SOF Factor Node for Crustal Source

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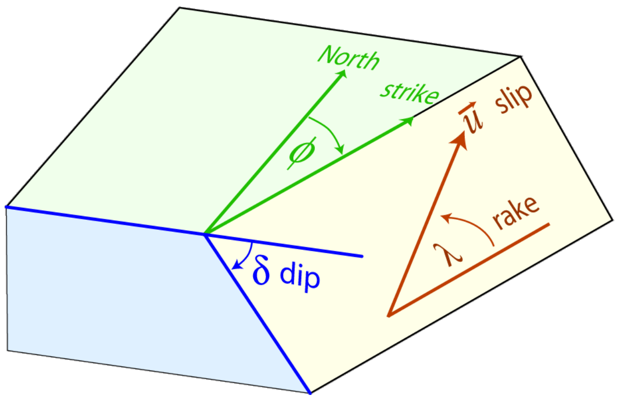
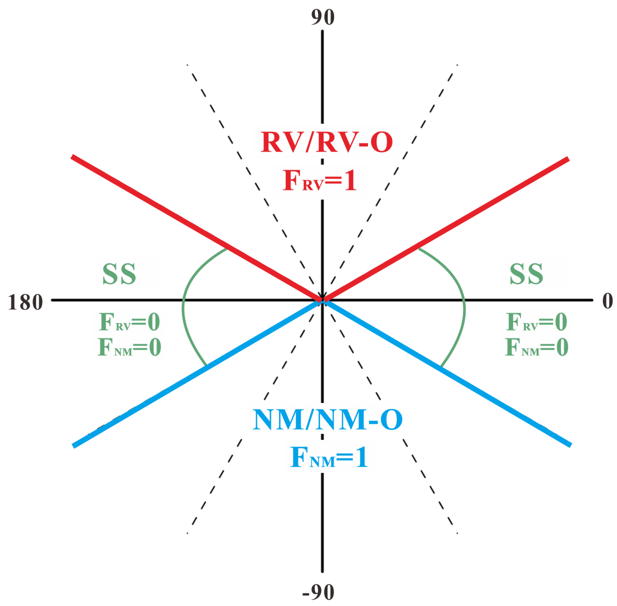
Taiwan SSHAC Level 3 PSHA Study
Taipei, Taiwan

Classification Criteria of SOF

- **Strike-slip fault**
  - $-30° \leq rake \leq 30°$
  - $-180° \leq rake \leq -150°$
  - $150° \leq rake \leq 180°$
- **Normal fault**
  - $-120° < rake < -60°$
- **Normal-oblique fault**
  - $-60° \leq rake < -30°$
  - $-150° < rake \leq -120°$
- **Reverse fault**
  - $60° < rake < 120°$
- **Reverse-oblique fault**
  - $30° < rake \leq 60°$
  - $120° \leq rake < 150°$



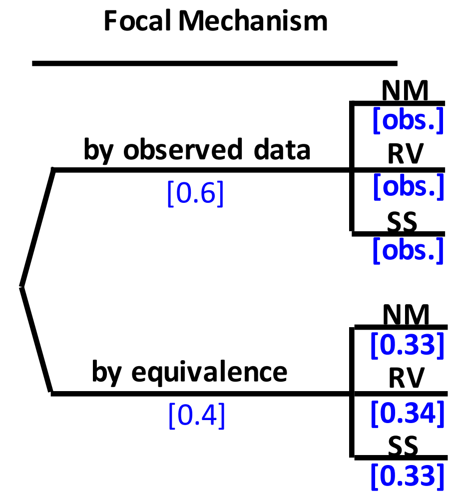


Ground Motion Classification of Oblique Fault

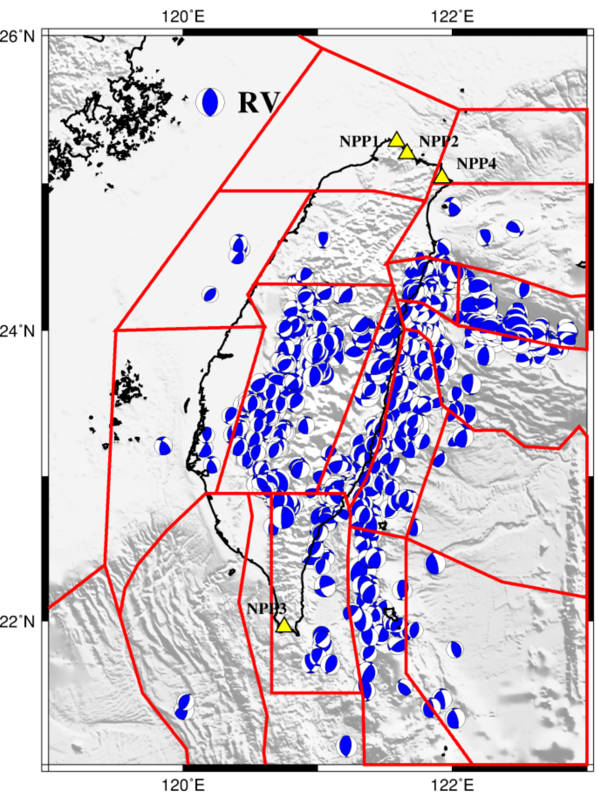
- **Adjusted model used the same classification of original ground motion model**
- **Ground motion of normal-oblique fault**
  - ASB14, ASK14, BSSA14, Bi14: are grouped to normal fault
  - CY14: are grouped to **strike-slip fault**
  - Id14: are grouped to **reverse fault**
- **Ground motion of reverse-oblique fault**
  - All of six models: are grouped to reverse faults

Focal Mechanism Statistics

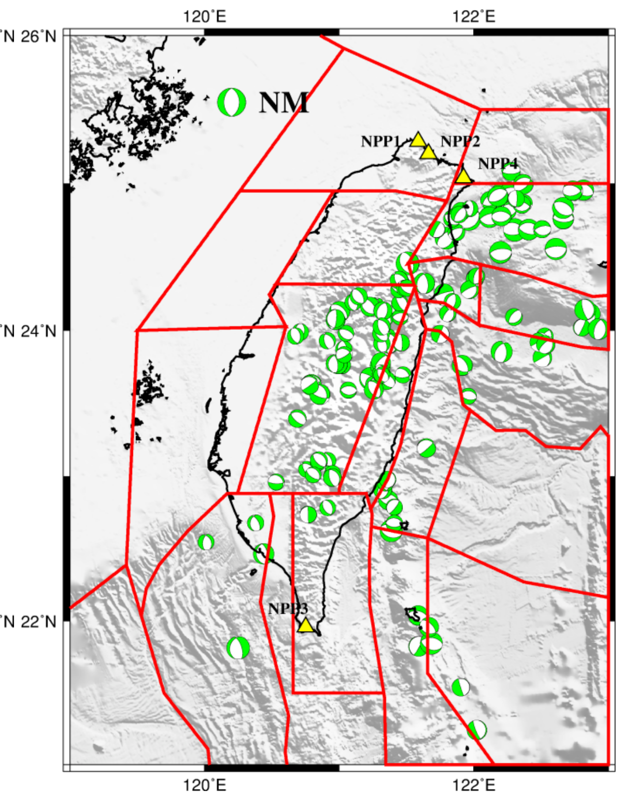
- Catalog: 1977 ~ 2015/6
- Magnitude: Mw≧4.0
- Depth: ≦ 35 km



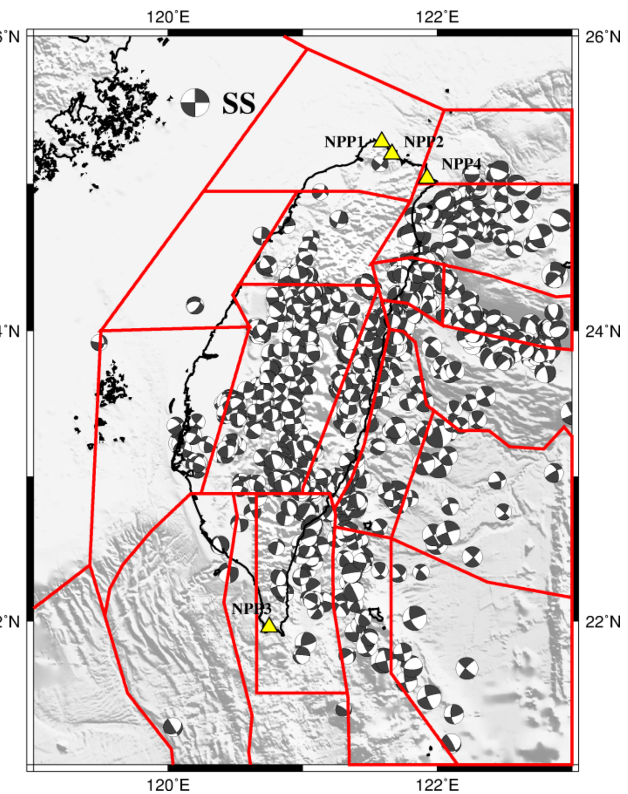
Zoning Scheme B



Reverse Type



Noraml Type

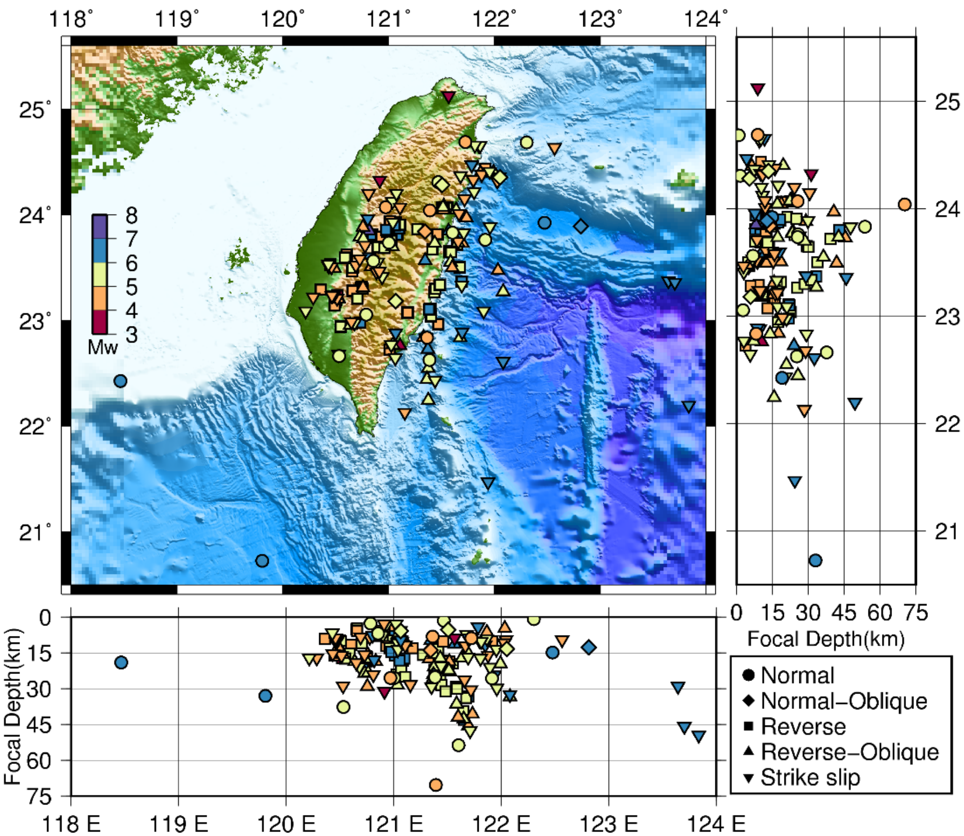


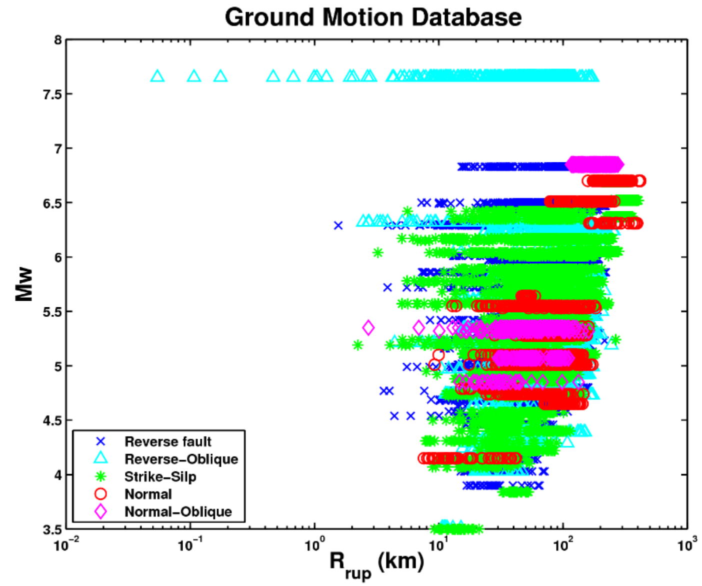
Strike Slip Type

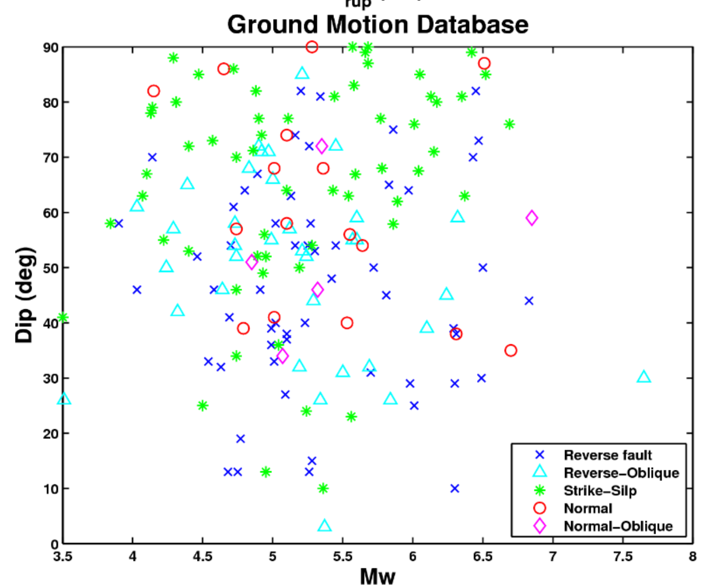
Count percentage of style of faulting in each subzone (Chin-Hsun Yeh)

Crustal Earthquakes and records in GMC Database

- NM: **16** events, **1414** records
- NO: **5** events, **617** records
- RV: **56** events, **10191** records
- RO: **35** events, **5317** records
- SS: **59** events, **6922** records

