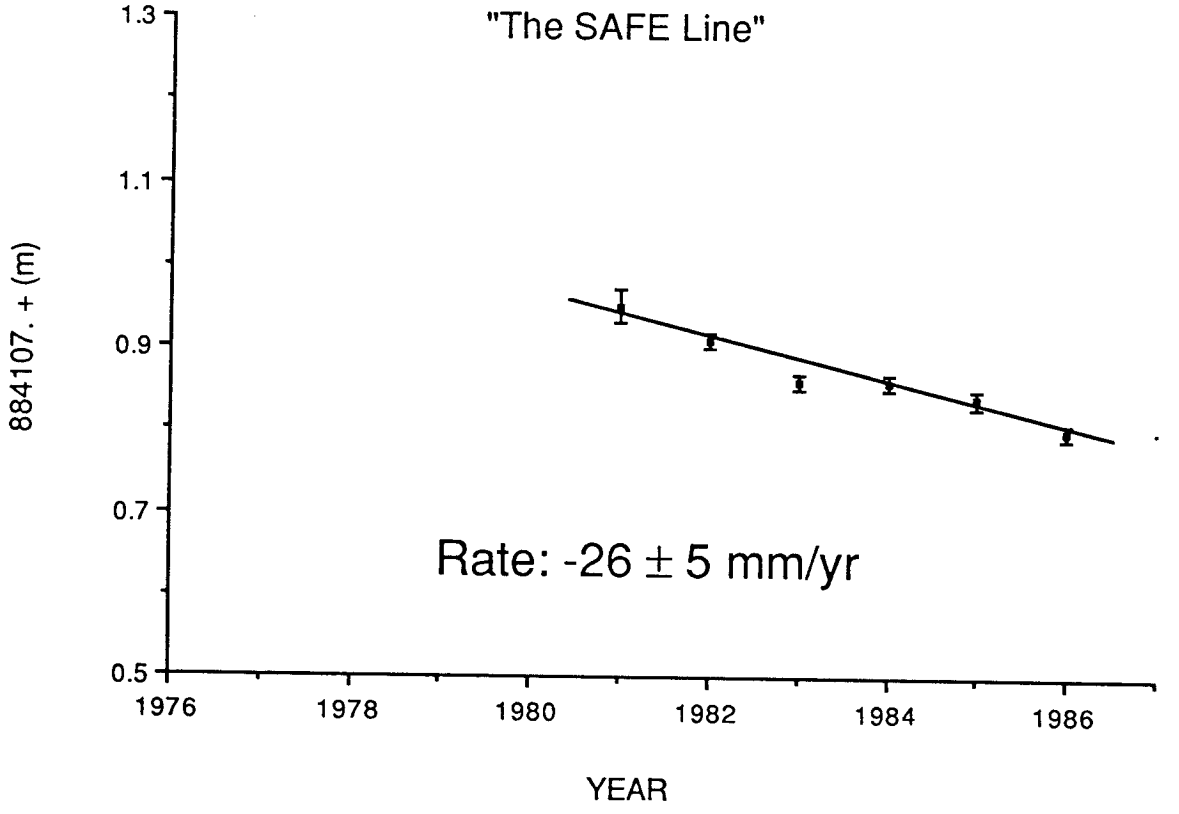
SLR Observed Vector Motions for Western North America



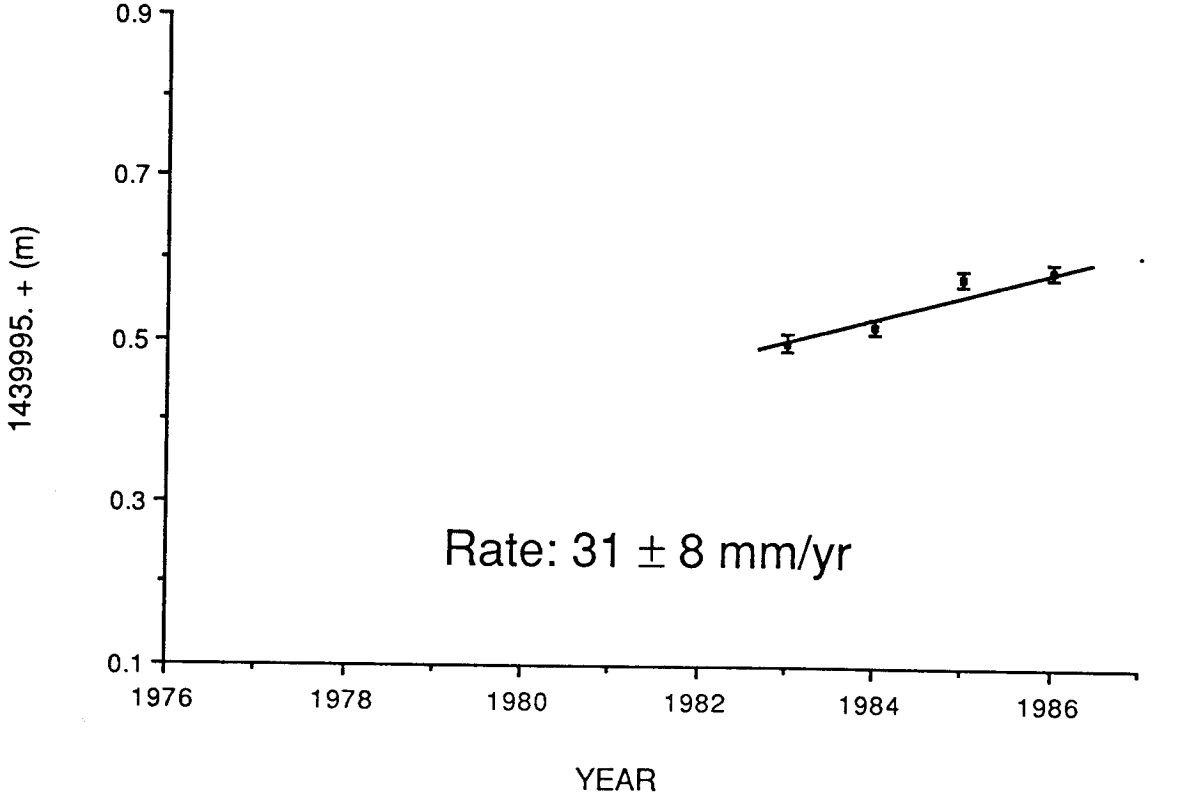
SL7.1 solution with AM0-2 871013

Station	Rate (mm/yr)	Azimuth
Bear Lake	42 ± 17	218° ± 23°
Mazatlan	12 ± 4	242° ± 26°
McDonald Obs.	29 ± 6	237° ± 12°
Monument Pk.	39 ± 6	284° ± 7°
Otay Mtn.	63 ± 10	297° ± 7°
Platteville	10 ± 10	188° ± 44°
Quincy	24 ± 7	242° ± 15°

