**Table S1.** Summary of stratigraphic, thickness, lithological, and facies data (after Cook *et al.* 2002) of the sections sampled during the present study.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Section** | **Stratigraphy** | **Thickness** | **Intervals sampled during the present study** | | | |
| **Stratigraphy** | **Thickness** | **Dominant lithology** | **Depositional environment** |
| **Aktobe** | Famennian to Serpukhovian | ~1600 m | a) Famennian  b) Tournaisian  c) Visean  d) Serpukhovian | 400 m | a) microbial laminites  b) lime mudstones, carbonate turbidites, carbonate debris-flows  c) lime mudstones, carbonate turbidites, carbonate debris-flows  d) lime mudstones, mud mounds | a) tidal flat / peritidal facies  b) slope facies  c) slope facies  d) deep ramp facies |
| **Besharik** | Frasnian to Tournaisian | ~1300 m | Famennian | 40 m | lime mudstones | deep ramp facies |
| **Ushozen** | Visean to Bashkirian | ~700 m | a) Visean  b) Serpukhovian  c) Bashkirian | 300 m | a) lime mudstones/wackestones, bioclastic grainstones/packstones  b) algal laminites  c) laminated lime mudstones/wackestones | a) deep ramp facies / open shelf facies  b) tidal flat /peritidal facies  c) deep ramp facies / open shelf |
| **Zhankurgan** | Frasnian to Bashkirian | ~3800 m | Visean | 150 m | lime mudstones, carbonate turbidites, carbonate debris-flows | slope facies |
| **Zhertansai** | Famennian to Visean | ~2700 m | a) Famennian  b) Tournaisian | 80 m | a) bioclastic wackestones  b) lime mudstones/wackestones | a) deep ramp facies  b) deep ramp facies |