**Supplementary material**

**Table S1. Grain-size contents of the hard clay and Xiashu loess**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Site | Category | Grain-size |  |  |  |
|  |  | > 50μm | 10-50μm | 5-10μm | < 5μm |
| Hard clay of Qingpu from Shanghai | Max. of hard clay quartz grains | 30.72% | 64.90% | 20.87% | 24.72% |
|  | Min. of hard clay quartz grains | 2.24% | 43.20% | 10.34% | 10.69% |
|  | Avg. of hard clay quartz grains | 10.49% | 56.72% | 15.39% | 17.41% |
|  |  |  |  |  |  |
| Xiashu loess of Zhoujia shan from Nanjing (Xu et al., 2016) | Max. of Xiashu loess quartz grains | 15.41% | 69.28% | 10.75% | 16.69% |
|  | Min. of Xiashu loess quartz grains | 9.77% | 62.64% | 6.22% | 9.87% |
|  | Avg. of Xiashu loess quartz grains | 12.38% | 65.62% | 8.64% | 13.35% |