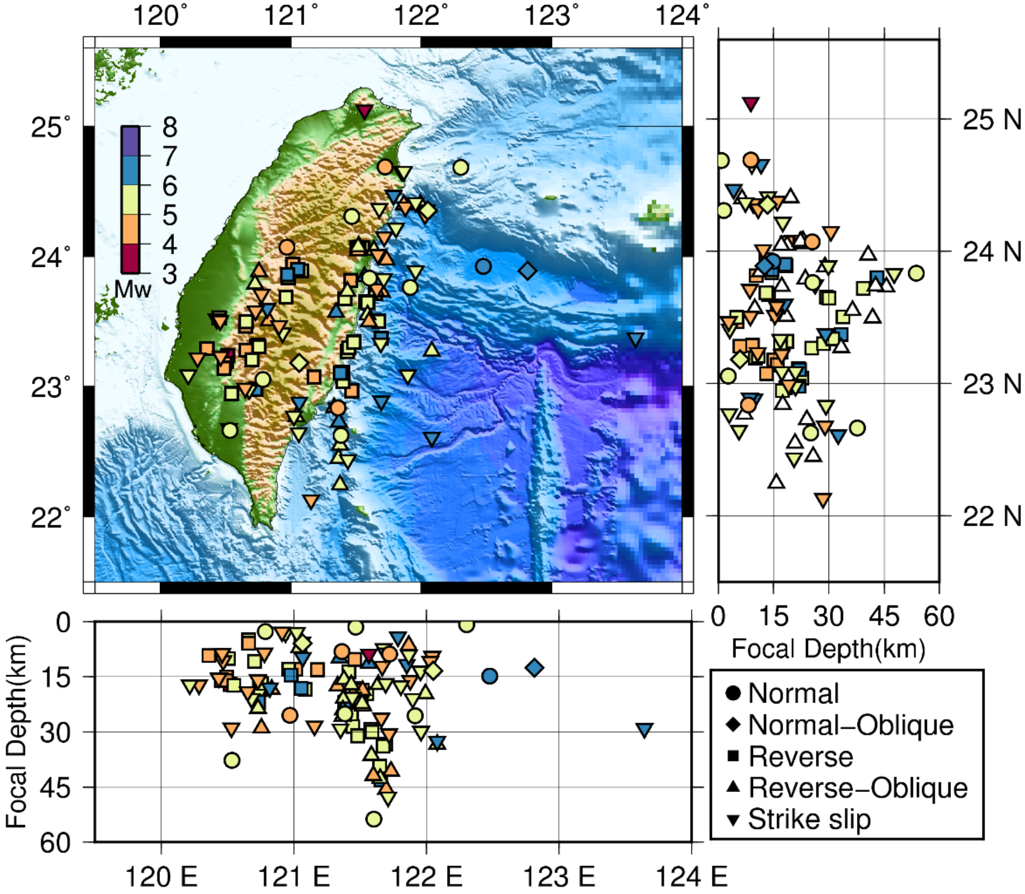


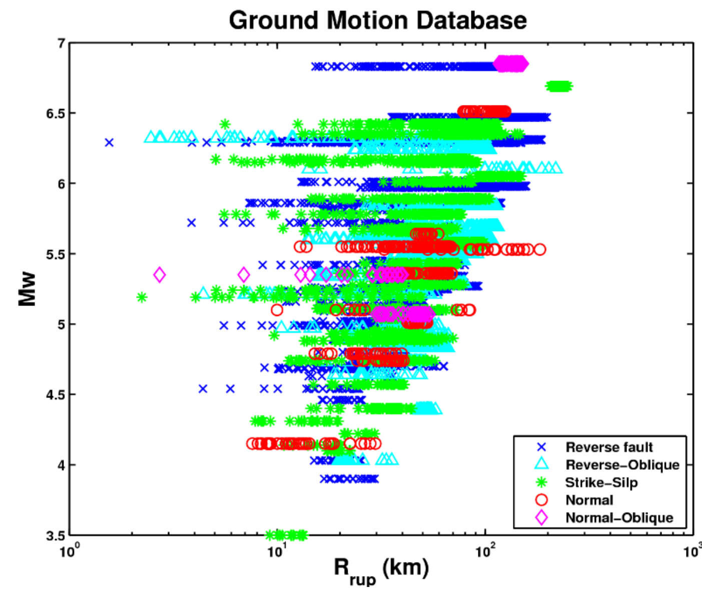


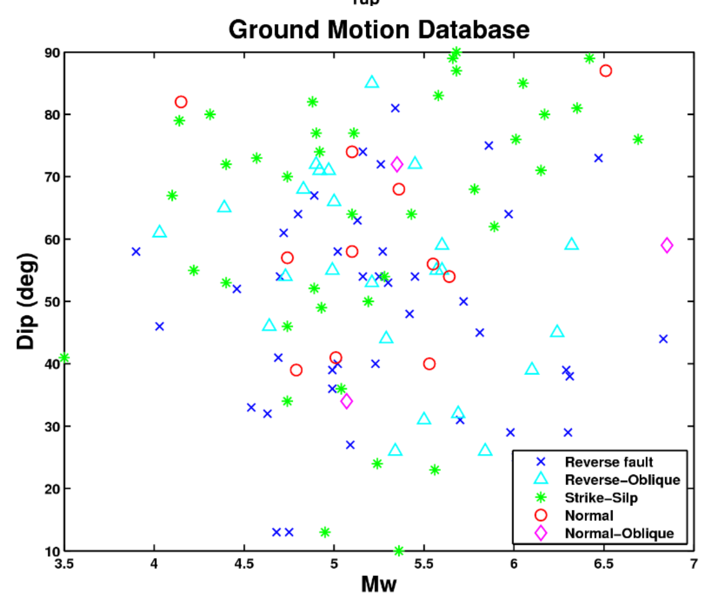


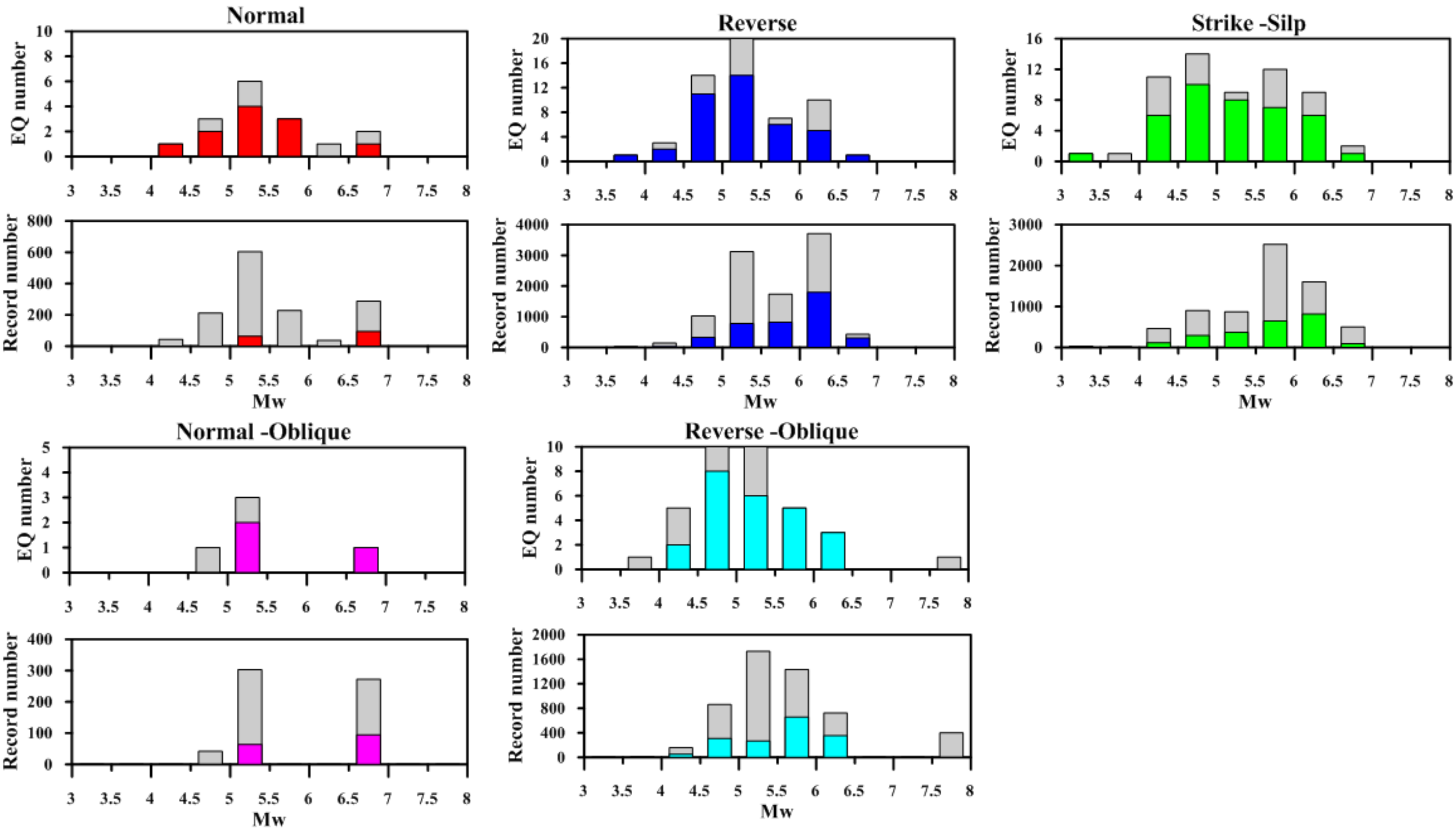
Selected Eqs & Data

NM: **11/16** events, **379/1414** records
NO: **3/5** events, **158/617** records
RV: **40/56** events, **4086/10191** Records
RO: **24/35** events, **1641/ 5317** records
SS: **39/59** events, **2345/6922** records









Normal
EQ number
Record number
Mw
Reverse
EQ number
Record number
Mw
Strike -Silp
EQ number
Record number
Mw
Normal -Oblique
EQ number
Record number
Mw
Reverse -Oblique
EQ number
Record number
Mw
3 3.5 4 4.5 5 5.5 6 6.5 7 7.5 8

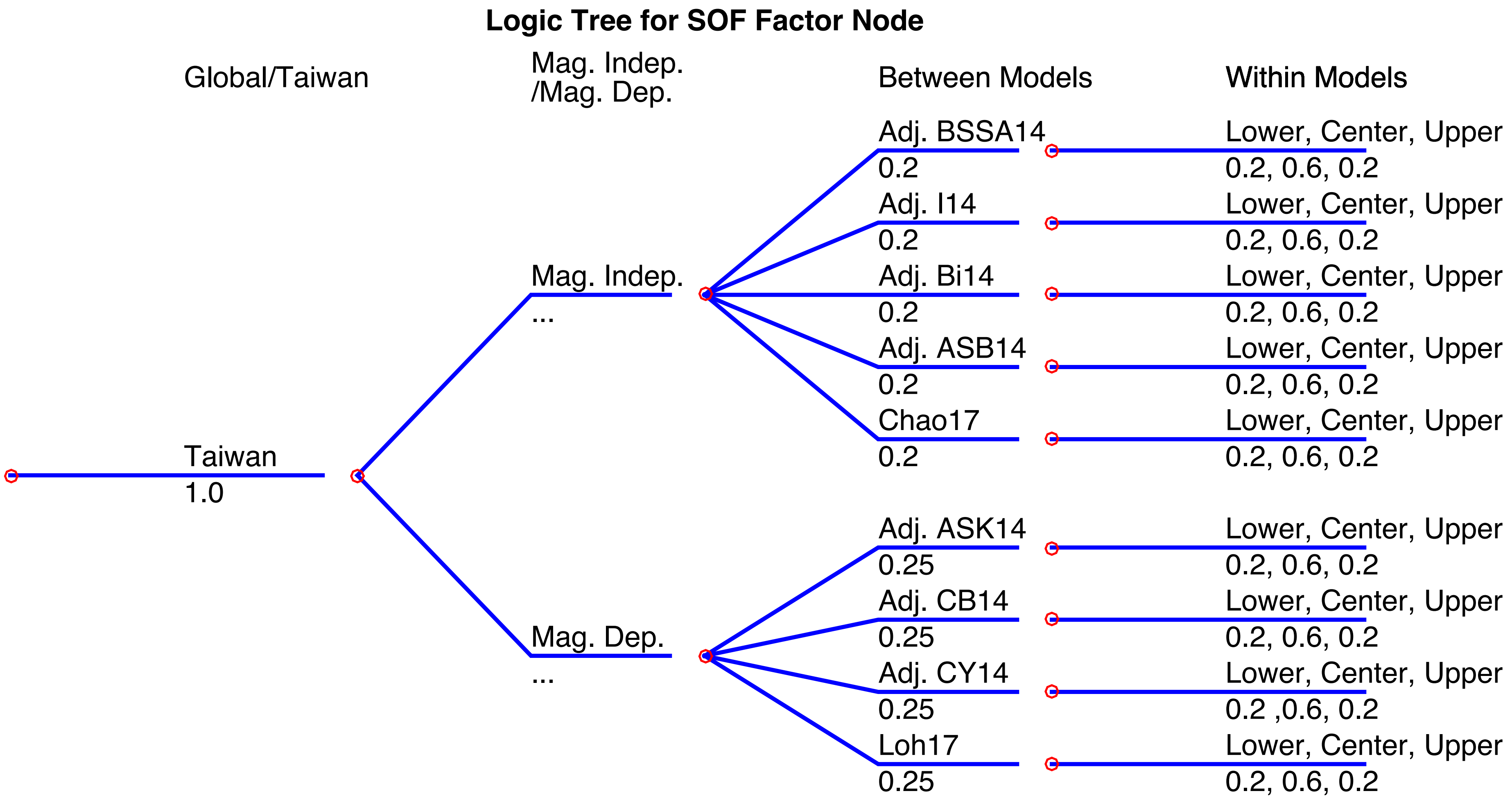
Content

- **Classification Criteria of SOF**
- **List of SOF for Crustal Source**
  - Magnitude-Independent
  - Magnitude-Dependent
- **Logic Tree of SOF for Crustal Source**
- **Develop SOF with TDIs for Crustal Event**
  - Normal Faulting Factor
    - Magnitude-Independent
    - Magnitude-Dependent
  - Reverse Faulting Factor
    - Magnitude-Independent
    - Magnitude-Dependent
- **Comparison of SOF**