Quincy - Monument Peak

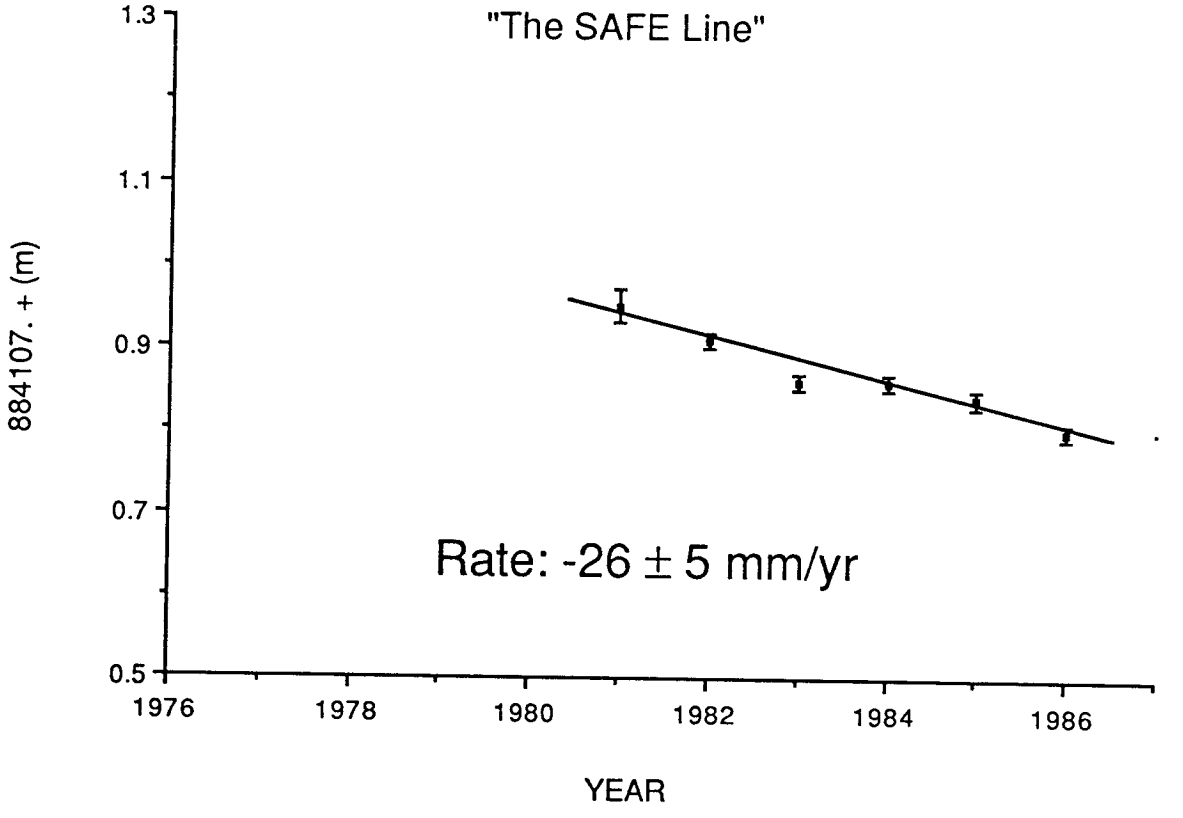


Monument Peak - Mazatlan

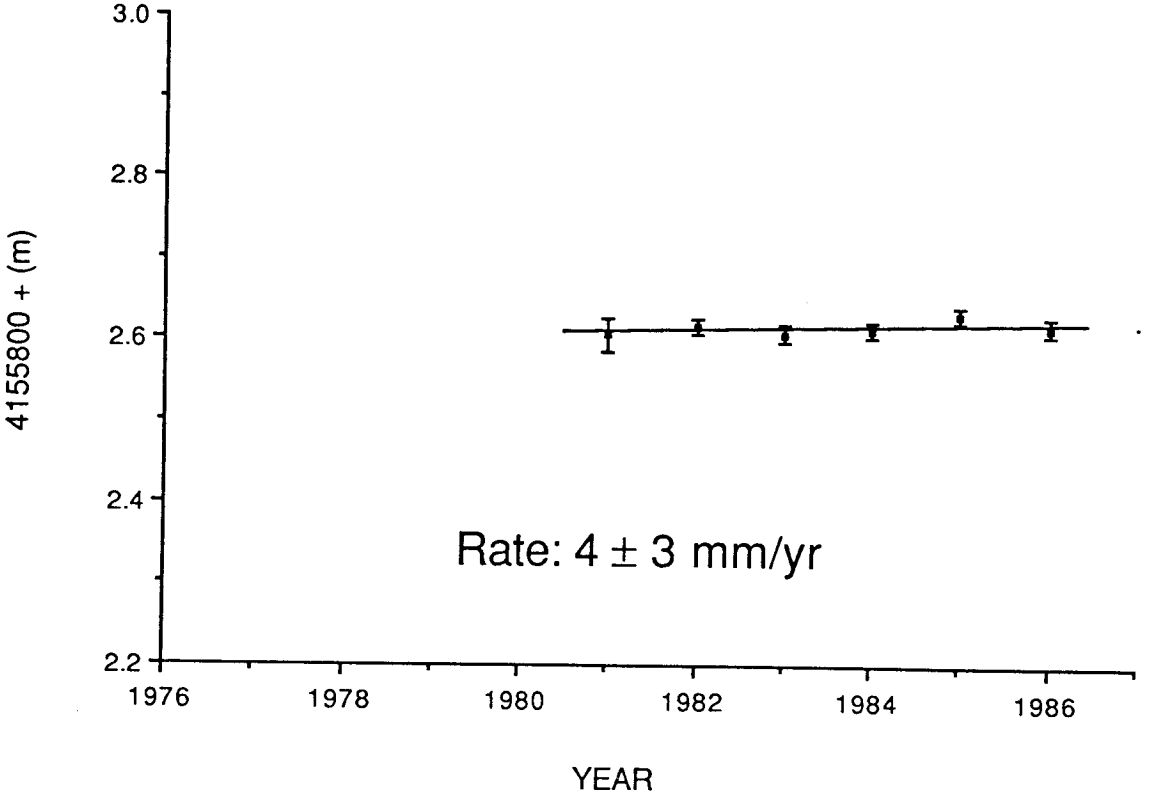


SL7.1 solution 871013

Quincy - Monument Peak



Monument Peak - Hawaii



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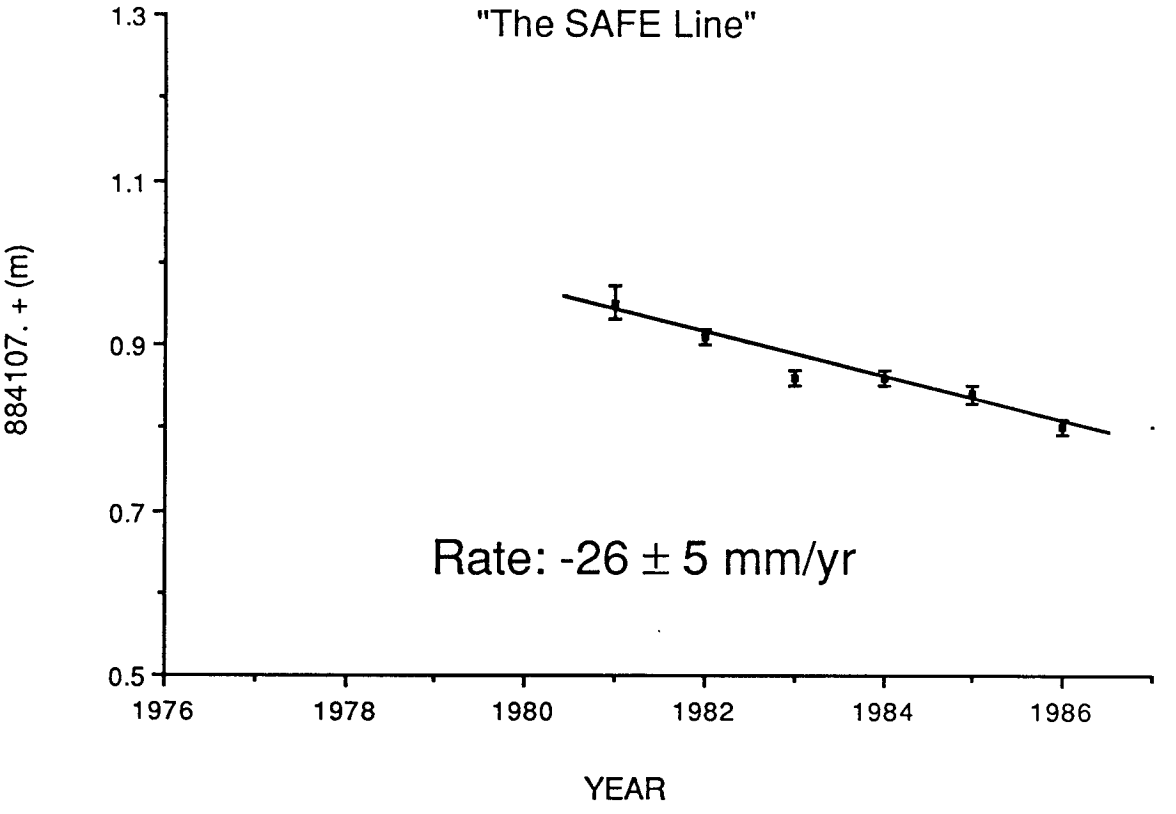
