Appendix F: Assessment of input parameters for long-term distribution

1.1 Assessment of input parameters

The LRR method was adopted to represent the long-term component input distribution parameters, because it accounts for all available data and the rate is adjusted to a trend that best fits all data points.

A normal distribution has been adopted to use for the LT component as recommended by Kenderdline et al. (2016). Input parameters for a normal distribution are a mean and standard deviation (SD), and these have been derived based on the LRR values within each cell for this study. The SD has been evaluated using four methods:

1. LRR values within each cell
2. LRR residuals within each cell
3. 90% CI values from LRR values within each cell
4. 90% CI values from beach profiles (trends) within each cell.

Method 1 calculates the SD taking into account all the LRR values within each cell.

For method 2 the alongshore LRR slope has been de-trended to obtain residual LRR values (similar to the approach discussed in the ST section). The SD has been calculated based on these residuals.

Method 3 calculates the SD based on the 90% CI values for each LRR value within the cell. If we assume that all the LRR values are normally distributed, and consider that the area under the normal distribution curve is 90% of the total area for each LRR value ±90% CI values, the SD can be calculated. Spiegel (1961) gives that for a standardised normal curve the area included between ±1.645·z equals to 90% of the total area. Figure F1 shows a standardised normal curve indicating 90% of the total area and corresponding z-values based on Spiegel (1961), with z equal to the SD. Therefore the SD was calculated for each LRR value by dividing the corresponding 90% CI value by 1.645, with the resulting SD for each cell as the average of all individual calculated SD values.

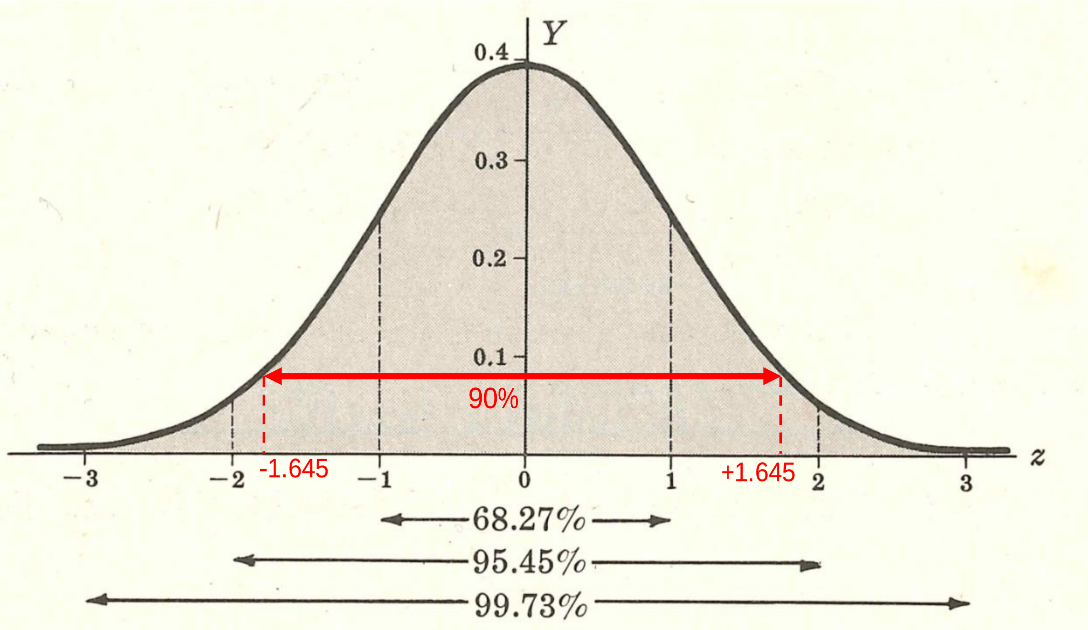

Figure F1 Graph of standardised normal distribution curve (source: Spiegel, 1961)

Method 4 calculates the SD based on the 90% CI values derived from beach profile trends (see Appendix B) for all profiles within each cell. The same transformation method to calculate the SD from the 90% CI values as used for method 3 has been used. The calculated SD values for all beach profiles within each cell have been averaged to obtain the resulting SD values for each cell.

Table F1 shows the derived mean and SD calculated according to the four discussed methods for each cell. The table shows the largest SD values based on the 90% CI values and the smallest SD values based on the LRR residuals. The SDs based on the 90% CI values from the LRR values are equal or slightly higher than the SDs based on the 90% CI values from the beach profile trend residuals. However, method 4 includes more than 50 data points compared to method 3, which only includes five data points.

Based on the uncertainty of the LRR values shown in Figure 4-7 (refer to Section 4.2.3.4) we have adopted the SD values that are based on 90% CI values. Method 4 SD values are proposed to be adopted as input distribution parameters for the LT component (highlighted in Table F1). This is because Method 4 is more reliably based on a greater number (50+) of data points compared to only five data points with Method 3.