List of SOF factor for Crustal Sources

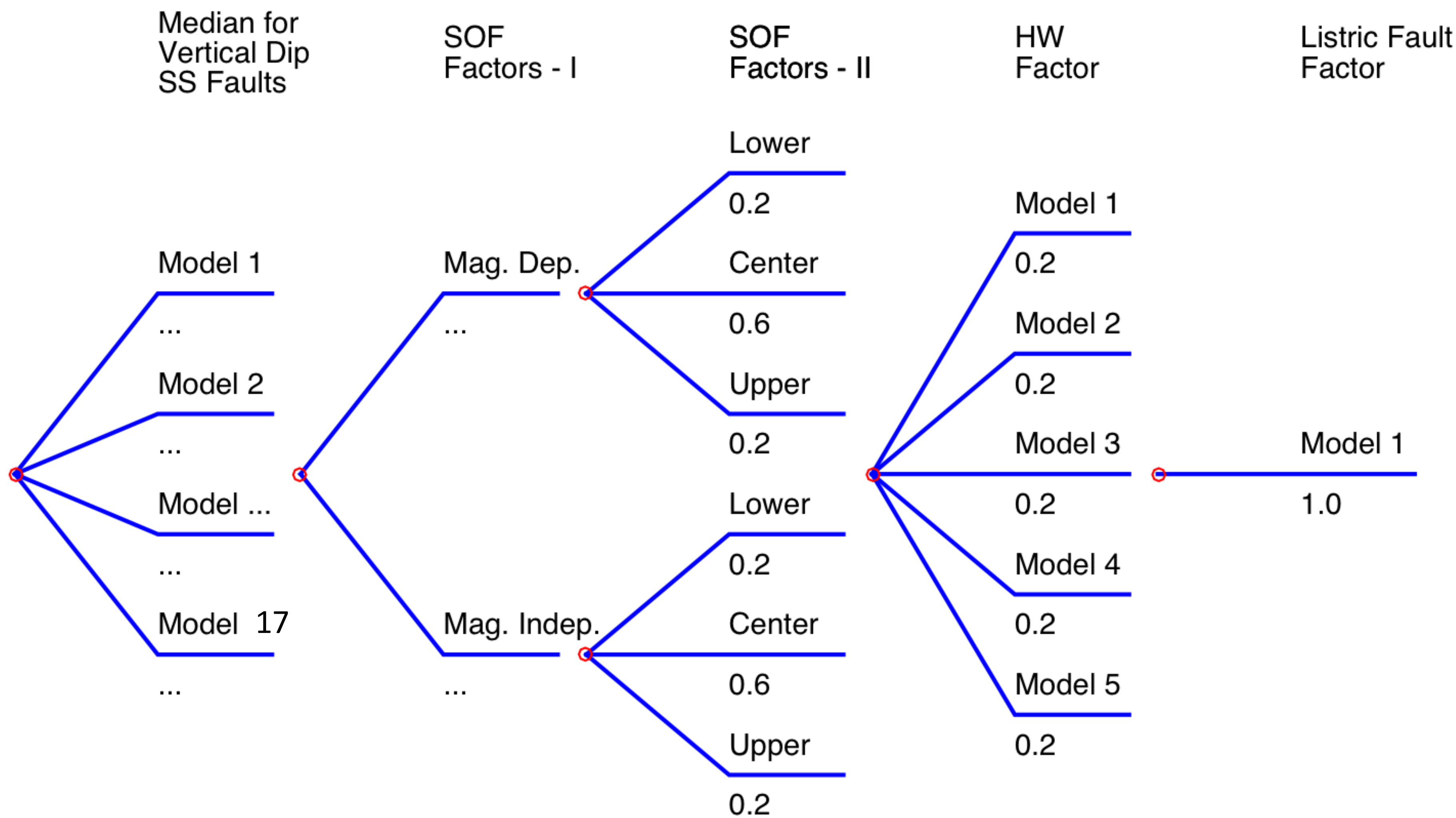
- **Taiwan models**
  - Magnitude -Independent
    - Adj-BSSA14
    - Adj-Id14
    - Adj-Bi14
    - Adj-ASB14
    - Chao17
  - Magnitude -Dependent
    - Adj-ASK14
    - Adj-CB14
    - Adj-CY14
    - Loh17

Logic Tree for SOF Factor



Note: finally this will be integrated into two nodes with 3 branches for each node

Logic Tree of the Median for Crustal Source



Approach of Total SD

- **Approach 1**
  - If $\sigma_{W,i} \ll \sigma_B$

    $\Longrightarrow$ Only consider σ_B
- **Approach 2**
  - If $\sigma_{W,i} \sim \sigma_B$

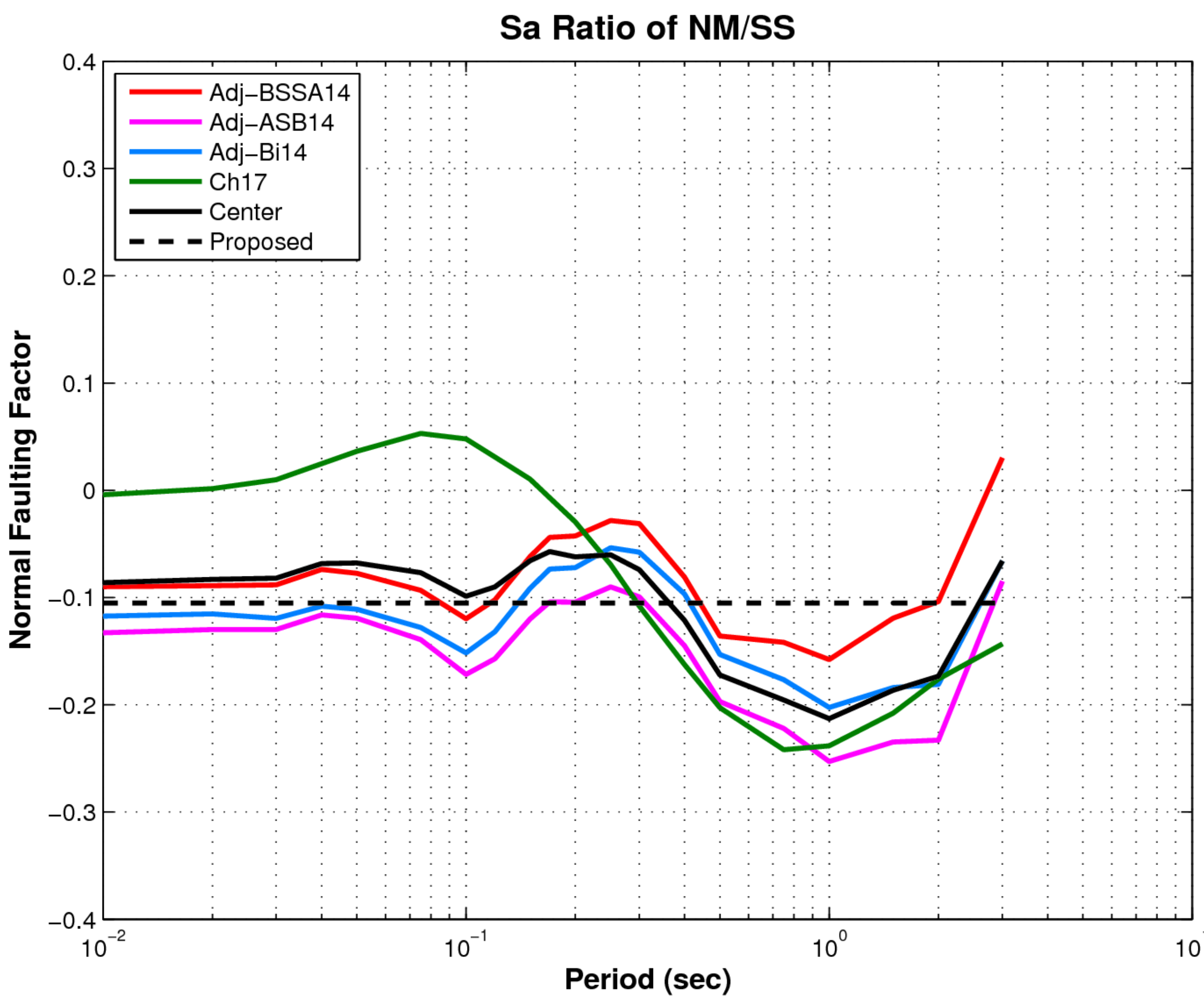
    $\Longrightarrow$ Use Monte Carlo method to calculate σ_{Total}
- **Approach 3**
  - If each $\sigma_{Within,i}$ both close

$$\Longrightarrow \ \sigma_T = \sqrt{\overline{\sigma_{W,i}}^2 + \sigma_B^2}$$

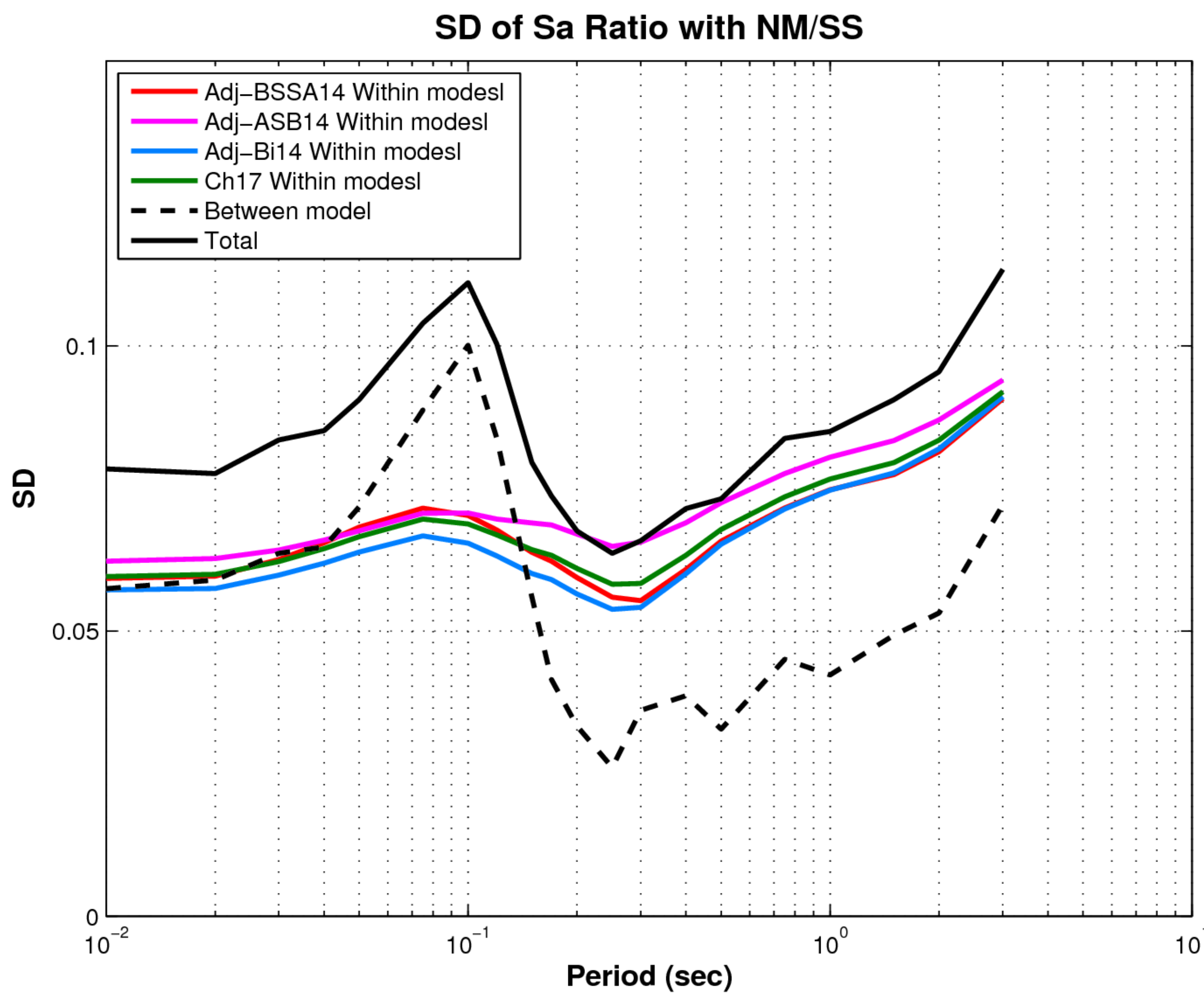
$\sigma_T = Total\ of\ SD$
$\sigma_{W,i} = Within\ model$ of SD
$\sigma_B =$ Between model of SD

Magnitude-Independent of Normal Faulting Factor

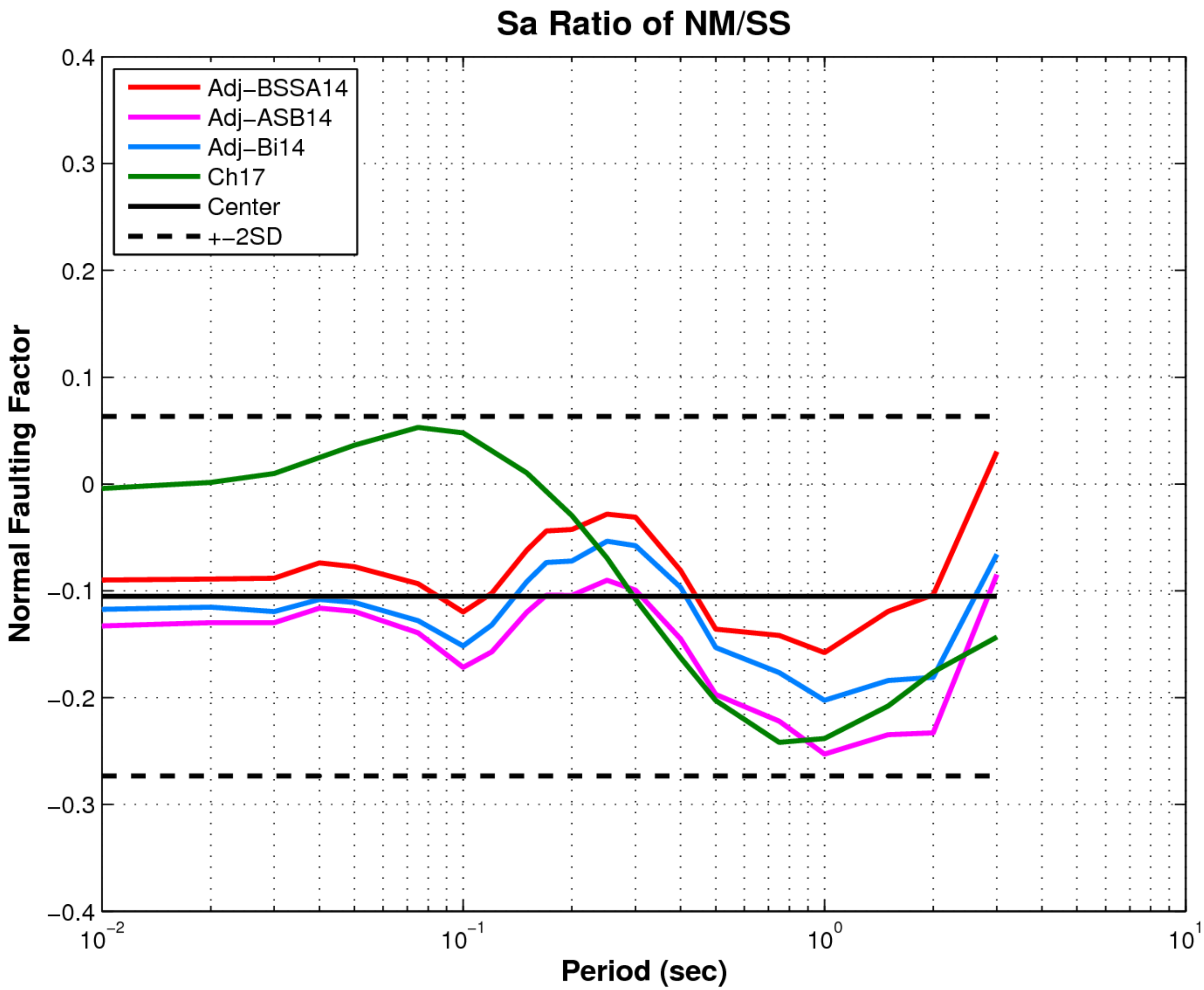
Comparison Magnitude-Independent of Normal Faulting Factor