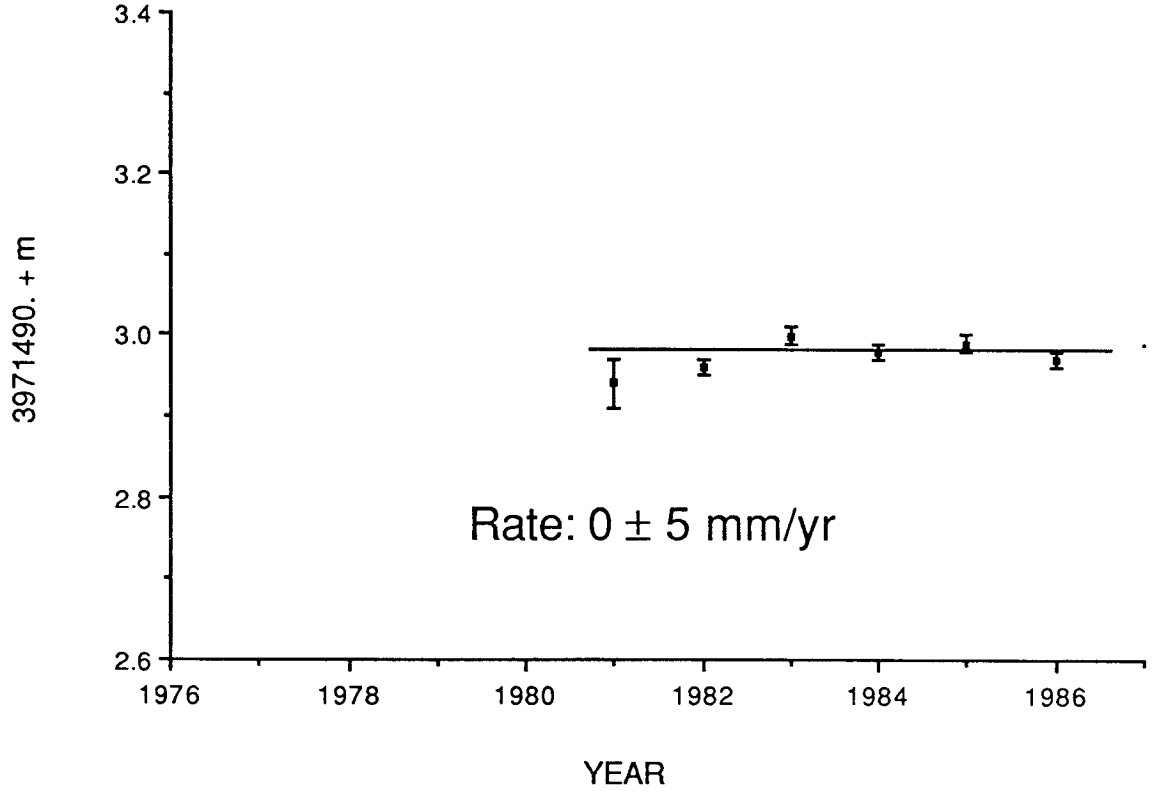
Quincy - Monument Peak



Quincy - Hawaii



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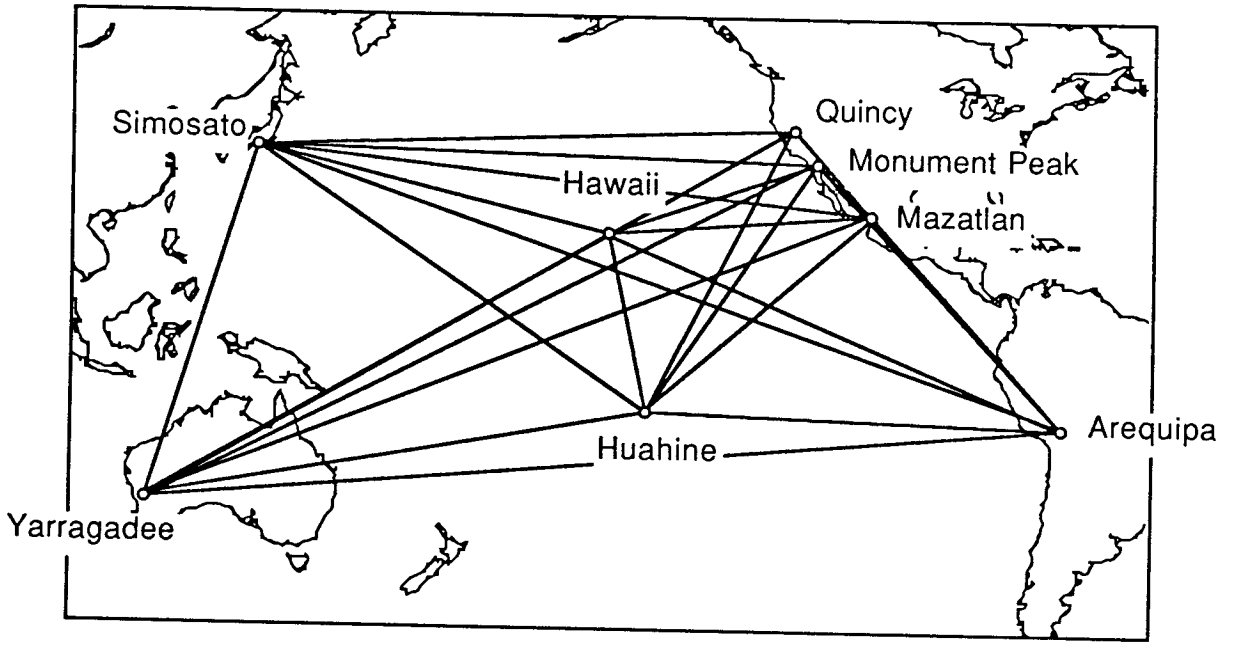
SLR Observed Plate Motion Rates for the Pacific Basin



