**Additional file 1**

**Title**: Understanding and reconstructing the coastal sea level variations along the western boundary of the North Pacific

**Authors**: Penghui Li1, Fanghua Xu1\*

**Affiliations:**

1. Ministry of Education Key Laboratory for Earth System Modeling, and Department of Earth System Science, Tsinghua University, Beijing 100084, China

\*Correspondence to:

Dr. Fanghua Xu, Ministry of Education Key Laboratory for Earth System Modeling, and Department of Earth System Science, Tsinghua University, Beijing 100084, China

Email: fxu@tsinghua.edu.cn

**Table. S1-S6 The same regression conducted as in Table 2. Five out of all the tide gauges south of the KE are selected randomly to estimate the coefficients.**

**S1:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Season** | **SLA0(a)** | **OWA(b)** | **AWA(c)** | **SLPA(d)** | **SSTA(e)** | **SSSA(f)** | **KTA(g)** |
| **Spring** | **0.27**  | **-0.05**  | **-0.10**  | **-0.46**  | **0.42**  | **-0.22**  | **-0.05**  |
| **Summer** | **0.31**  | **0.02**  | **-0.07**  | **-0.25**  | **0.34**  | **-0.08**  | **0.10**  |
| **Autumn** | **0.35**  | **0.19**  | **-0.17**  | **-0.49**  | **0.13**  | **0.00**  | **0.08**  |
| **Winter** | **0.27**  | **-0.05**  | **-0.28**  | **-0.60**  | **0.51**  | **-0.12**  | **-0.04**  |

**S2:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Season** | **SLA0(a)** | **OWA(b)** | **AWA(c)** | **SLPA(d)** | **SSTA(e)** | **SSSA(f)** | **KTA(g)** |
| **Spring** | **0.37**  | **-0.07**  | **-0.10**  | **-0.48**  | **0.42**  | **-0.15**  | **-0.05**  |
| **Summer** | **0.36**  | **0.03**  | **-0.05**  | **-0.19**  | **0.32**  | **-0.15**  | **0.12**  |
| **Autumn** | **0.39**  | **0.13**  | **-0.13**  | **-0.60**  | **-0.05**  | **-0.10**  | **0.03**  |
| **Winter** | **0.31**  | **0.02**  | **-0.24**  | **-0.59**  | **0.43**  | **-0.19**  | **-0.04**  |

**S3:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Season** | **SLA0(a)** | **OWA(b)** | **AWA(c)** | **SLPA(d)** | **SSTA(e)** | **SSSA(f)** | **KTA(g)** |
| **Spring** | **0.35**  | **-0.04**  | **-0.17**  | **-0.51**  | **0.30**  | **-0.29**  | **-0.04**  |
| **Summer** | **0.35**  | **0.04**  | **-0.08**  | **-0.19**  | **0.36**  | **-0.10**  | **0.12**  |
| **Autumn** | **0.39**  | **0.14**  | **-0.18**  | **-0.63**  | **-0.08**  | **-0.12**  | **0.04**  |
| **Winter** | **0.28**  | **0.02**  | **-0.30**  | **-0.64**  | **0.39**  | **-0.22**  | **-0.03**  |

**S4:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Season** | **SLA0(a)** | **OWA(b)** | **AWA(c)** | **SLPA(d)** | **SSTA(e)** | **SSSA(f)** | **KTA(g)** |
| **Spring** | **0.30**  | **-0.09**  | **-0.10**  | **-0.47**  | **0.46**  | **-0.16**  | **-0.03**  |
| **Summer** | **0.28**  | **-0.02**  | **-0.04**  | **-0.14**  | **0.48**  | **-0.11**  | **0.11**  |
| **Autumn** | **0.36**  | **0.15**  | **-0.14**  | **-0.51**  | **0.05**  | **-0.08**  | **0.07**  |
| **Winter** | **0.28**  | **-0.01**  | **-0.31**  | **-0.63**  | **0.45**  | **-0.15**  | **-0.04**  |

**S5:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Season** | **SLA0(a)** | **OWA(b)** | **AWA(c)** | **SLPA(d)** | **SSTA(e)** | **SSSA(f)** | **KTA(g)** |
| **Spring** | **0.26**  | **0.01**  | **-0.06**  | **-0.40**  | **0.42**  | **-0.21**  | **-0.07**  |
| **Summer** | **0.30**  | **0.09**  | **-0.08**  | **-0.25**  | **0.27**  | **-0.12**  | **0.09**  |
| **Autumn** | **0.31**  | **0.21**  | **-0.13**  | **-0.52**  | **0.19**  | **0.06**  | **0.06**  |
| **Winter** | **0.23**  | **-0.01**  | **-0.28**  | **-0.62**  | **0.43**  | **-0.13**  | **-0.05**  |

**S6:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Season** | **SLA0(a)** | **OWA(b)** | **AWA(c)** | **SLPA(d)** | **SSTA(e)** | **SSSA(f)** | **KTA(g)** |
| **Spring** | **0.31**  | **-0.09**  | **-0.08**  | **-0.44**  | **0.51**  | **-0.10**  | **-0.05**  |
| **Summer** | **0.34**  | **0.03**  | **-0.06**  | **-0.22**  | **0.30**  | **-0.11**  | **0.10**  |
| **Autumn** | **0.39**  | **0.17**  | **-0.15**  | **-0.49**  | **0.07**  | **-0.02**  | **0.07**  |
| **Winter** | **0.32**  | **-0.04**  | **-0.26**  | **-0.58**  | **0.50**  | **-0.15**  | **-0.05**  |



**Figure S1. The time series of SLA of the three tide gauges south of the KE used for evaluation and the gray lines are the SLAs of the tide gauges used to build the equations. All tide gauge data is 1-year low passed.**



**Figure S2. The same as Figure S1, but for north of the KE.**



**Figure S3. The time series of SL of tide gauges north of the KE**