Develop the Magnitude-Independent of Normal Faulting Factor (Approach 2)

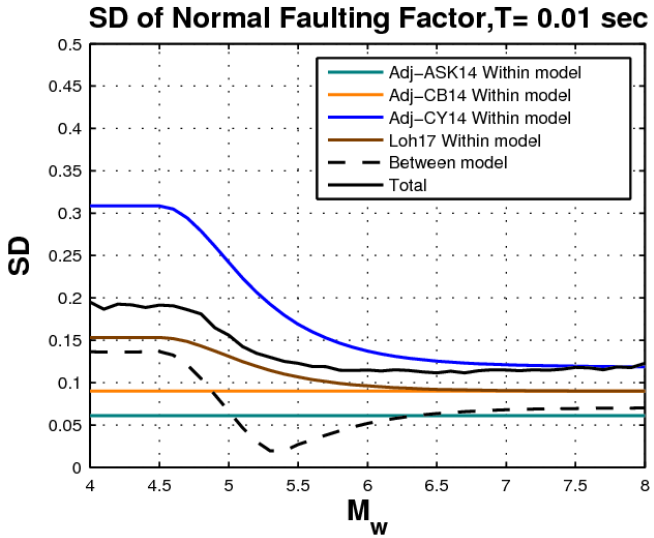


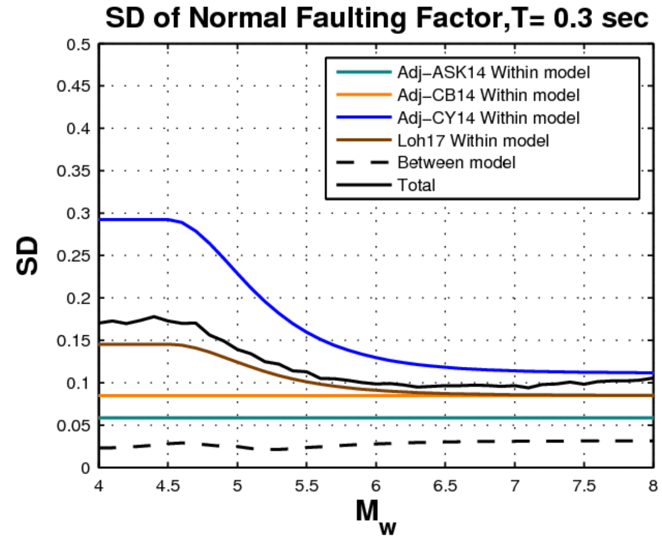
Develop the Magnitude-Independent of Normal Faulting Factor

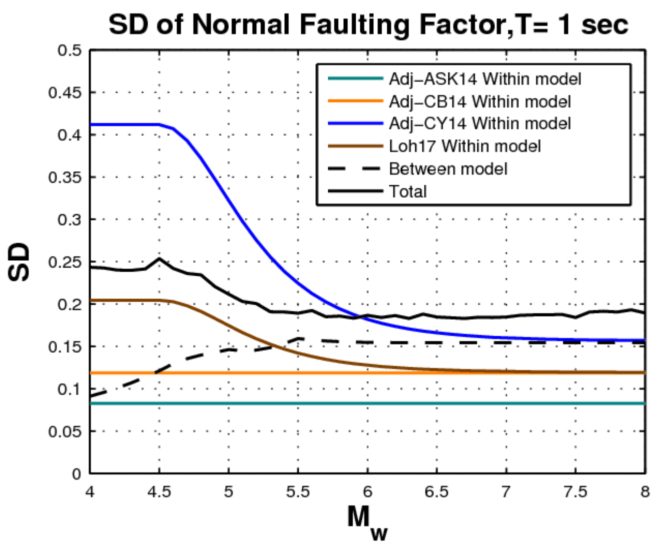


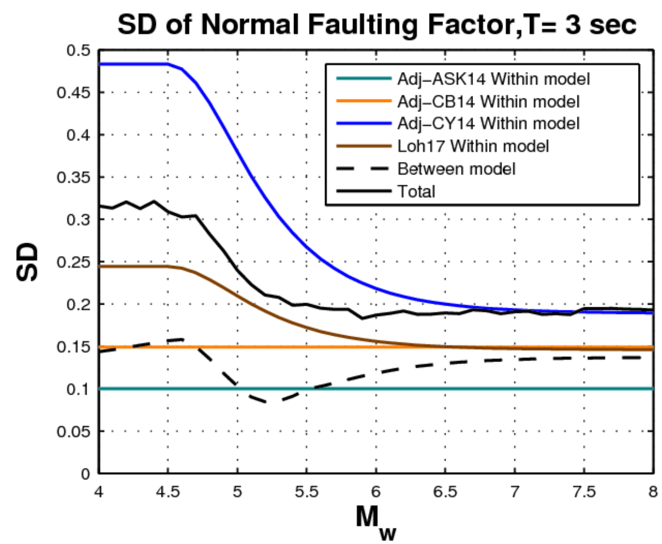
Magnitude-Dependent of Normal Faulting Factor

Develop the Magnitude-Dependent of Normal Faulting Factor (Approach 2)

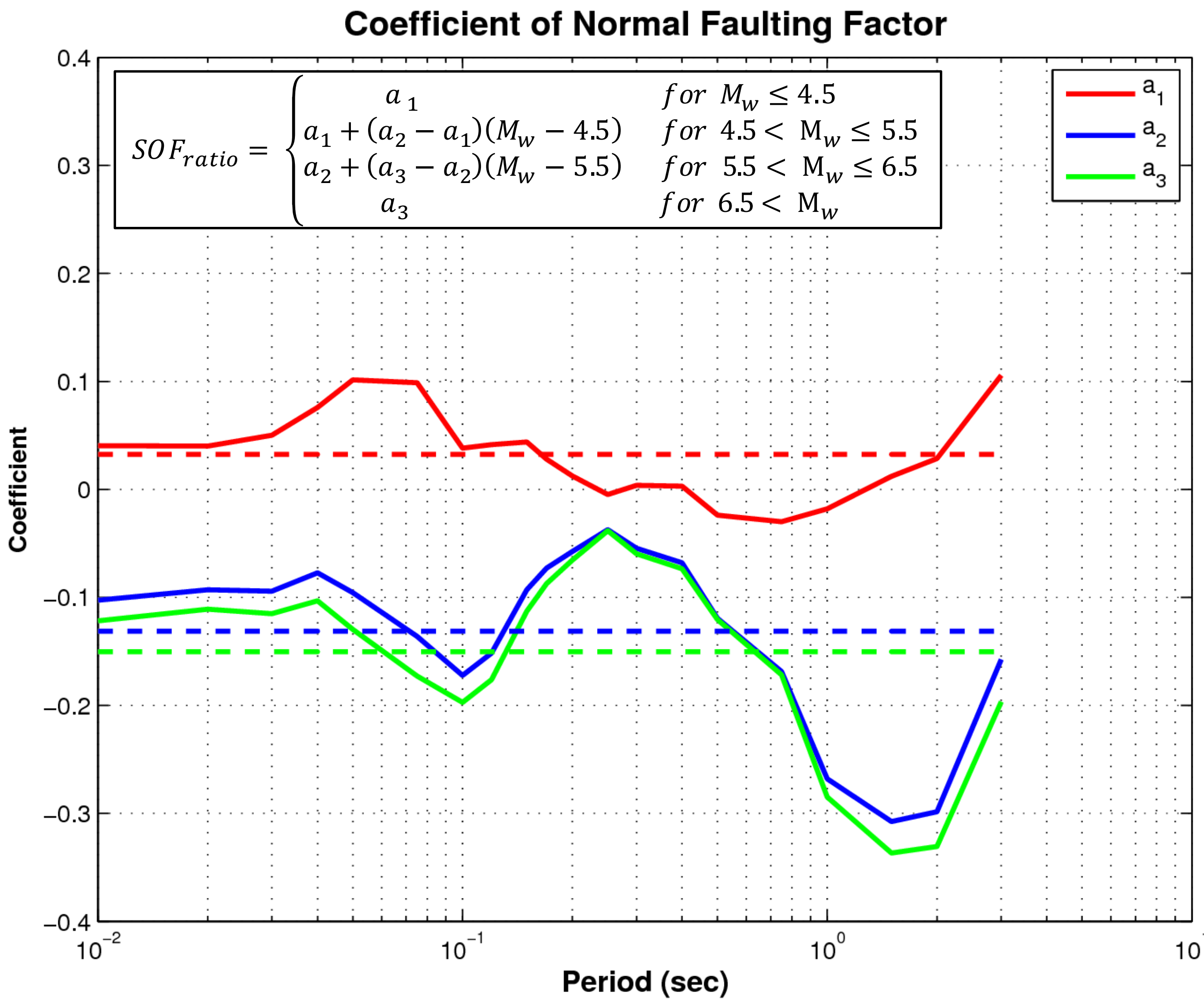








Develop the Magnitude-Dependent of Normal Faulting Factor



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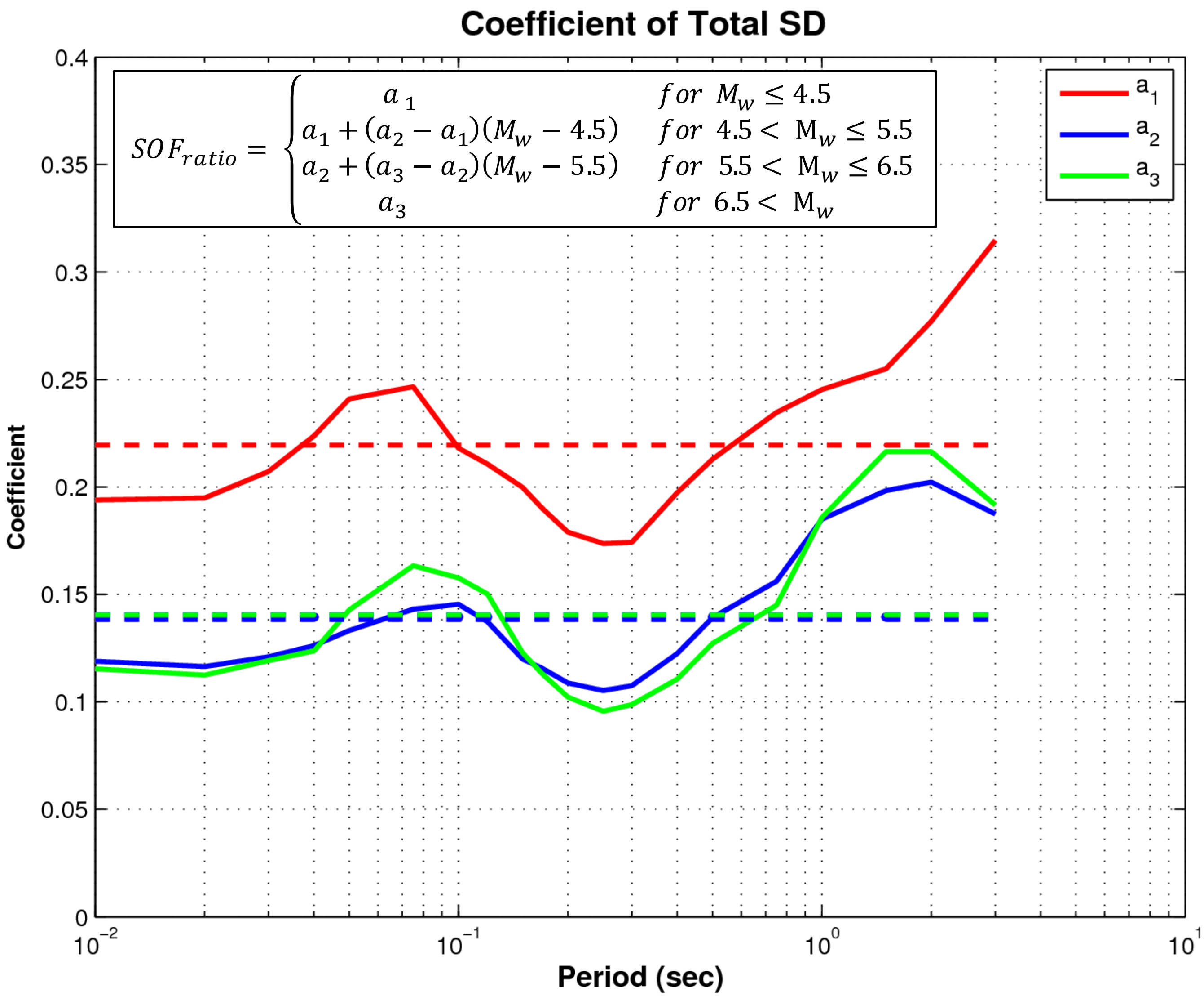