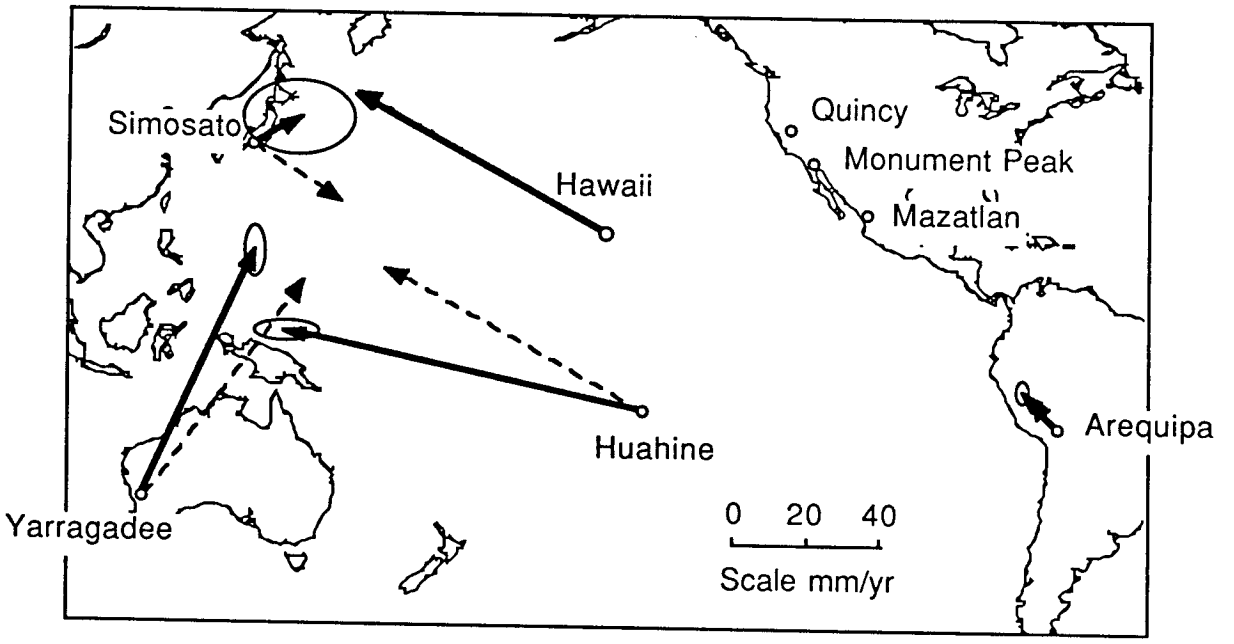
SLR Observed Plate Motion Rates for the Pacific Basin

(all measurements in mm/yr)

FROM - TO	OBS. RATE	M/J
Quincy - Simosato	-27.8 ± 14.1	-10.9
Quincy - Hawaii	0.0 ± 4.7	8.2
Quincy - Yarragadee	-85.1 ± 8.0	-82.3
Quincy - Huahine	-0.9 ± 3.1	-23.8
Quincy - Arequipa	7.2 ± 5.9	-11.4
Mon. Pk. - Simosato	-51.8 ± 17.0	-64.7
Mon. Pk. - Hawaii	3.6 ± 3.2	0.0
Mon. Pk. - Yarragadee	-91.0 ± 7.4	-102.6
Mon. Pk. - Huahine	20.7 ± 4.9	0.0
Mon. Pk. - Arequipa	33.1 ± 2.3	42.4
Mazatlan - Simosato	-28.5 ± 26.0	-11.6
Mazatlan - Hawaii	46.6 ± 13.5	48.3
Mazatlan - Yarragadee	-41.7 ± 8.6	-57.7
Mazatlan - Huahine	48.8 ± 6.3	14.2
Mazatlan - Arequipa	-0.8 ± 9.0	-11.8
Arequipa - Simosato	-13.0 ± 16.8	-24.9
Arequipa - Hawaii	79.2 ± 4.1	66.0
Arequipa - Yarragadee	80.0 ± 8.9	61.7
Arequipa - Huahine	119.3 ± 18.5	73.7
Huahine - Simosato	-104.0 ± 22.1	-106.8
Huahine - Hawaii	11.5 ± 5.5	0.0
Huahine - Yarragadee	-83.0 ± 4.5	-68.7
Yarragadee - Simosato	-71.8 ± 9.1	-77.4
Yarragadee - Hawaii	-96.4 ± 7.4	-102.8
Simosato - Hawaii	-87.4 ± 12.6	-99.0