Table F1 Long-term erosion component values

Open coast site	Long-term component input distribution parameters				
Cell	Mean (m)	Method 1 SD (m) based on LRR values	Method 2 SD (m) based on LRR residuals	Method 3 SD (m) based on 90% CI values of LRR values	Method 4 SD (m) based on 90% CI of residuals
A	+0.38	0.10	0.04	0.17	0.10
B	+0.14	0.06	0.06	0.12	0.10
C	+0.20	0.07	0.05	0.12	0.07
D	+021	0.05	0.04	0.12	0.07
E	+0.26	0.03	0.03	0.07	0.06
F	+0.44	0.09	0.07	0.12	0.06

Highlighted cells are proposed values to adopt for the LT component

1.2 Testing normality of residuals within each cell

The assumption that the residuals within each cell are distributed normally have been tested. We have used two visual methods. The first visual method includes plotting histograms of the LRR values and overlaying a normal distribution based on the mean and SD as shown in Table F1. Figure F2 shows the histograms based on all LRR values within each cell and fitted normal distributions, and shows that, while there are variances, the histograms do generally approximate a normal distribution.

The second visual method includes derivation of expected values of a normal distribution based on the mean and SD of all LRR values within the cell. By plotting the LRR values and the expected values of each LRR value over standardised values (z-values), a visual comparison can be made. Figure F3 shows a comparison of the normally distributed expected values curve and original LRR values curve for all cells. These figures show that the LRR values curve roughly follow the expected values curve.