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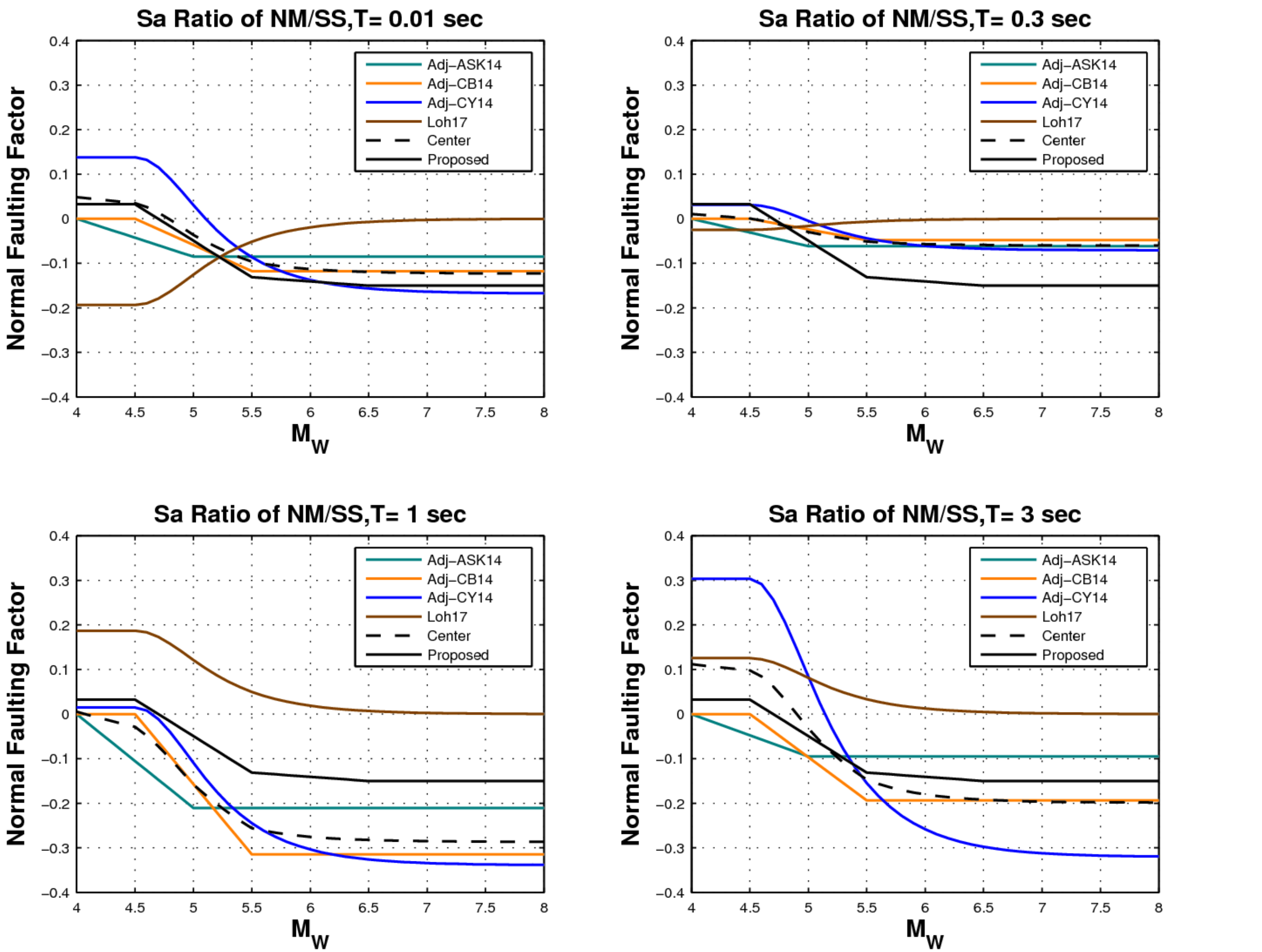

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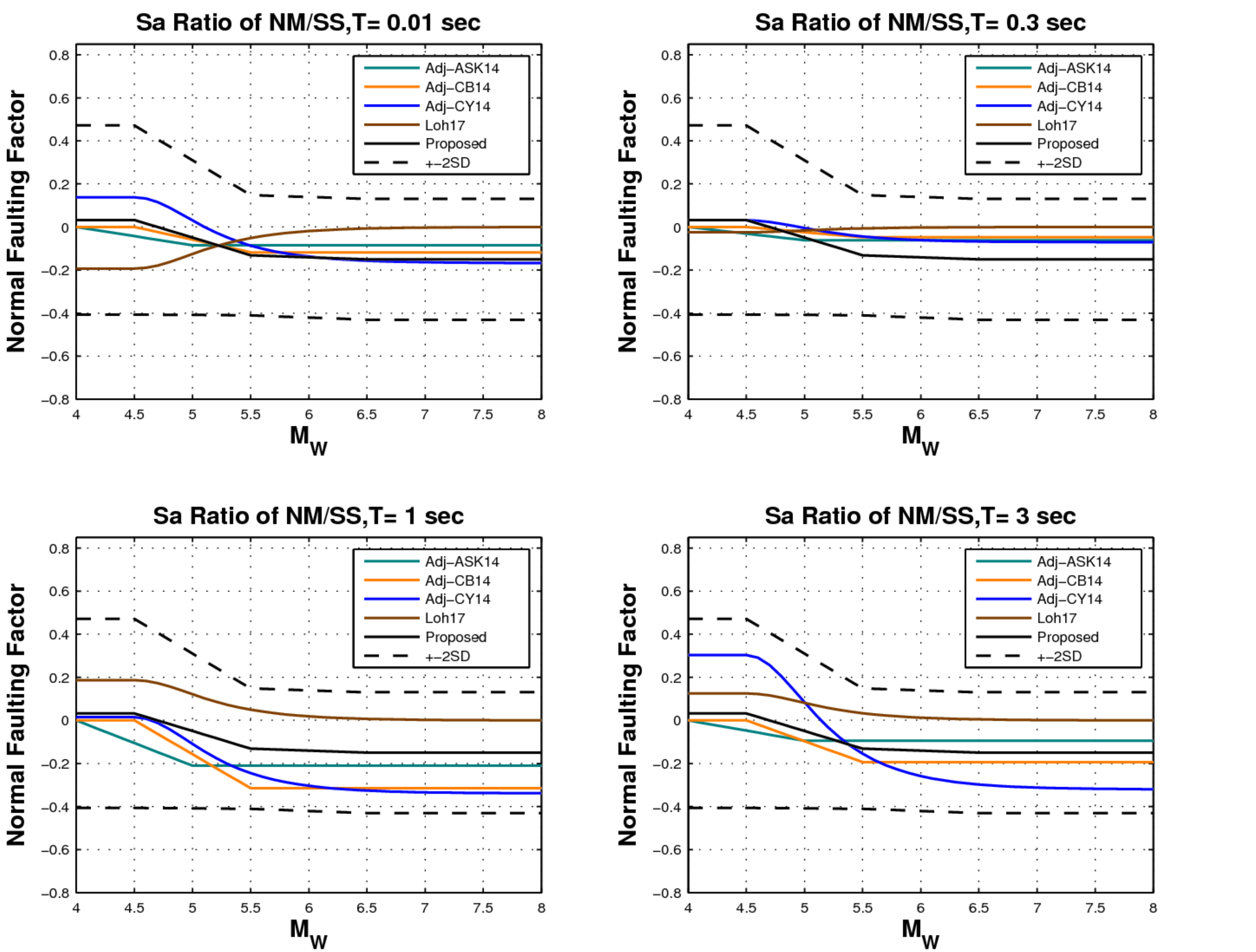
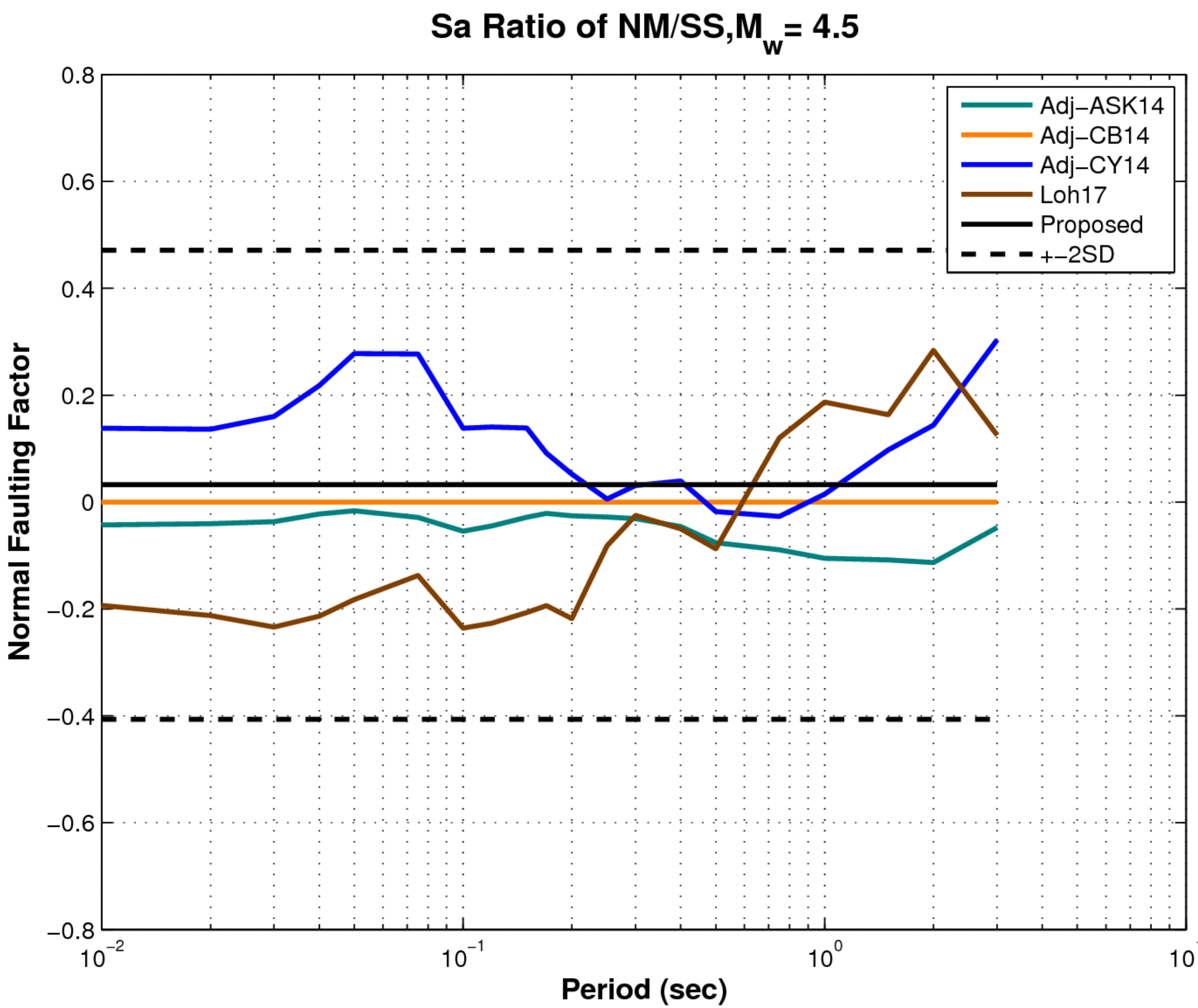
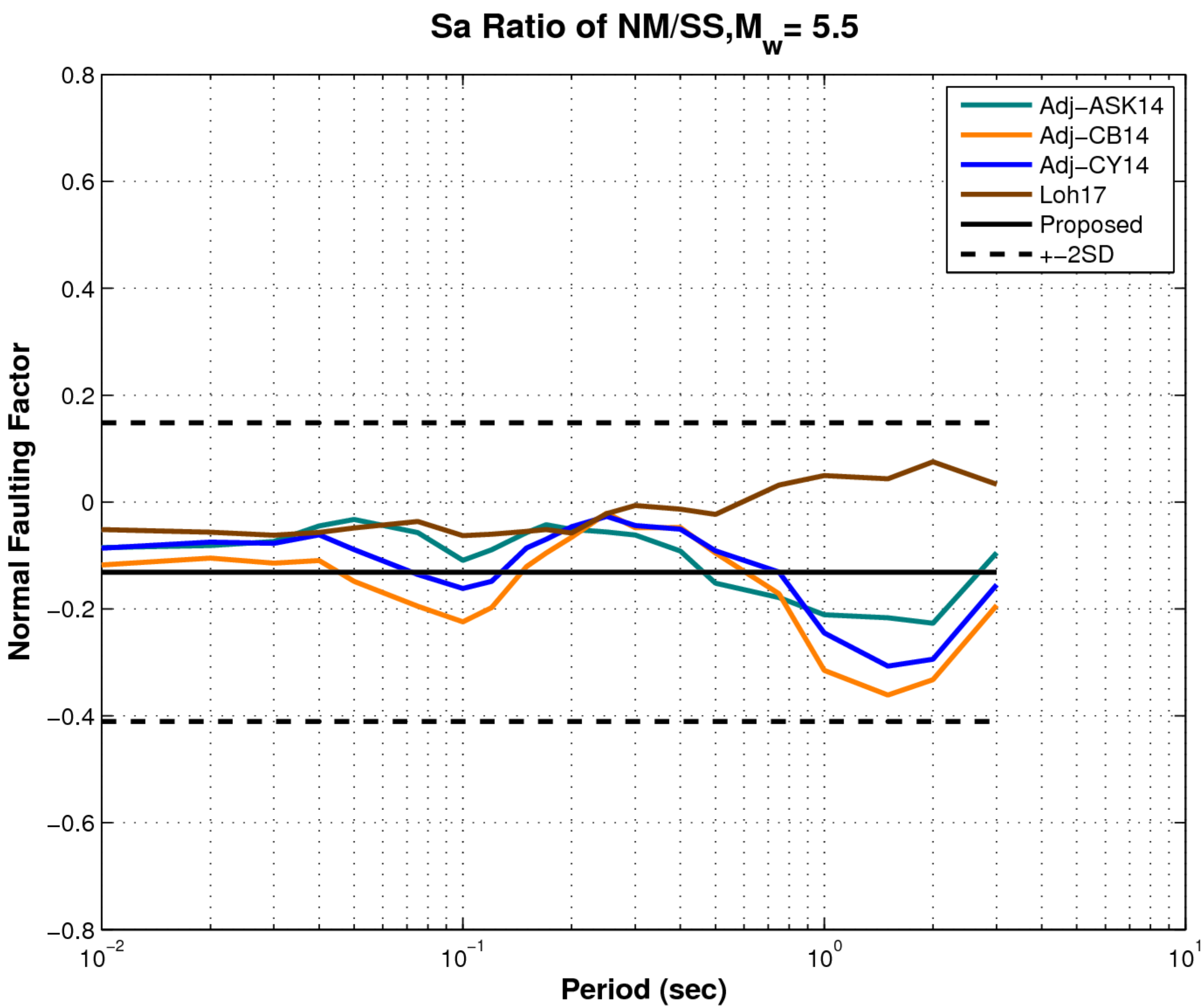