SL7.1 solution with AM0-2 871013

SLR Observed Vector Motion Rates for the Pacific Basin



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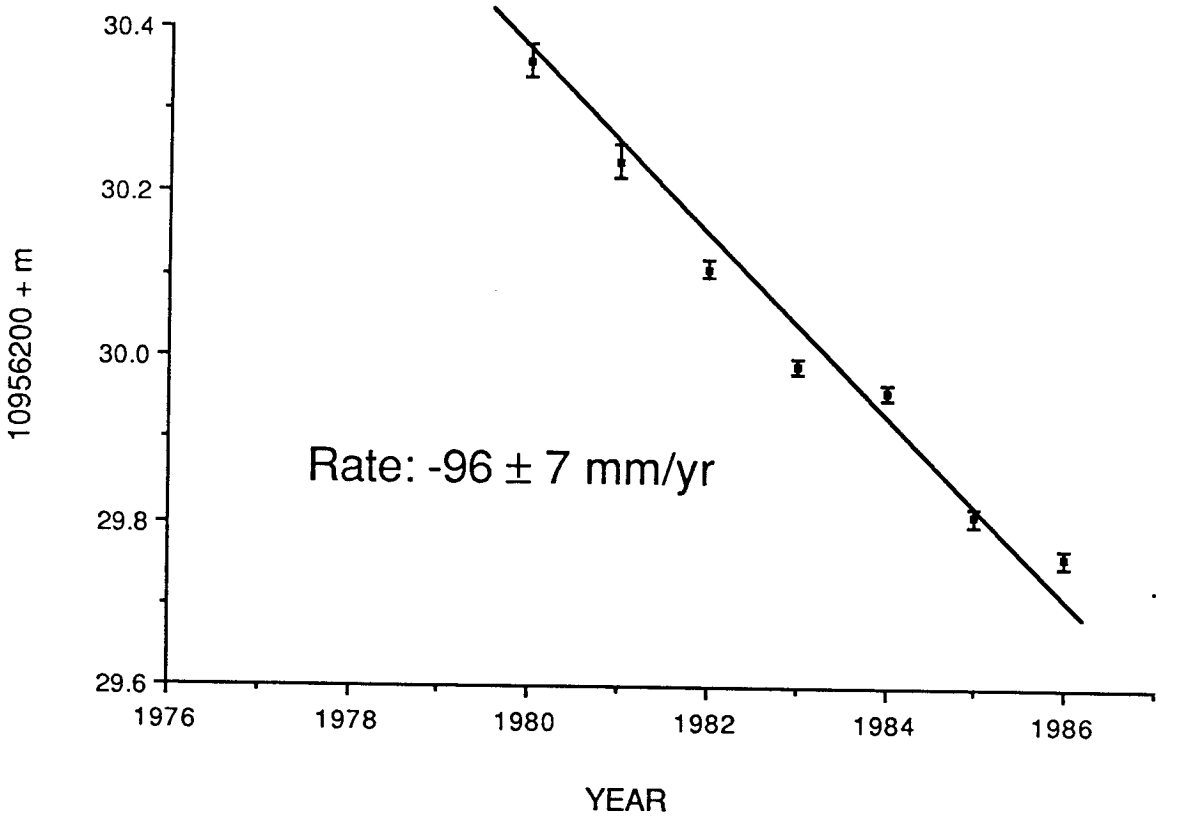
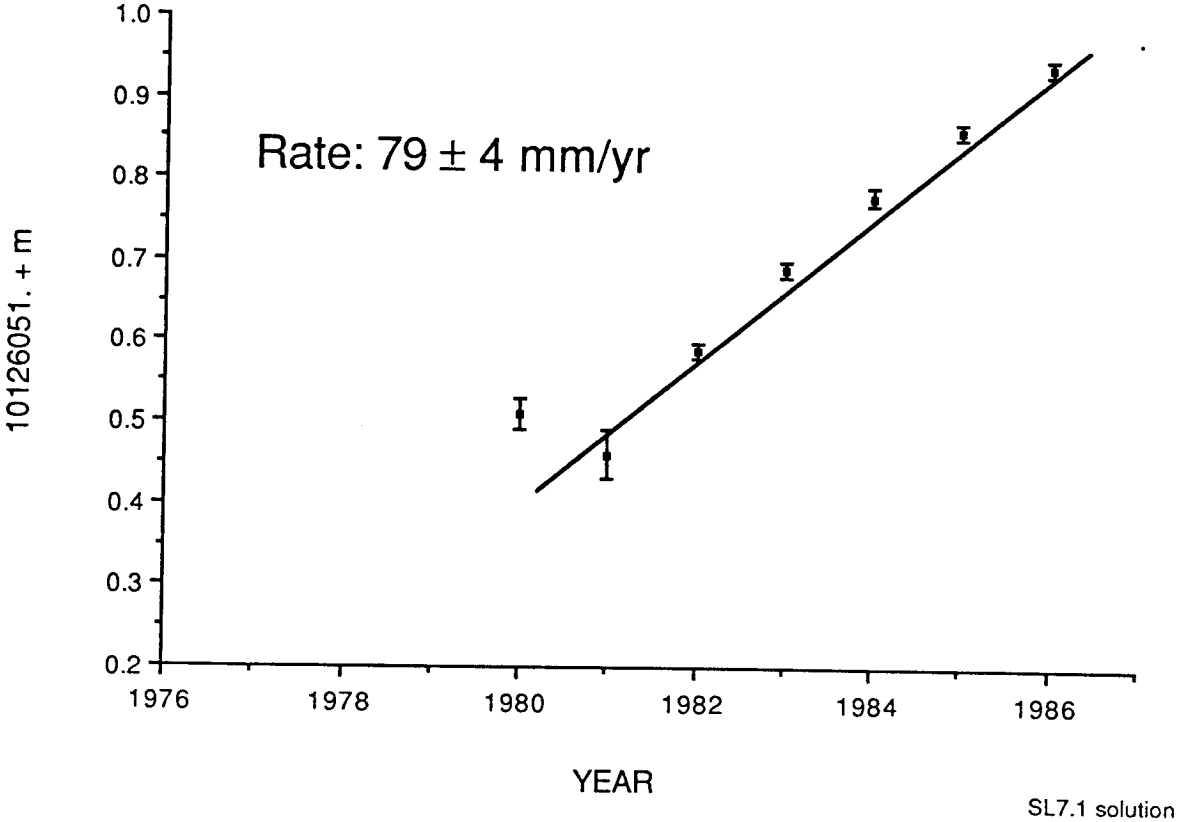
Yarragadee - Hawaii