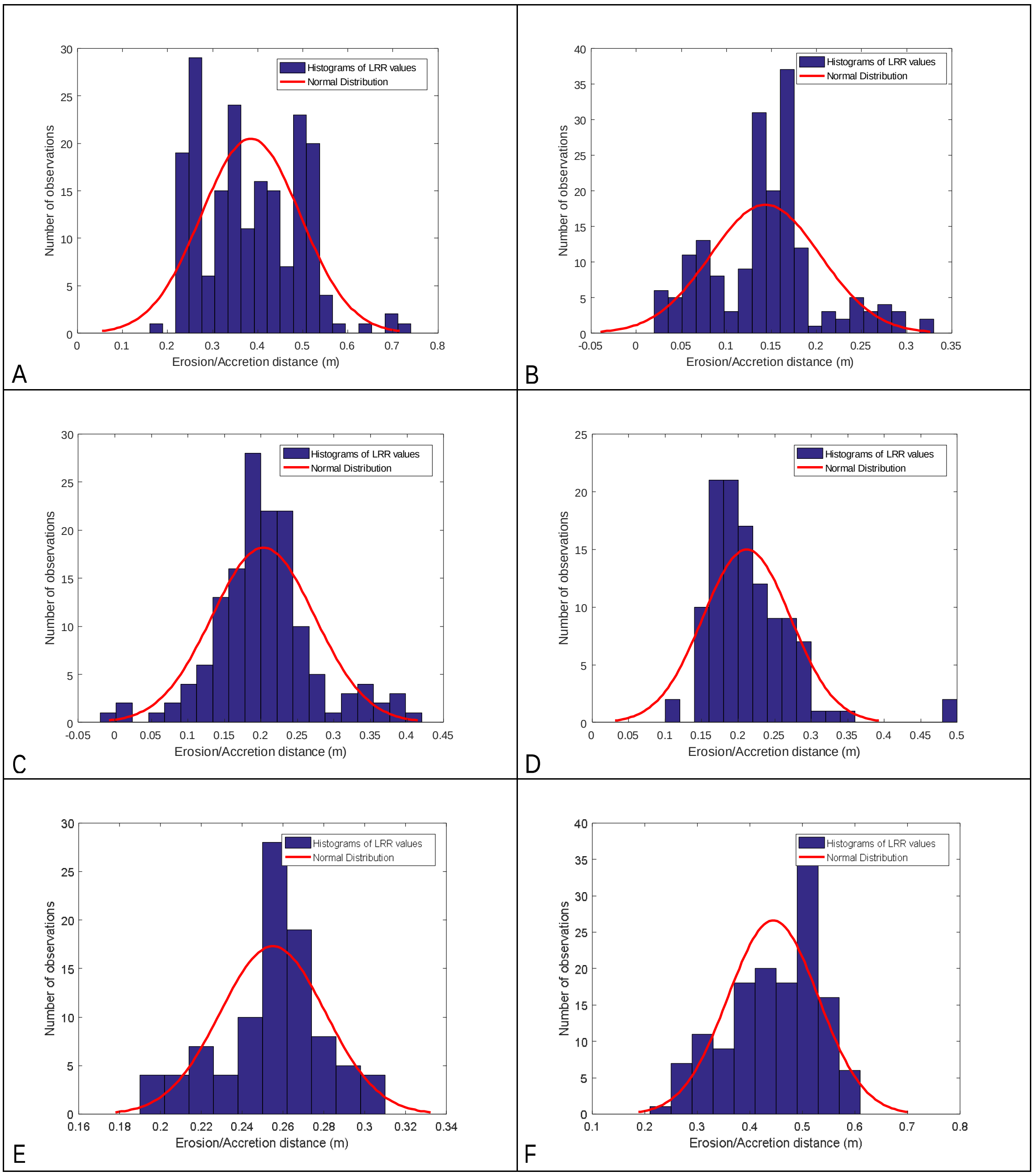

Figure F2 Histograms based on LRR values including fitted normal distributions for each cell (A-F)

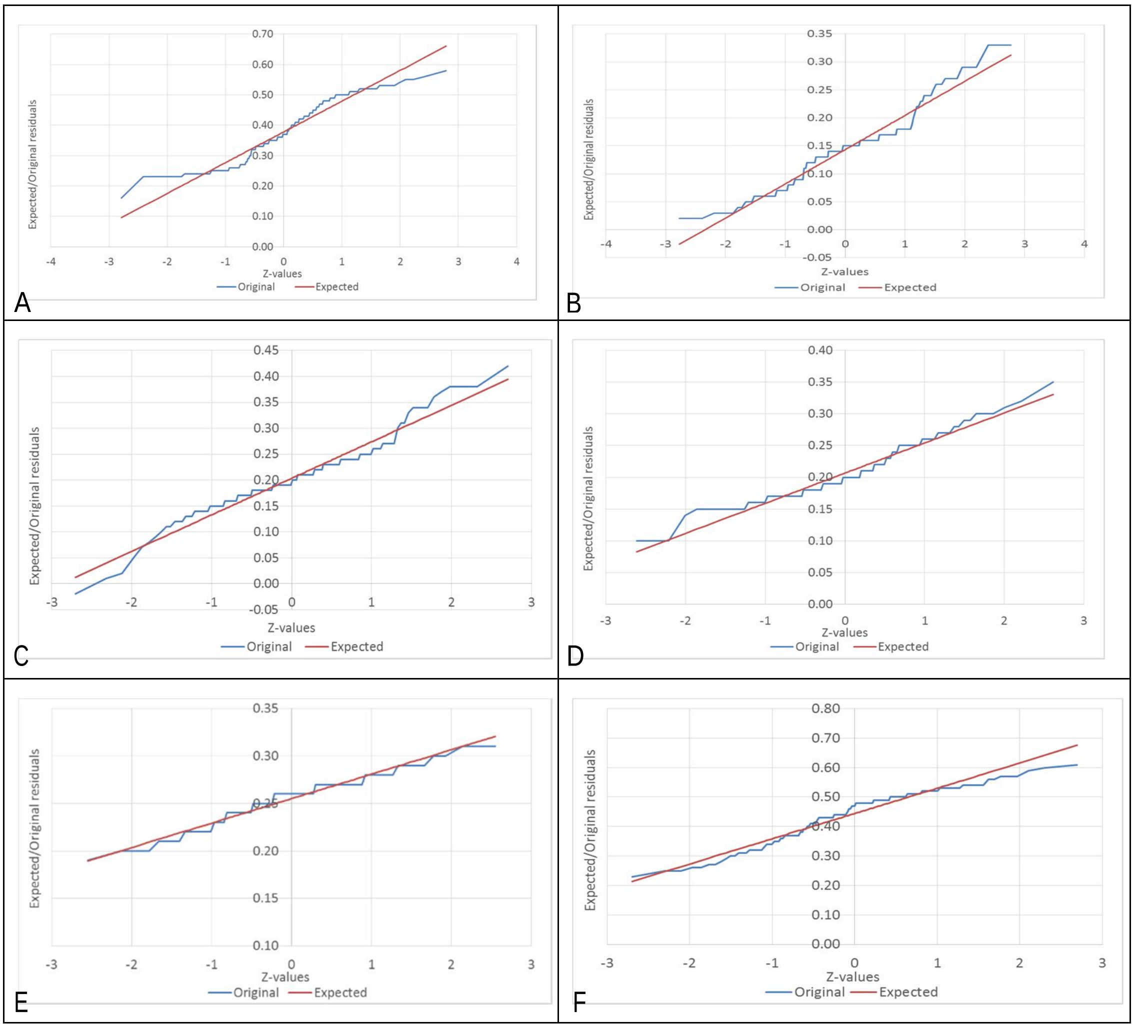

Figure F3 Expected values of LRR values and original LRR values within the cell plotted over z-values for cell A – F