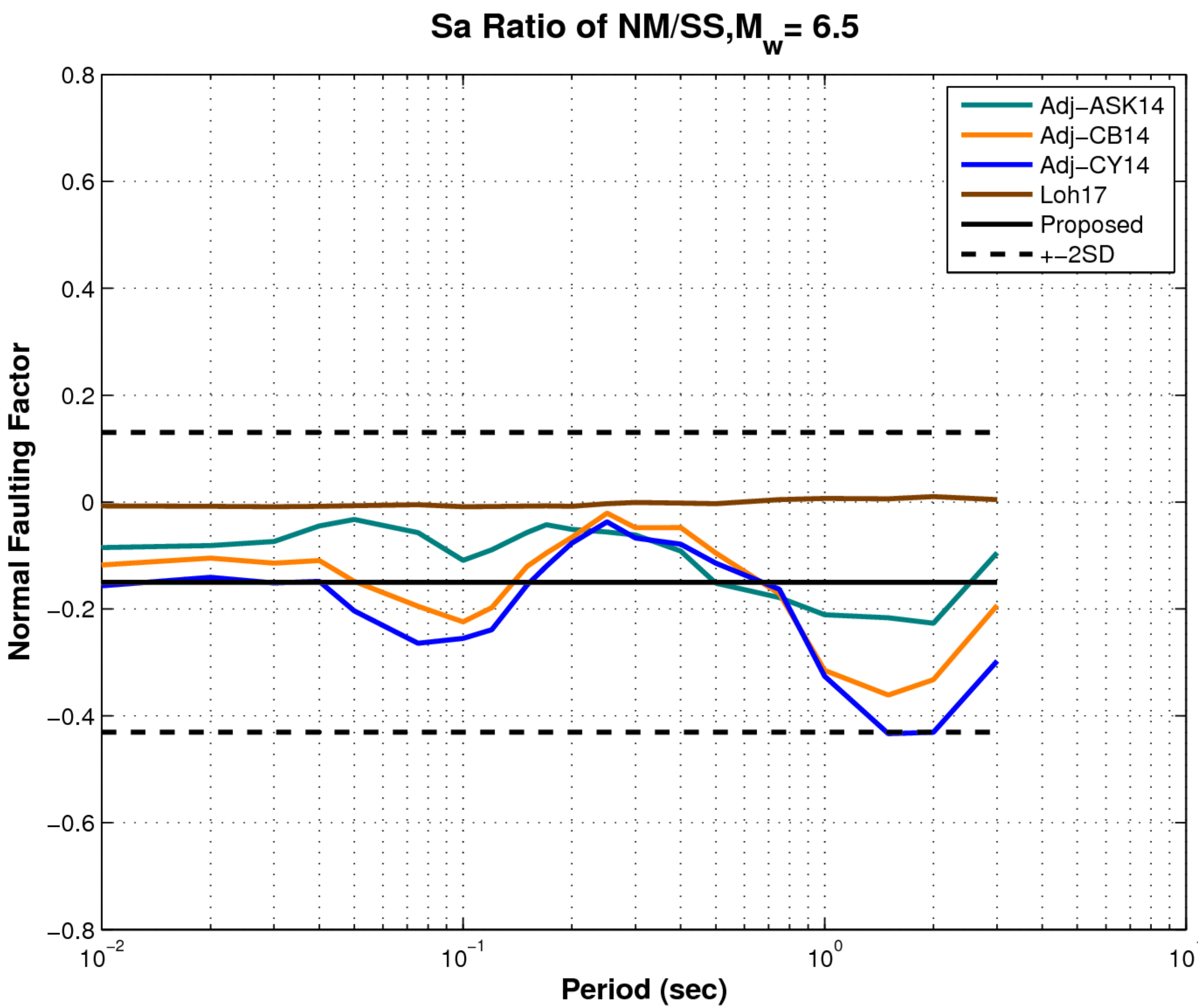
Comparison Magnitude-Dependent of Normal Faulting Factor for Mw=4.5



Comparison Magnitude-Dependent of Normal Faulting Factor for Mw=5.5

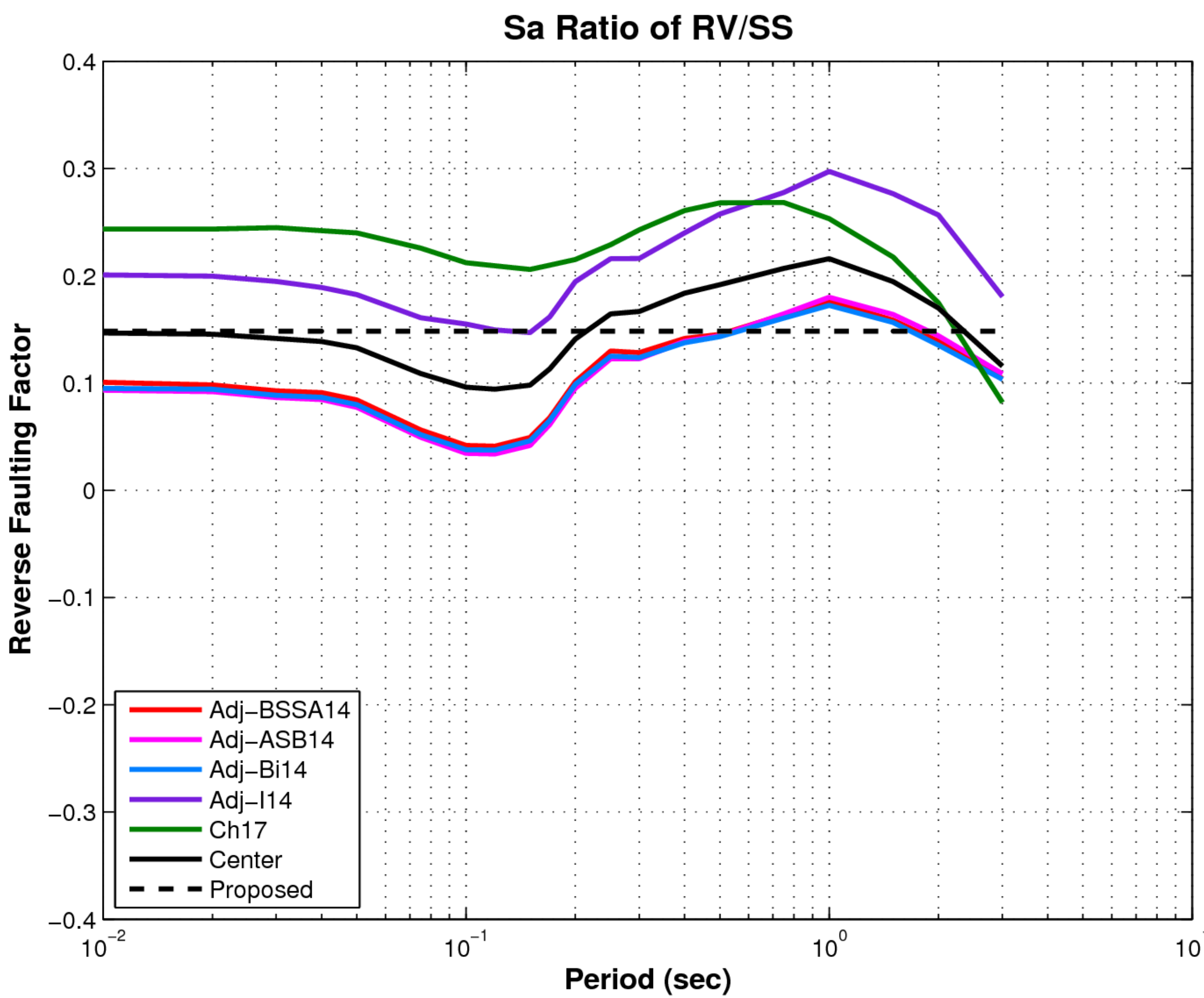


Comparison Magnitude-Dependent of Normal Faulting Factor for Mw=6.5

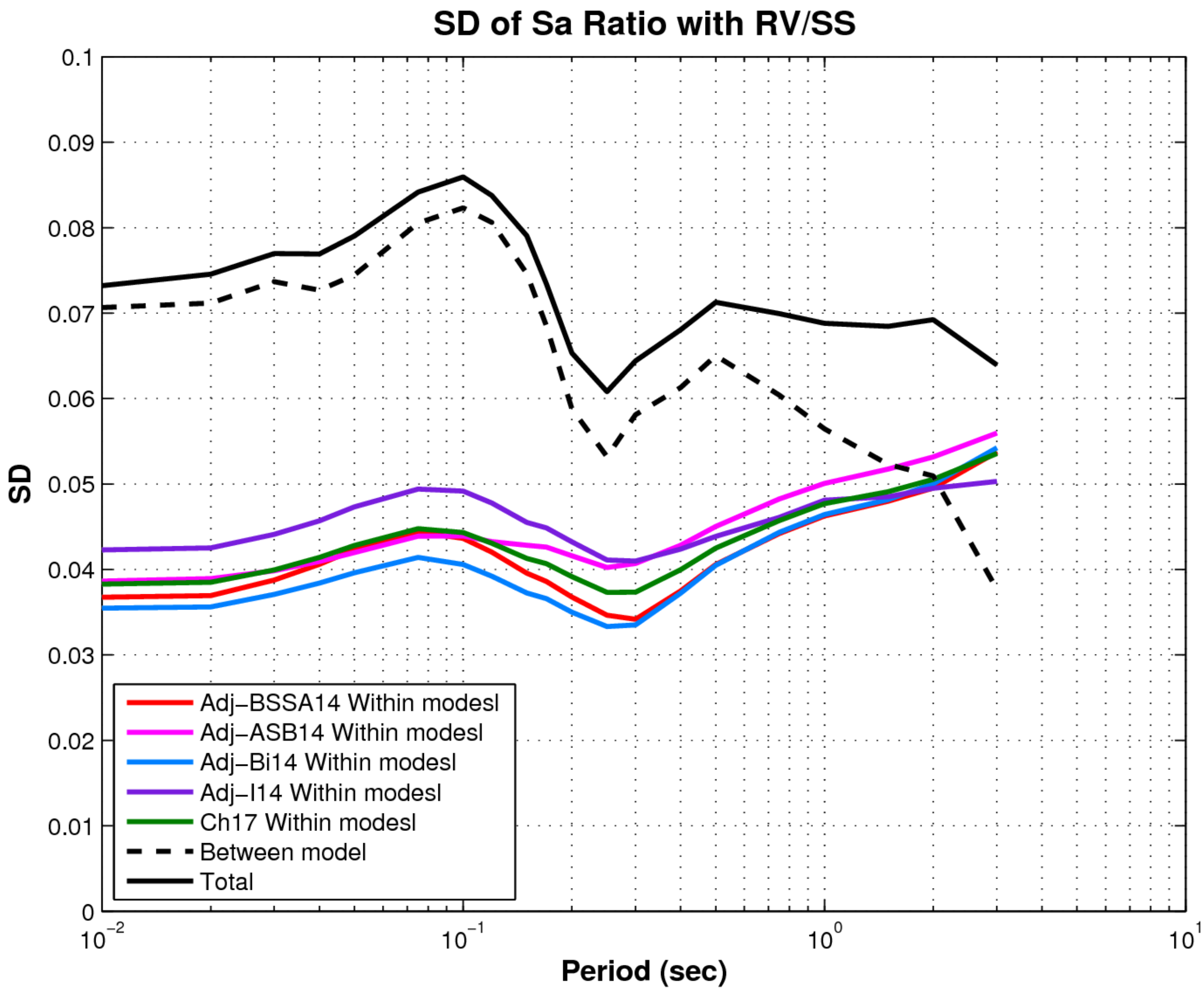


Magnitude-Independent of Reverse Faulting Factor

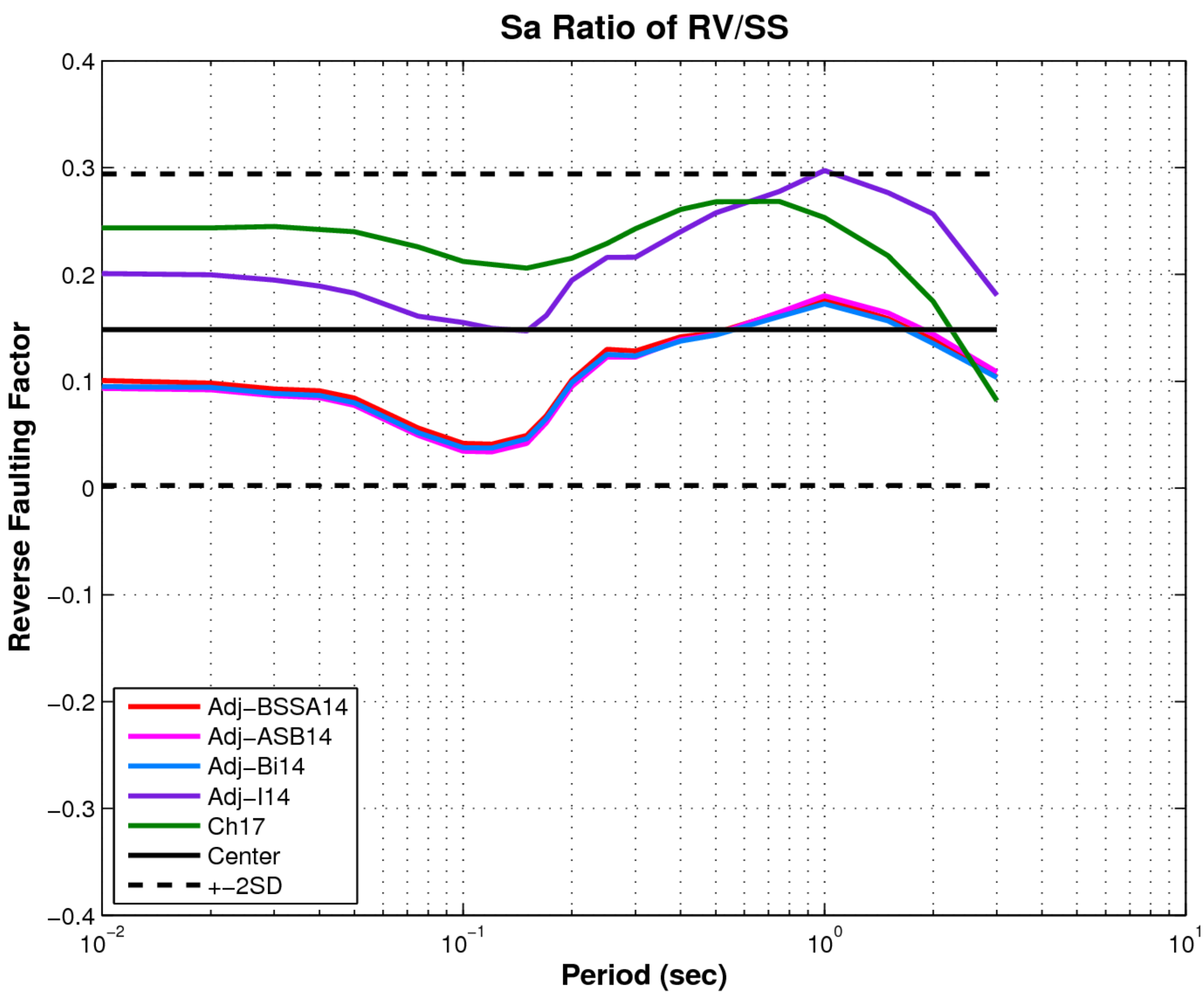
Comparison Magnitude-Independent of Reverse Faulting Factor



Develop the Magnitude-Independent of Reverse Faulting Factor (Approach 2)

