**Table S4**. Pairwise inversion distance inferred by GRIMM of 40 diatom plastomes.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *Leptocylindrus danicus* | *Probosica sp* | *Actinocyclus subtilis* | *Coscinodiscus radiatus* | *Rhizosolenia setigera* | *Guinardia striata* | *Rhizosolenia fallax* | *Rhizosolenia imbricata* | *Lithodesmium undulatum* | *Eunotogramma sp* | *Roundia cardiophora* | *Thalassiosira weissflogii* | *Discostella pseudostelligera* | *Thalassiosira oceania* | *Cyclotella\_nana* | *Cyclotella sp L04\_2* | *Cyclotella sp WC03\_2* | *Plagiogrammopsis van heurckii* | *Trieres sinensis* | *Triceratium dubium* | *Cerataulina daemon* | *Acanthoceras zachariasii* | *Chaetoceros simplex* | *Attheya logicornis* | *Biddulphia tridens* | *Biddulphia biddulphiana* | *Asterionellopsis glacialis* | *Plagiogramma staurophorum* | *Psammoneis obaidii* | *Asterionella formosa* | *Astrosyne radiata* |
| *Leptocylindrus danicus* | 0 | 19 | 11 | 11 | 13 | 13 | 13 | 12 | 14 | 16 | 16 | 16 | 16 | 17 | 16 | 16 | 16 | 14 | 13 | 13 | 13 | 16 | 17 | 15 | 13 | 13 | 16 | 12 | 17 | 13 | 18 |
| *Probosica sp* | 19 | 0 | 16 | 16 | 17 | 19 | 18 | 18 | 17 | 18 | 19 | 19 | 19 | 19 | 19 | 18 | 18 | 18 | 17 | 17 | 17 | 18 | 18 | 18 | 17 | 17 | 17 | 17 | 19 | 17 | 20 |
| *Actinocyclus subtilis* | 11 | 16 | 0 | 0 | 2 | 5 | 3 | 4 | 3 | 8 | 9 | 9 | 9 | 15 | 9 | 9 | 9 | 7 | 6 | 6 | 4 | 9 | 10 | 10 | 7 | 7 | 11 | 10 | 11 | 6 | 11 |
| *Coscinodiscus radiatus* | 11 | 16 | 0 | 0 | 2 | 5 | 3 | 4 | 3 | 8 | 9 | 9 | 9 | 15 | 9 | 9 | 9 | 7 | 6 | 6 | 4 | 9 | 10 | 10 | 7 | 7 | 11 | 10 | 11 | 6 | 11 |
| *Rhizosolenia setigera* | 13 | 17 | 2 | 2 | 0 | 3 | 1 | 4 | 5 | 10 | 11 | 11 | 11 | 15 | 11 | 11 | 11 | 9 | 8 | 8 | 6 | 11 | 12 | 12 | 8 | 8 | 11 | 12 | 13 | 8 | 12 |
| *Guinardia striata* | 13 | 19 | 5 | 5 | 3 | 0 | 2 | 5 | 8 | 11 | 13 | 13 | 13 | 16 | 13 | 12 | 12 | 10 | 10 | 10 | 9 | 12 | 13 | 13 | 11 | 11 | 12 | 13 | 14 | 11 | 14 |
| *Rhizosolenia fallax* | 13 | 18 | 3 | 3 | 1 | 2 | 0 | 3 | 6 | 11 | 11 | 11 | 11 | 16 | 11 | 10 | 10 | 8 | 8 | 8 | 7 | 11 | 12 | 11 | 9 | 9 | 10 | 11 | 14 | 9 | 12 |
| *Rhizosolenia imbricata* | 12 | 18 | 4 | 4 | 4 | 5 | 3 | 0 | 7 | 12 | 12 | 12 | 12 | 19 | 12 | 11 | 11 | 9 | 9 | 9 | 8 | 11 | 12 | 12 | 10 | 10 | 13 | 12 | 15 | 10 | 14 |
| *Lithodesmium undulatum* | 14 | 17 | 3 | 3 | 5 | 8 | 6 | 7 | 0 | 9 | 12 | 12 | 12 | 15 | 12 | 12 | 12 | 10 | 9 | 9 | 7 | 9 | 10 | 11 | 6 | 6 | 13 | 12 | 11 | 8 | 13 |
| *Eunotogramma sp* | 16 | 18 | 8 | 8 | 10 | 11 | 11 | 12 | 9 | 0 | 13 | 13 | 13 | 18 | 13 | 13 | 13 | 10 | 11 | 11 | 12 | 13 | 14 | 13 | 11 | 11 | 17 | 13 | 14 | 12 | 14 |
