Global Laser Solution: SL7.1

David E. Smith
Ronald Kolenkiewicz
NASA/GSFC

Peter J. Dunn
Mark H. Torrence
Erricos E. Pavlis
John W. Robbins
Ronald G. Williamson
Steve M. Klosko
Lloyd Carpenter
EG&G/WASC Inc.

Susan K. Fricke
RMS Inc.

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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)

Quincy

-25.8 ± 4.6
M/J: -53.3

Monument Peak

6.2 ± 13.9
M/J: 0.0

Platteville

11.0 ± 5.9
M/J: -1.5

18.8 ± 2.2
M/J: 40.7

McDonald Observatory

9.6 ± 8.6
M/J: 0.0

-24.0 ± 15.4
M/J: 0.0

Mazatlan

31.5 ± 8.2
M/J: 54.5
Quincy - Monument Peak

"The SAFE Line"

Rate: $-26 \pm 5 \text{ mm/yr}$

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Monument Peak - Mazatlan

Rate: $31 \pm 8 \text{ mm/yr}$
Quincy - Monument Peak

"The SAFE Line"

Rate: $-26 \pm 5 \text{ mm/yr}$

Monument Peak - Hawaii

Rate: $4 \pm 3 \text{ mm/yr}$
Quincy - Monument Peak

"The SAFE Line"

Rate: \(-26 \pm 5 \text{ mm/yr}\)

Quincy - Hawaii

Rate: \(0 \pm 5 \text{ mm/yr}\)
SLR Observed Plate Motion Rates for the Pacific Basin
# SLR Observed Plate Motion Rates for the Pacific Basin

(all measurements in mm/yr)

<table>
<thead>
<tr>
<th>FROM - TO</th>
<th>OBS. RATE</th>
<th>M/J</th>
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</thead>
<tbody>
<tr>
<td>Quincy - Simosato</td>
<td>-27.8 ± 14.1</td>
<td>-10.9</td>
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<tr>
<td>Quincy - Hawaii</td>
<td>0.0 ± 4.7</td>
<td>8.2</td>
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<tr>
<td>Quincy - Yarragadee</td>
<td>-85.1 ± 8.0</td>
<td>-82.3</td>
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<tr>
<td>Quincy - Huahine</td>
<td>-0.9 ± 3.1</td>
<td>-23.8</td>
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<tr>
<td>Quincy - Arequipa</td>
<td>7.2 ± 5.9</td>
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<td>3.6 ± 3.2</td>
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<td>Mon. Pk. - Yarragadee</td>
<td>-91.0 ± 7.4</td>
<td>-102.6</td>
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<tr>
<td>Mon. Pk. - Huahine</td>
<td>20.7 ± 4.9</td>
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<td>Mon. Pk. - Arequipa</td>
<td>33.1 ± 2.3</td>
<td>42.4</td>
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<td>Mazatlan - Hawaii</td>
<td>46.6 ± 13.5</td>
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<td>14.2</td>
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<td>Mazatlan - Arequipa</td>
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<td>Arequipa - Simosato</td>
<td>-13.0 ± 16.8</td>
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<td>79.2 ± 4.1</td>
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<td>Arequipa - Huahine</td>
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<td>11.5 ± 5.5</td>
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<td>-96.4 ± 7.4</td>
<td>-102.8</td>
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<td>Simosato - Hawaii</td>
<td>-87.4 ± 12.6</td>
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</table>
SLR Observed Vector Motion Rates for the Pacific Basin
Yarragadee - Hawaii

Rate: $-96 \pm 7 \text{ mm/yr}$

Arequipa - Hawaii

Rate: $79 \pm 4 \text{ mm/yr}$
Huahine

LATITUDE : 1 meter

LONGITUDE : 1 meter

SL7.1 solution 871020
Hawaii - Huahine

Rate: 12 ± 5 mm/yr
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.