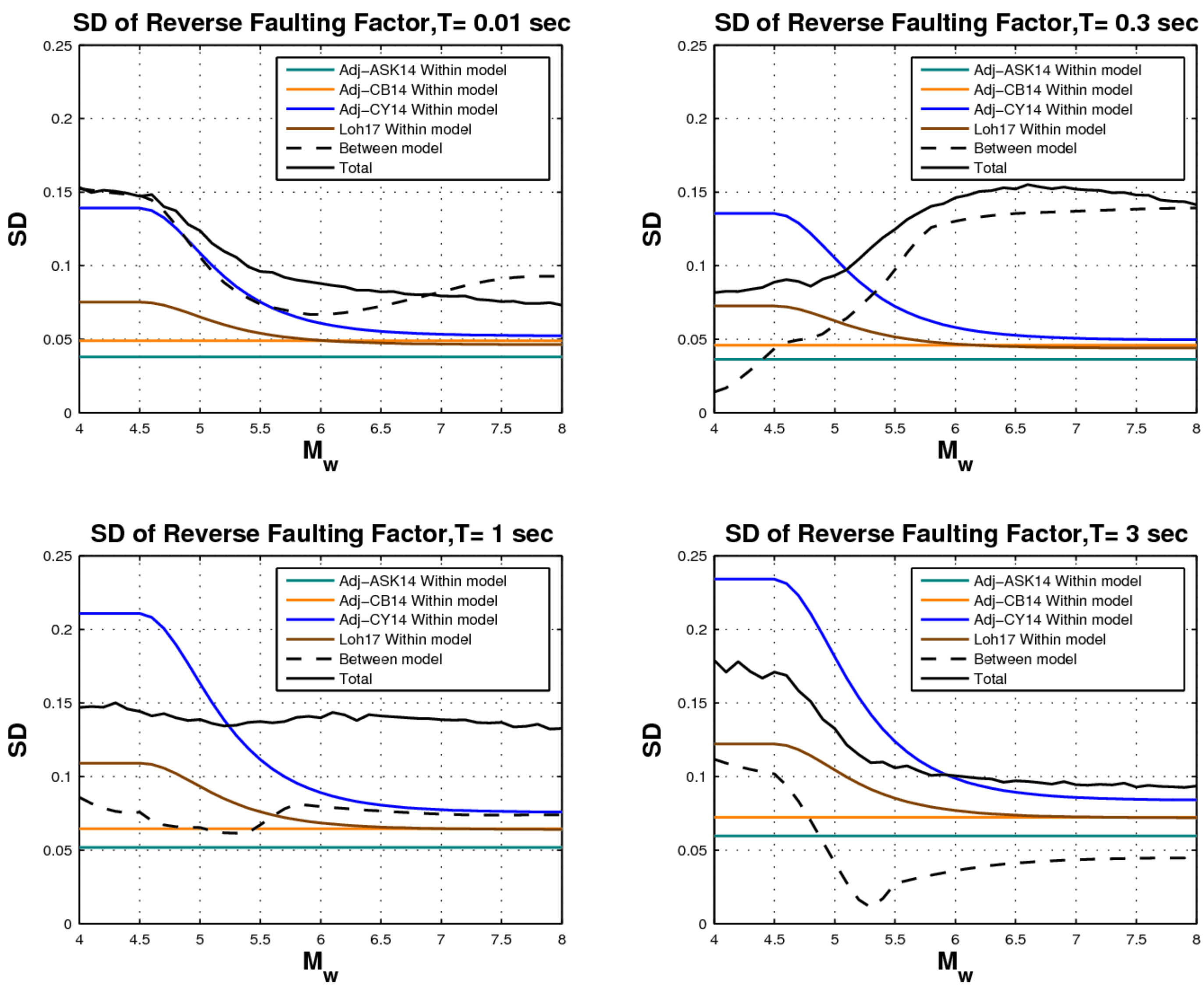


Develop the Magnitude-Independent of Reverse Faulting Factor

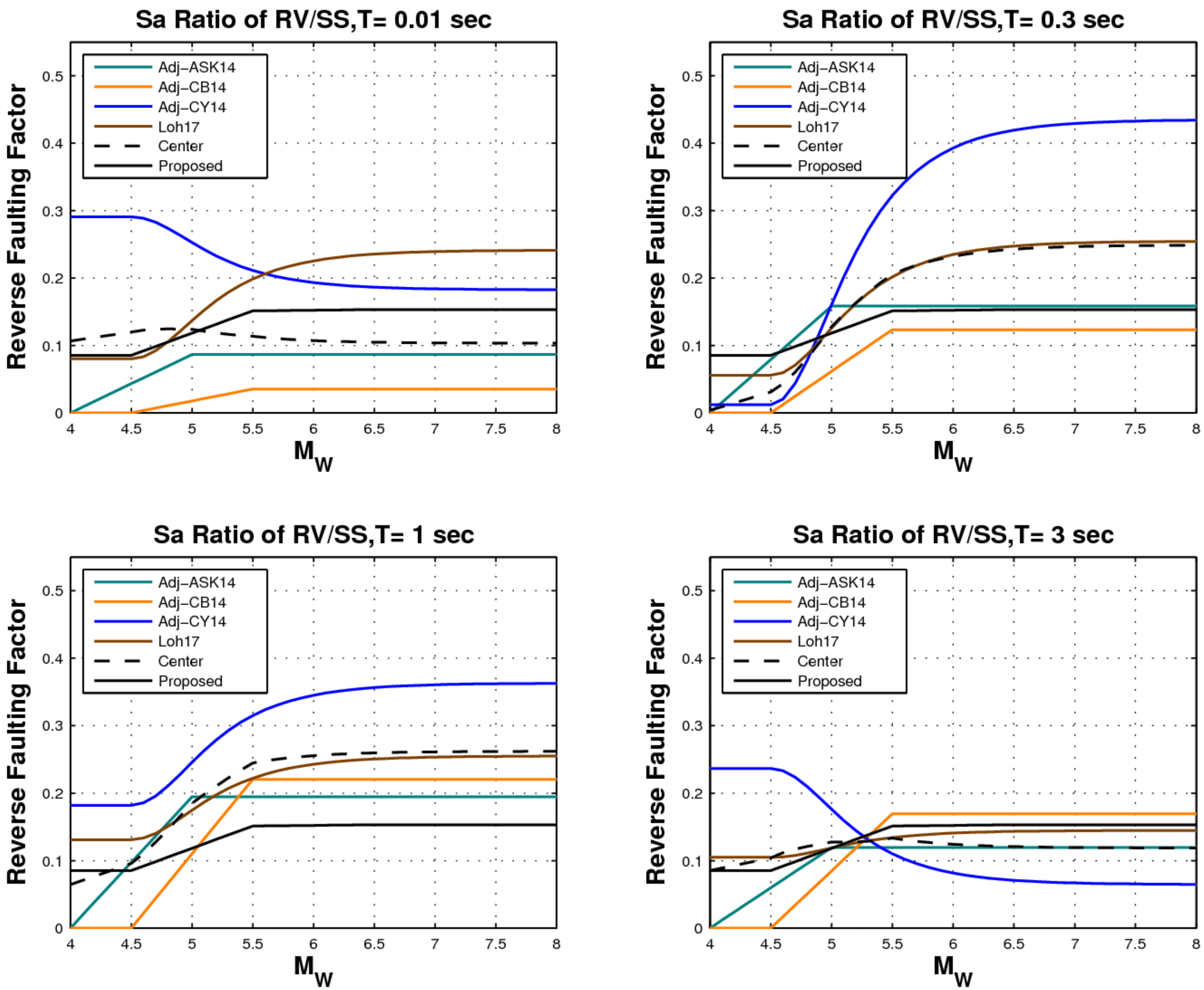


Magnitude-Dependent of Reverse Faulting Factor

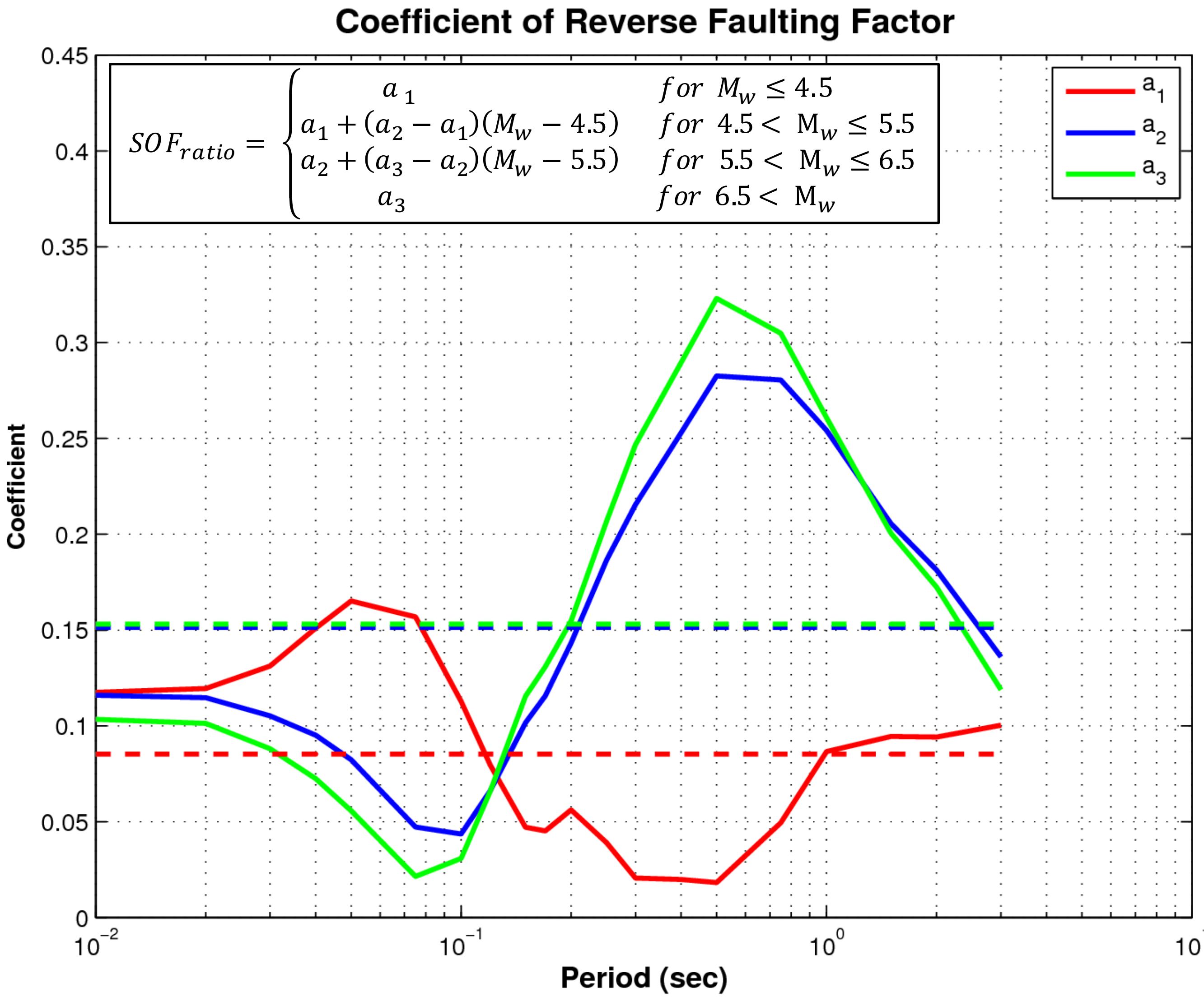
Develop the Magnitude-Dependent of Reverse Faulting Factor (Approach 2)



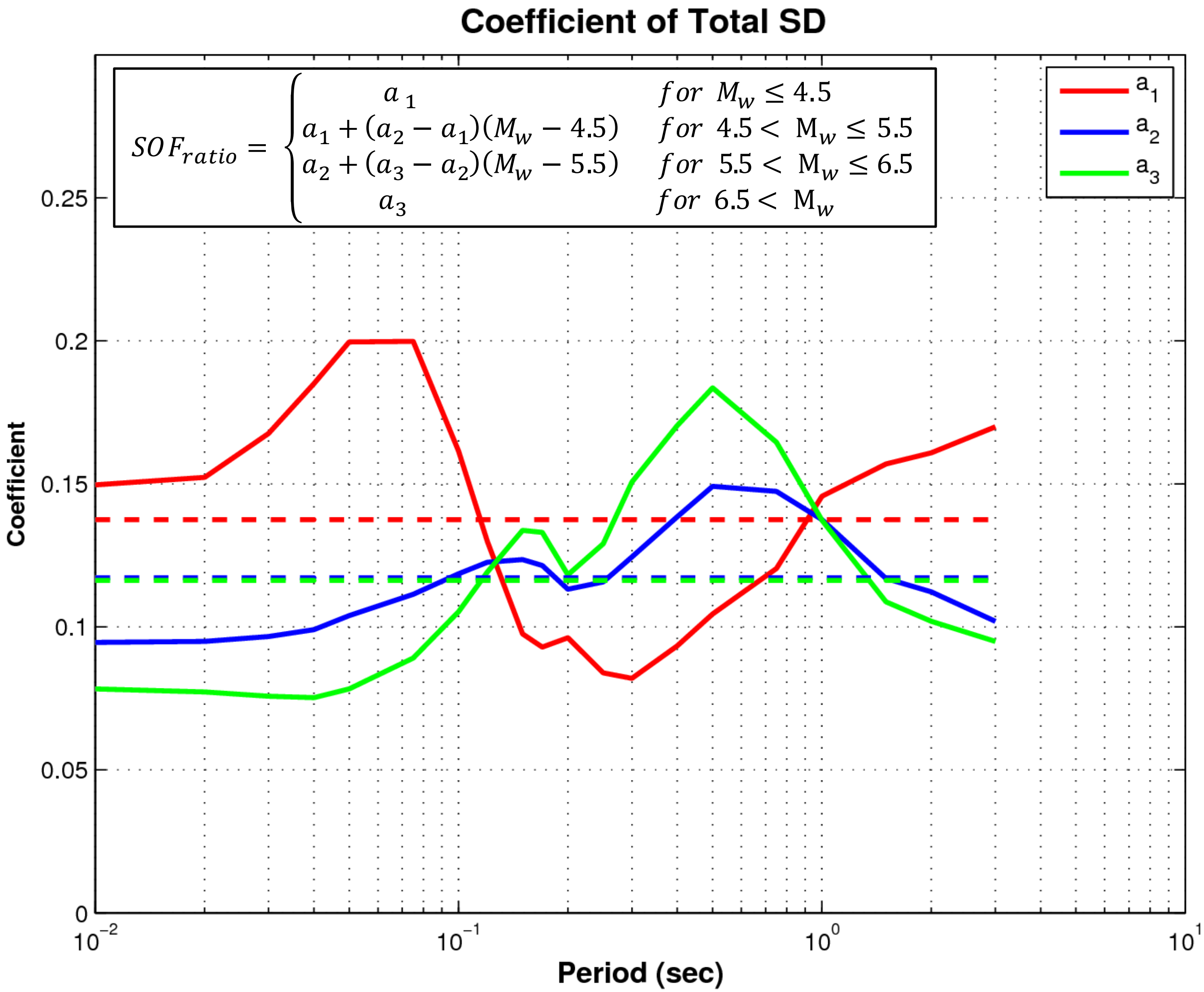
Develop the Magnitude-Dependent of Reverse Faulting Factor



