Investigation of scaling relationships between time and morphology, following change in wave climate.

In the limit of instantaneous wave climate change, we find that wavelengths of capes and spits display diffusive scaling with respect to time, for both capes and spits.

We determined these relationships as follows:

Characteristic times scales at which the aspect ratio (amplitude/wavelength) changed by 1/e and 1/e2 were determined from data generated by model runs in which the wave climate was changed instantaneously to a diffusive wave climate (***U*** changed from 0.7 to 0.45).

Model runs at 250 and 900 years were used for the calculations, since these are different enough in time for scaling relationships to be evident above noise.

We find that time is proportional to the square of the wavelength. The results are summarised in tables S1 and S2, supported by figures S1 and S2.

Spits models

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Models |  | Time | Wavelength | Amplitude | Aspect ratio |
| 250 year | 1 e-fold | 20 | 7196 | 861 | 0.120 |
| 900 year | 1 e-fold | 90 | 14727 | 2408 | 0.163 |
| Ratios | 250/900 | 0.22 | 0.49 | 0.36 | 0.74 |
|  |  |  |  |  |  |
| Length Ratios2 | 250/900 | 0.22 | 0.24 | 0.13 | 0.54 |
|  |  |  |  |  |  |
| Models |  | Time | Wavelength | Amplitude | Aspect ratio |
| 250 year | 2 e-fold | 55 | 8755 | 384 | 0.044 |
| 900 year | 2 e-fold | 320 | 21700 | 1295 | 0.060 |
| Ratios | 250/900 | 0.17 | 0.40 | 0.30 | 0.73 |
|  |  |  |  |  |  |
| Length Ratios2 | 250/900 | 0.17 | 0.16 | 0.09 | 0.54 |

Capes models

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Models |  | Time | Wavelength | Amplitude | Aspect ratio |
| 250 | 1 e-fold | 5 | 4311 | 400 | 0.093 |
| 900 | 1 e-fold | 20 | 8905 | 932 | 0.105 |
| Ratios | 250/900 | 0.25 | 0.48 | 0.43 | 0.89 |
|  |  |  |  |  |  |
| Length Ratios2 | 250/900 | 0.25 | 0.23 | 0.18 | 0.78 |
|  |  |  |  |  |  |
| Models |  | Time | Wavelength | Amplitude | Aspect ratio |
| 250 | 2 e-fold | 18 | 6524 | 208 | 0.032 |
| 900 | 2 e-fold | 80 | 13154 | 507 | 0.039 |
| Ratios | 250/900 | 0.23 | 0.50 | 0.41 | 0.82 |
|  |  |  |  |  |  |
| Length Ratios2 | 250/900 | 0.23 | 0.25 | 0.17 | 0.67 |