Arequipa - Hawaii



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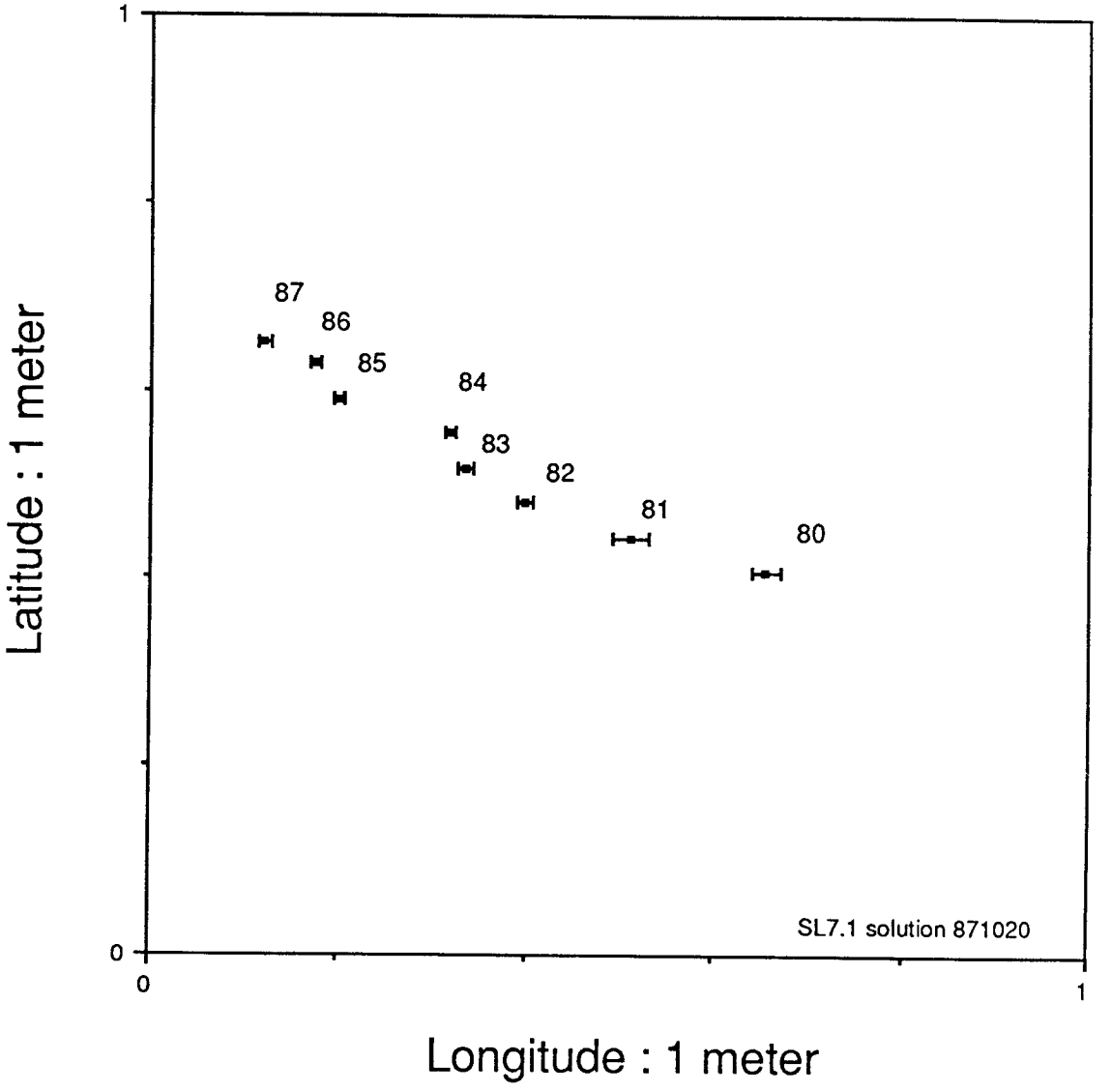
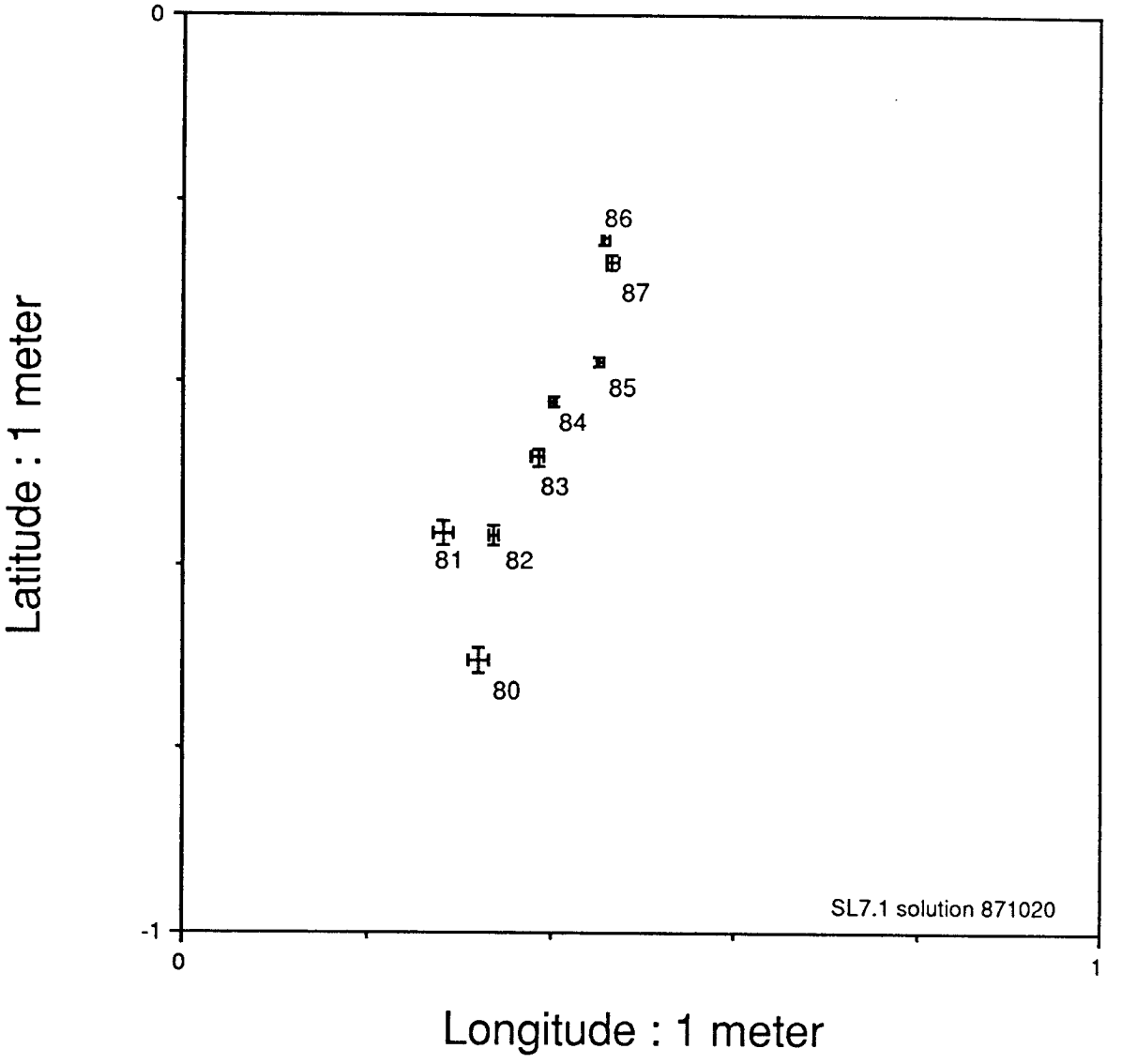
Hawaii


1
0
0
1
87
86
85
84
83
82
81
80
SL7.1 solution 871020
Latitude : 1 meter
Longitude : 1 meter