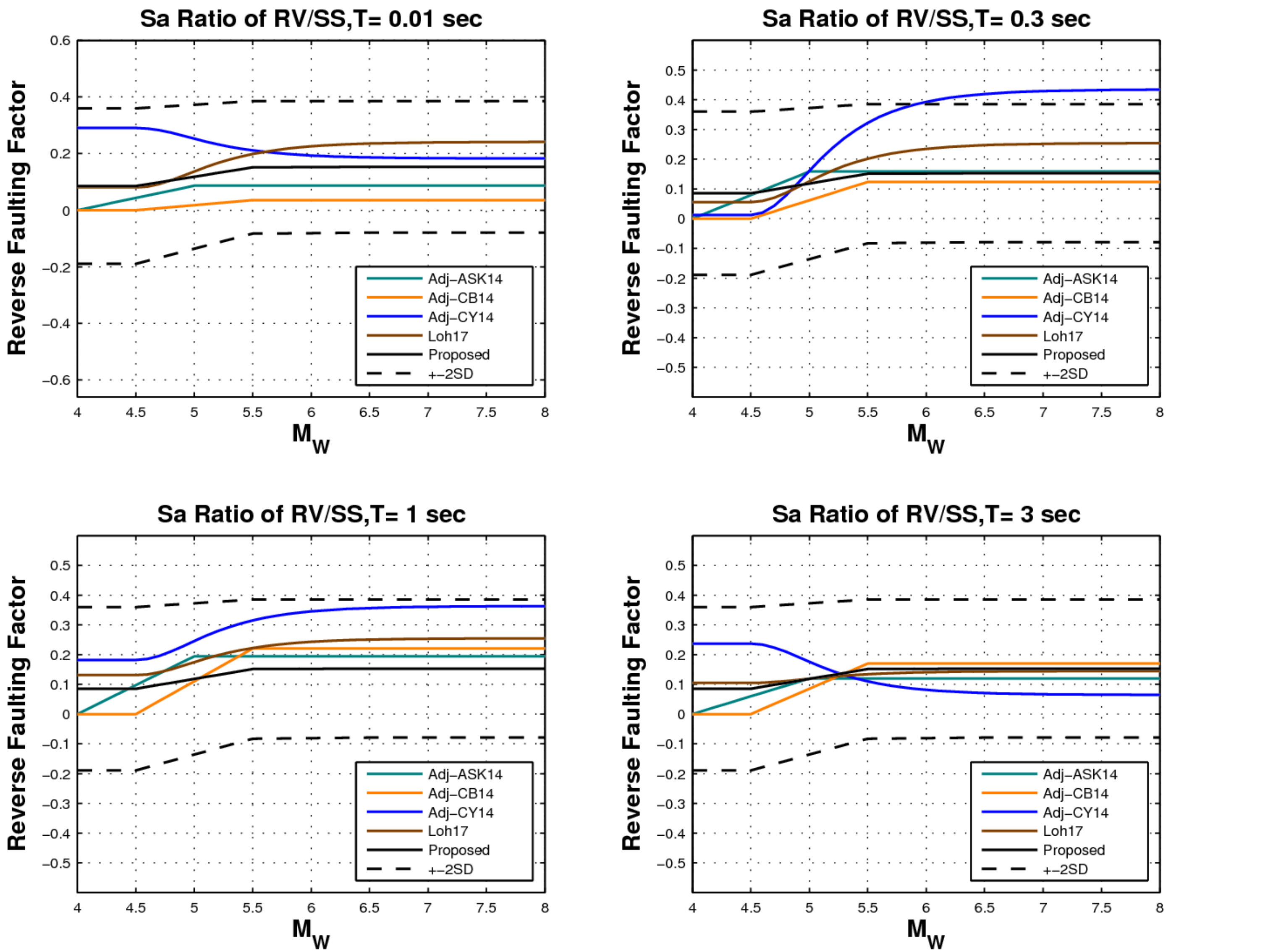
Develop the Magnitude-Dependent of Reverse Faulting Factor



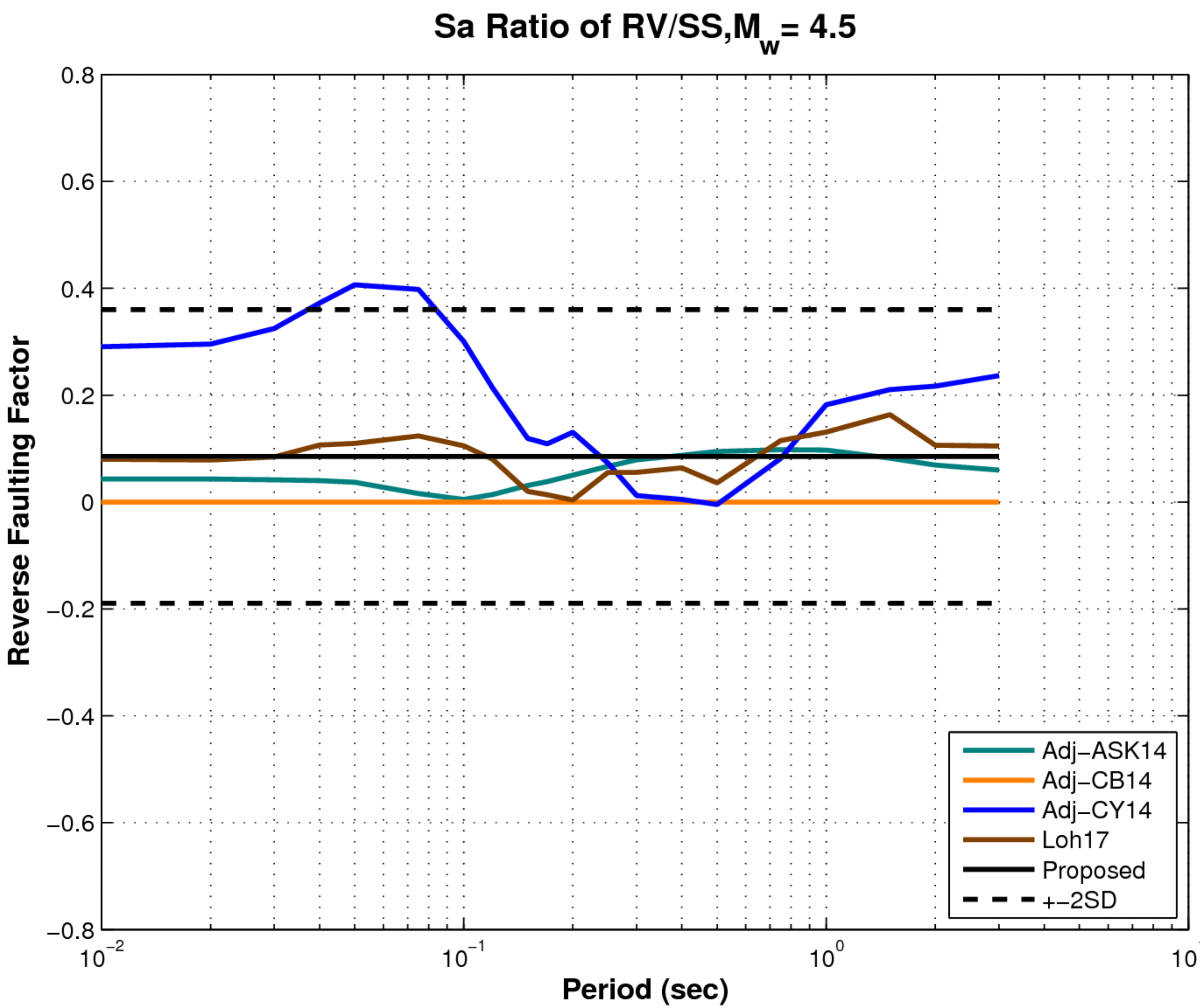
Develop the Magnitude-Dependent of Reverse Faulting Factor



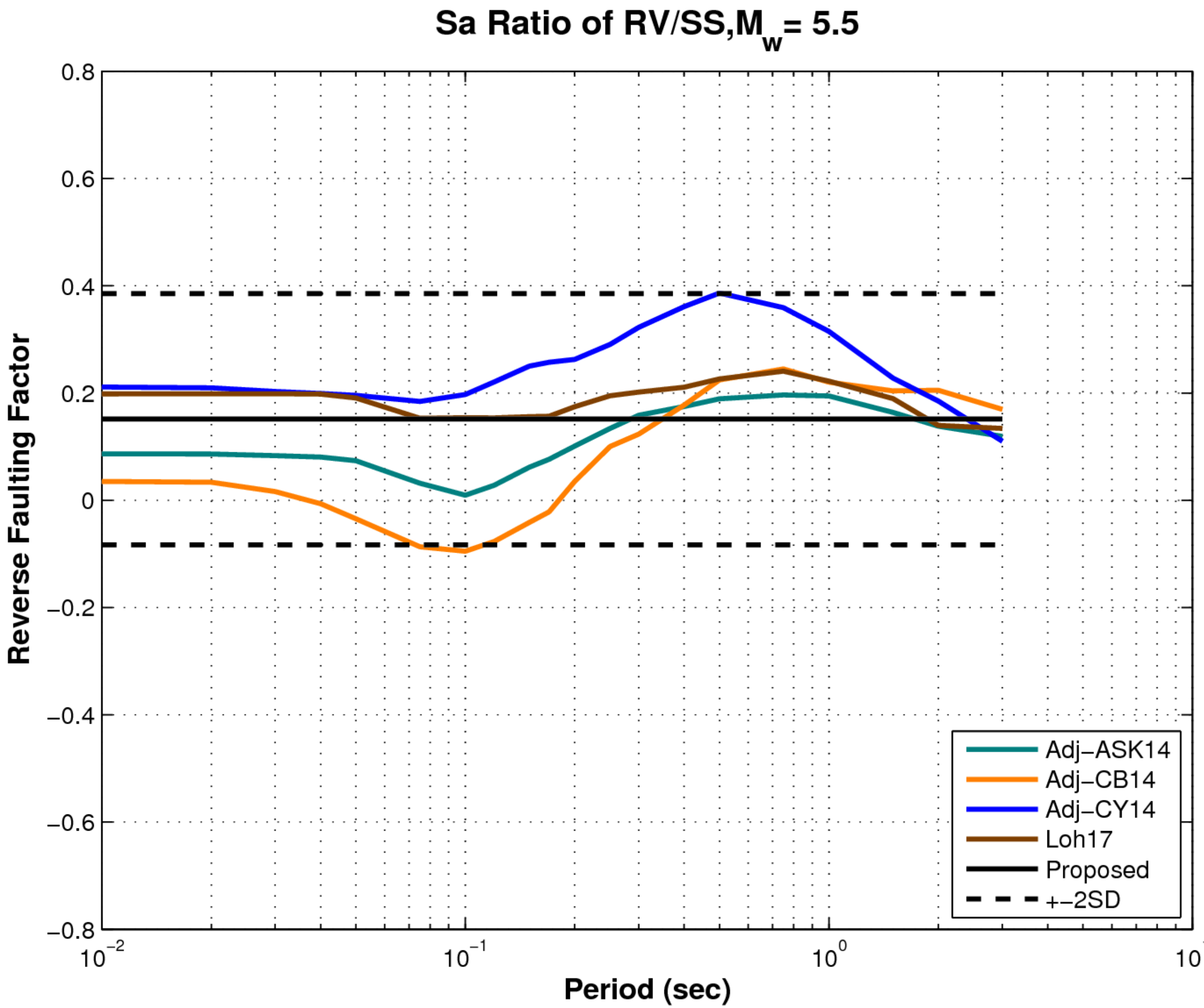
Develop the Magnitude-Dependent of Reverse Faulting Factor



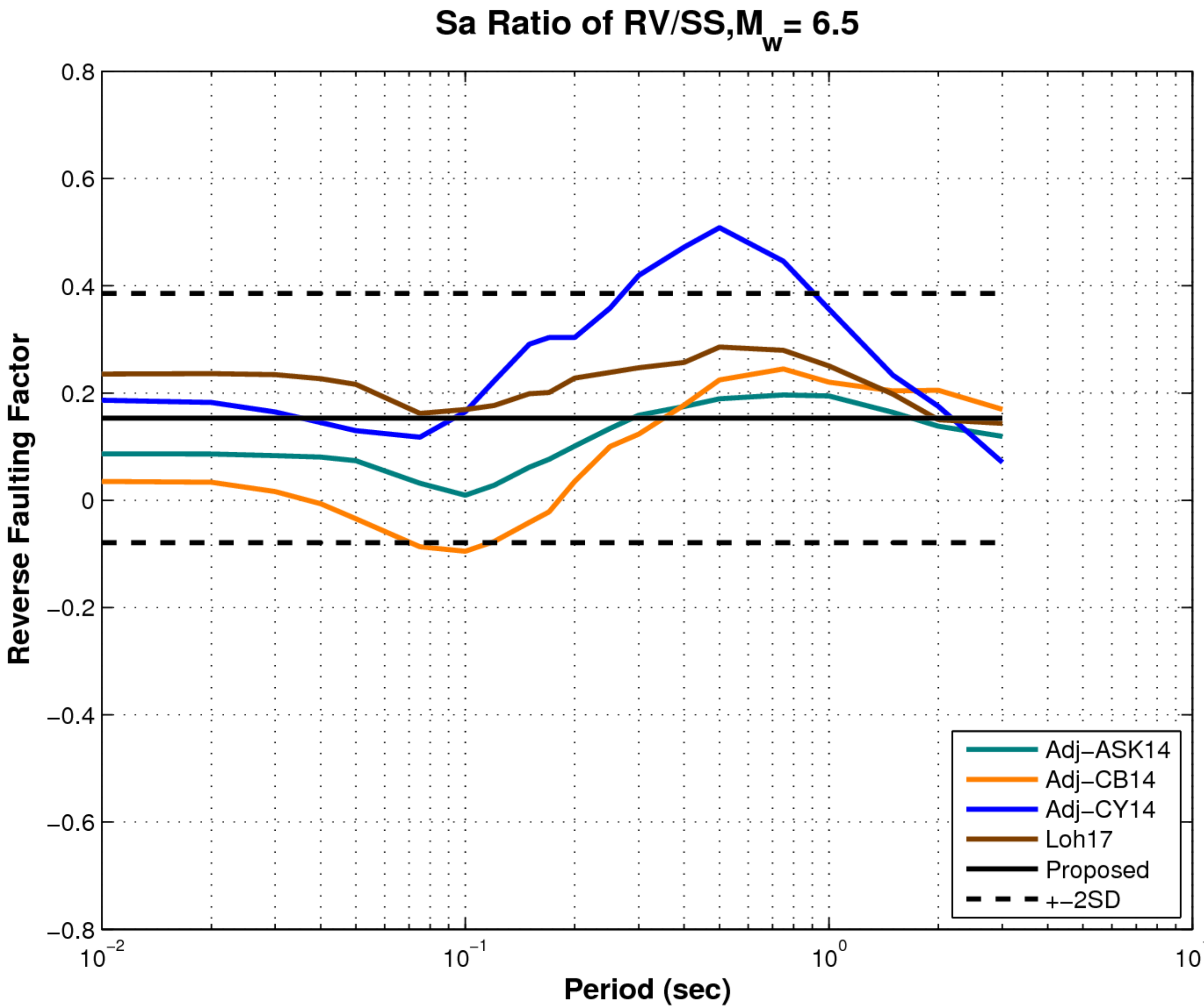
Comparison Magnitude-Dependent of Reverse Faulting Factor for Mw=4.5



Comparison Magnitude-Dependent of Reverse Faulting Factor for Mw=5.5



Comparison Magnitude-Dependent of Reverse Faulting Factor for Mw=6.5



Comparison of SOF