| *Roundia cardiophora* | 16 | 19 | 9 | 9 | 11 | 13 | 11 | 12 | 12 | 13 | 0 | 0 | 0 | 10 | 0 | 1 | 1 | 10 | 8 | 8 | 7 | 12 | 13 | 14 | 11 | 11 | 14 | 11 | 14 | 8 | 16 |
| *Thalassiosira weissflogii* | 16 | 19 | 9 | 9 | 11 | 13 | 11 | 12 | 12 | 13 | 0 | 0 | 0 | 10 | 0 | 1 | 1 | 10 | 8 | 8 | 7 | 12 | 13 | 14 | 11 | 11 | 14 | 11 | 14 | 8 | 16 |
| *Discostella pseudostelligera* | 16 | 19 | 9 | 9 | 11 | 13 | 11 | 12 | 12 | 13 | 0 | 0 | 0 | 10 | 0 | 1 | 1 | 10 | 8 | 8 | 7 | 12 | 13 | 14 | 11 | 11 | 14 | 11 | 14 | 8 | 16 |
| *Thalassiosira oceania* | 17 | 19 | 15 | 15 | 15 | 16 | 16 | 19 | 15 | 18 | 10 | 10 | 10 | 0 | 10 | 11 | 11 | 16 | 14 | 14 | 15 | 17 | 17 | 17 | 15 | 15 | 16 | 17 | 17 | 15 | 20 |
| *Cyclotella nana* | 16 | 19 | 9 | 9 | 11 | 13 | 11 | 12 | 12 | 13 | 0 | 0 | 0 | 10 | 0 | 1 | 1 | 10 | 8 | 8 | 7 | 12 | 13 | 14 | 11 | 11 | 14 | 11 | 14 | 8 | 16 |
| *Cyclotella sp L04\_2* | 16 | 18 | 9 | 9 | 11 | 12 | 10 | 11 | 12 | 13 | 1 | 1 | 1 | 11 | 1 | 0 | 0 | 11 | 8 | 8 | 6 | 12 | 13 | 13 | 12 | 12 | 13 | 10 | 15 | 8 | 16 |
| *Cyclotella sp WC03\_2* | 16 | 18 | 9 | 9 | 11 | 12 | 10 | 11 | 12 | 13 | 1 | 1 | 1 | 11 | 1 | 0 | 0 | 11 | 8 | 8 | 6 | 12 | 13 | 13 | 12 | 12 | 13 | 10 | 15 | 8 | 16 |
| *Plagiogrammopsis van heurckii* | 14 | 18 | 7 | 7 | 9 | 10 | 8 | 9 | 10 | 10 | 10 | 10 | 10 | 16 | 10 | 11 | 11 | 0 | 4 | 4 | 5 | 7 | 8 | 12 | 10 | 10 | 13 | 9 | 15 | 9 | 15 |
| *Trieres sinensis* | 13 | 17 | 6 | 6 | 8 | 10 | 8 | 9 | 9 | 11 | 8 | 8 | 8 | 14 | 8 | 8 | 8 | 4 | 0 | 0 | 2 | 4 | 5 | 9 | 7 | 7 | 11 | 9 | 12 | 7 | 13 |
| *Triceratium dubium* | 13 | 17 | 6 | 6 | 8 | 10 | 8 | 9 | 9 | 11 | 8 | 8 | 8 | 14 | 8 | 8 | 8 | 4 | 0 | 0 | 2 | 4 | 5 | 9 | 7 | 7 | 11 | 9 | 12 | 7 | 13 |
| *Cerataulina daemon* | 13 | 17 | 4 | 4 | 6 | 9 | 7 | 8 | 7 | 12 | 7 | 7 | 7 | 15 | 7 | 6 | 6 | 5 | 2 | 2 | 0 | 6 | 7 | 9 | 7 | 7 | 10 | 8 | 12 | 7 | 12 |
| *Acanthoceras zachariasii* | 16 | 18 | 9 | 9 | 11 | 12 | 11 | 11 | 9 | 13 | 12 | 12 | 12 | 17 | 12 | 12 | 12 | 7 | 4 | 4 | 6 | 0 | 1 | 11 | 7 | 7 | 15 | 12 | 13 | 11 | 17 |
| *Chaetoceros simplex* | 17 | 18 | 10 | 10 | 12 | 13 | 12 | 12 | 10 | 14 | 13 | 13 | 13 | 17 | 13 | 13 | 13 | 8 | 5 | 5 | 7 | 1 | 0 | 12 | 8 | 8 | 15 | 13 | 14 | 12 | 18 |
| *Attheya logicornis* | 15 | 18 | 10 | 10 | 12 | 13 | 11 | 12 | 11 | 13 | 14 | 14 | 14 | 17 | 14 | 13 | 13 | 12 | 9 | 9 | 9 | 11 | 12 | 0 | 5 | 5 | 12 | 13 | 12 | 11 | 12 |
| *Biddulphia tridens* | 13 | 17 | 7 | 7 | 8 | 11 | 9 | 10 | 6 | 11 | 11 | 11 | 11 | 15 | 11 | 12 | 12 | 10 | 7 | 7 | 7 | 7 | 8 | 5 | 0 | 0 | 11 | 12 | 12 | 9 | 13 |