Yarragadee


0
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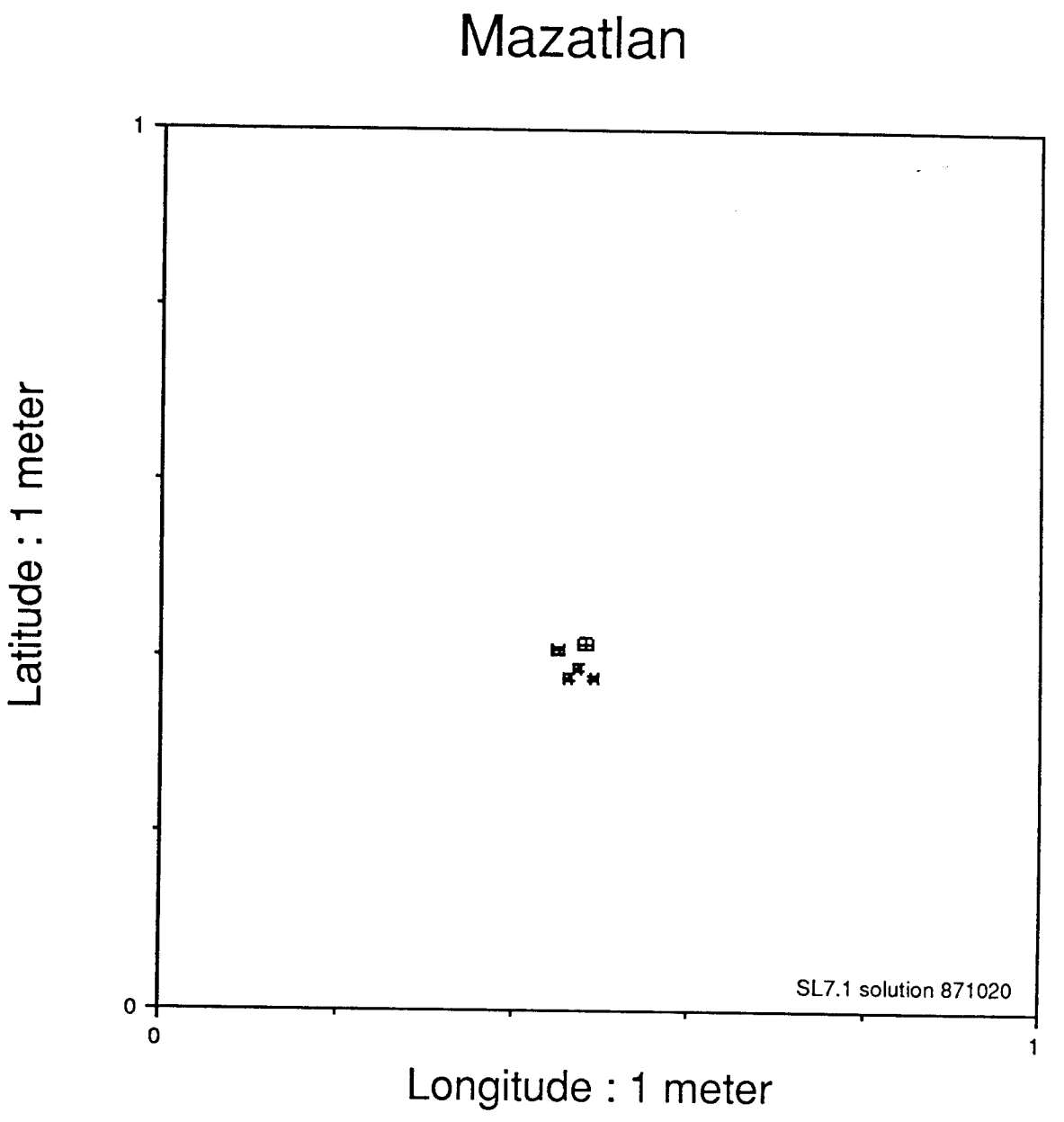
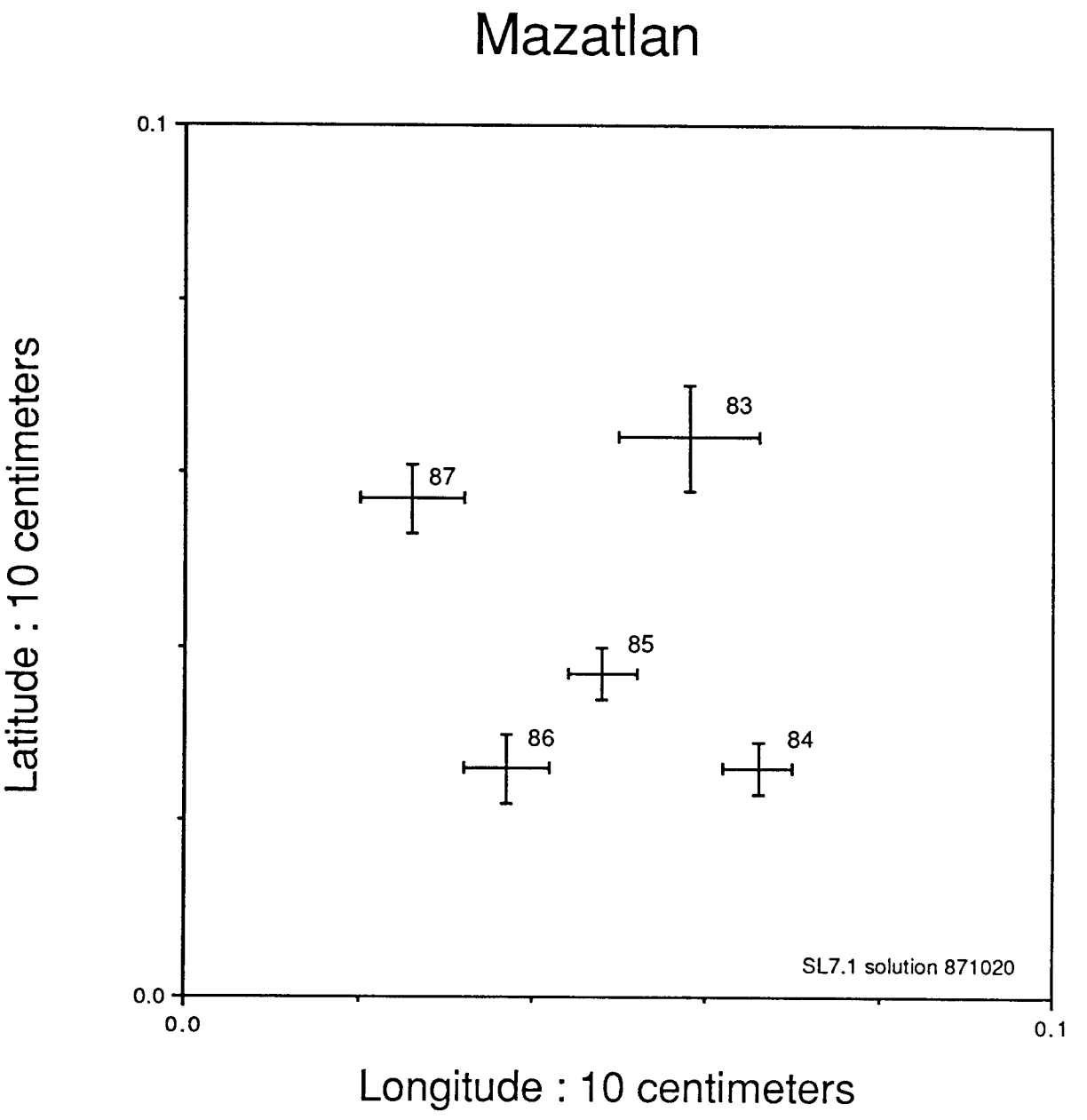
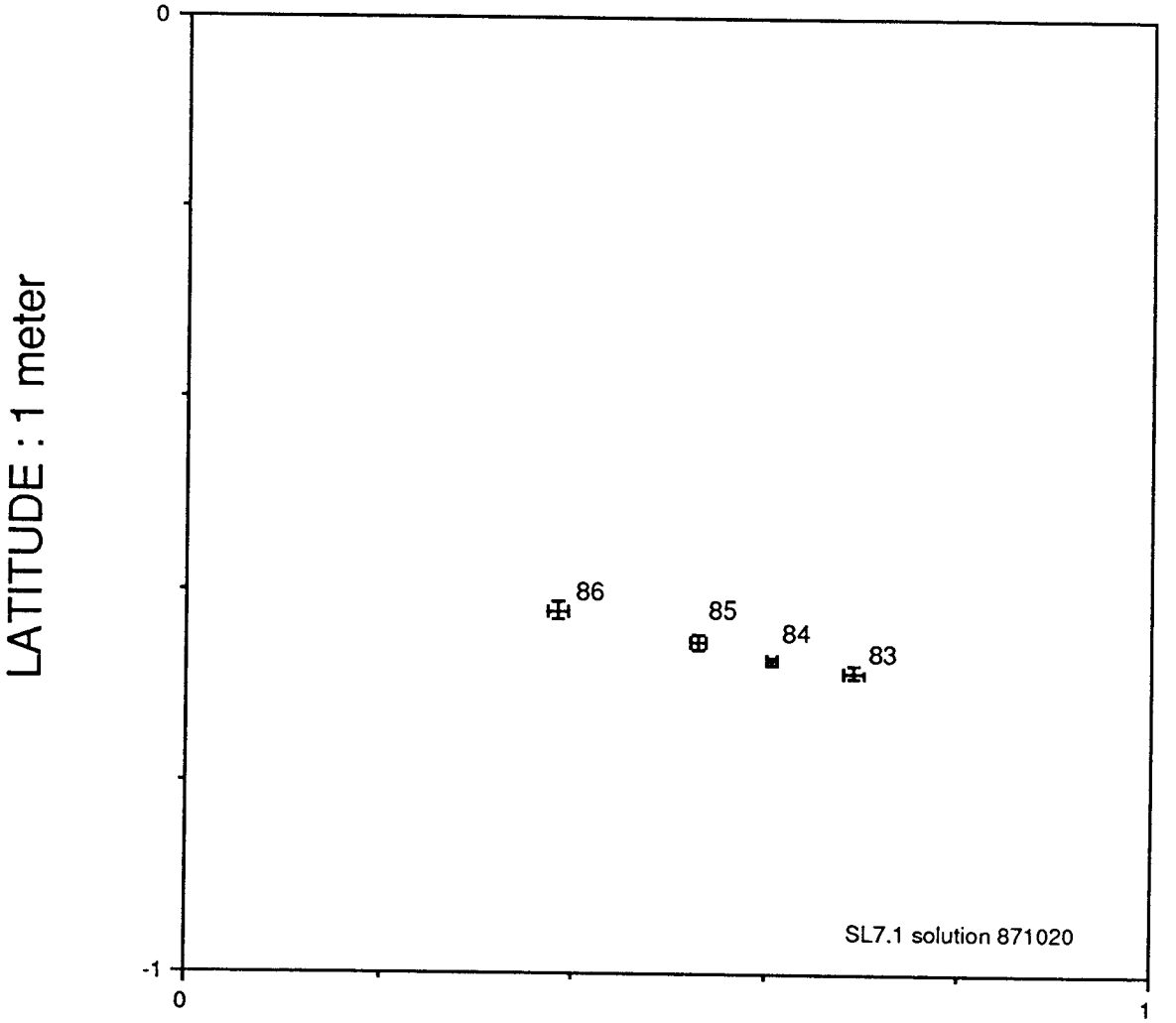
0
1
86
87
85
84
83
81
82
80
SL7.1 solution 871020
Latitude : 1 meter
Longitude : 1 meter

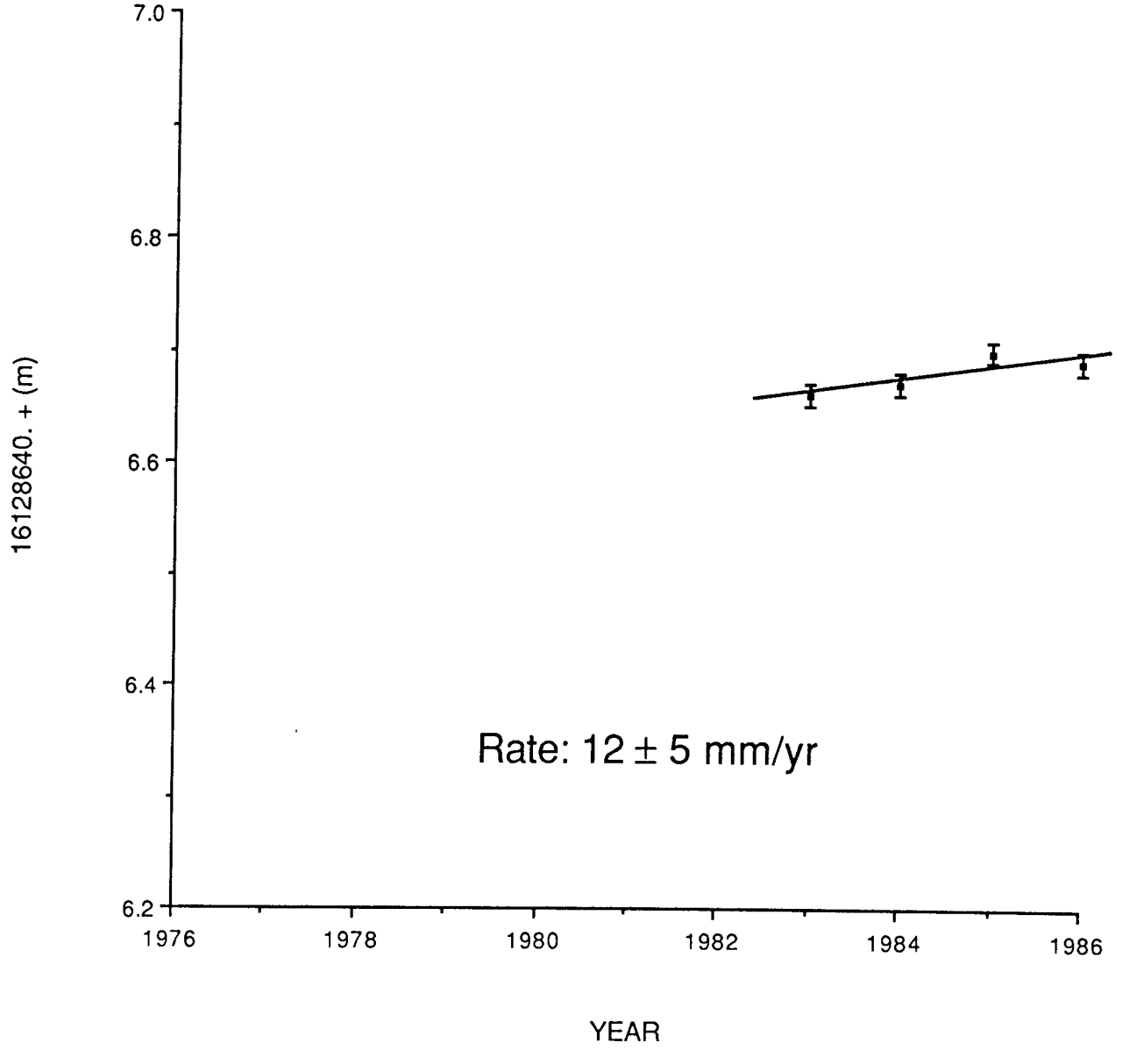

Mazatlan
1
0
0
1
Latitude : 1 meter
Longitude : 1 meter
SL7.1 solution 871020


Mazatlan
0.1
0.0
0.0
0.1
Latitude : 10 centimeters
Longitude : 10 centimeters
83
87
85
86
84
SL7.1 solution 871020

Huahine


0
-1
0
1
86
85
84
83
SL7.1 solution 871020
LATITUDE : 1 meter
LONGITUDE : 1 meter

Hawaii - Huahine



SL7.1 solution 871020

Conclusions

- SL7.1 is providing greater precision in baselines and station vectors (~ 20% over SL6).

- Out of 105 baselines with ≥ 4 years of data (1976-86) ~ 45 have an accuracy in rate of change of better than or equal to 10 mm/yr.

- Monument Peak motion is less than the full Pacific Plate motion. The velocity component parallel to the fault is responsible for the deficiency.

- Results from Quincy, Platteville, McDonald Obs. suggest that Basin and Range spreading is being detected.

- Simosato (Japan) appears to be moving N.E. - not consistent with Simosato being on the Pacific or Eurasian Plates (agrees with VLBI results for Kashima).

- Huahine may be showing deformation within the Pacific Plate.