| *Biddulphia biddulphiana* | 13 | 17 | 7 | 7 | 8 | 11 | 9 | 10 | 6 | 11 | 11 | 11 | 11 | 15 | 11 | 12 | 12 | 10 | 7 | 7 | 7 | 7 | 8 | 5 | 0 | 0 | 11 | 12 | 12 | 9 | 13 |
| *Asterionellopsis glacialis* | 16 | 17 | 11 | 11 | 11 | 12 | 10 | 13 | 13 | 17 | 14 | 14 | 14 | 16 | 14 | 13 | 13 | 13 | 11 | 11 | 10 | 15 | 15 | 12 | 11 | 11 | 0 | 10 | 11 | 11 | 11 |
| *Plagiogramma staurophorum* | 12 | 17 | 10 | 10 | 12 | 13 | 11 | 12 | 12 | 13 | 11 | 11 | 11 | 17 | 11 | 10 | 10 | 9 | 9 | 9 | 8 | 12 | 13 | 13 | 12 | 12 | 10 | 0 | 12 | 8 | 14 |
| *Psammoneis obaidii* | 17 | 19 | 11 | 11 | 13 | 14 | 14 | 15 | 11 | 14 | 14 | 14 | 14 | 17 | 14 | 15 | 15 | 15 | 12 | 12 | 12 | 13 | 14 | 12 | 12 | 12 | 11 | 12 | 0 | 9 | 11 |
| *Asterionella formosa* | 13 | 17 | 6 | 6 | 8 | 11 | 9 | 10 | 8 | 12 | 8 | 8 | 8 | 15 | 8 | 8 | 8 | 9 | 7 | 7 | 7 | 11 | 12 | 11 | 9 | 9 | 11 | 8 | 9 | 0 | 10 |
| *Astrosyne radiata* | 18 | 20 | 11 | 11 | 12 | 14 | 12 | 14 | 13 | 14 | 16 | 16 | 16 | 20 | 16 | 16 | 16 | 15 | 13 | 13 | 12 | 17 | 18 | 12 | 13 | 13 | 11 | 14 | 11 | 10 | 0 |
| *Synedra acus* | 12 | 16 | 4 | 4 | 6 | 9 | 7 | 8 | 7 | 10 | 10 | 10 | 10 | 15 | 10 | 10 | 10 | 9 | 7 | 7 | 6 | 11 | 12 | 9 | 8 | 8 | 7 | 6 | 7 | 4 | 8 |
| *Licmorphora sp* | 10 | 16 | 7 | 7 | 9 | 10 | 10 | 9 | 9 | 11 | 11 | 11 | 11 | 14 | 11 | 11 | 11 | 11 | 9 | 9 | 9 | 12 | 13 | 12 | 11 | 11 | 10 | 6 | 8 | 5 | 11 |
| *Eunotia naegelii* | 11 | 16 | 4 | 4 | 6 | 7 | 5 | 6 | 7 | 10 | 9 | 9 | 9 | 15 | 9 | 8 | 8 | 7 | 5 | 5 | 4 | 9 | 10 | 8 | 7 | 7 | 7 | 6 | 9 | 4 | 8 |
| *Cylindrotheca closterium* | 15 | 18 | 11 | 11 | 11 | 13 | 11 | 12 | 12 | 15 | 14 | 14 | 14 | 18 | 14 | 13 | 13 | 13 | 11 | 11 | 9 | 12 | 13 | 13 | 12 | 12 | 10 | 11 | 14 | 12 | 13 |
| *Seminavis robusta* | 14 | 19 | 7 | 7 | 9 | 10 | 8 | 7 | 9 | 13 | 12 | 12 | 12 | 17 | 12 | 11 | 11 | 10 | 8 | 8 | 7 | 11 | 12 | 11 | 10 | 10 | 8 | 9 | 10 | 7 | 9 |
| *Entomoneis sp* | 14 | 19 | 8 | 8 | 10 | 10 | 9 | 8 | 8 | 11 | 12 | 12 | 12 | 17 | 12 | 11 | 11 | 9 | 10 | 10 | 9 | 9 | 10 | 11 | 8 | 8 | 12 | 7 | 11 | 7 | 12 |
| *Fistulifera sp JPCC DA0580* | 11 | 17 | 5 | 5 | 7 | 8 | 6 | 5 | 7 | 11 | 10 | 10 | 10 | 16 | 10 | 9 | 9 | 8 | 6 | 6 | 5 | 9 | 10 | 9 | 8 | 8 | 10 | 8 | 10 | 5 | 9 |
| *Didymosphenia germinata* | 12 | 17 | 5 | 5 | 7 | 8 | 6 | 5 | 7 | 11 | 10 | 10 | 10 | 16 | 10 | 9 | 9 | 8 | 6 | 6 | 5 | 9 | 10 | 9 | 8 | 8 | 8 | 7 | 10 | 5 | 9 |
| *Phaeodactylum tricornutum* | 12 | 17 | 5 | 5 | 7 | 8 | 6 | 5 | 7 | 11 | 10 | 10 | 10 | 16 | 10 | 9 | 9 | 8 | 6 | 6 | 5 | 9 | 10 | 9 | 8 | 8 | 8 | 7 | 10 | 5 | 9 |