**Plant traits determining biogeomorphic landscape dynamics: a study on clonal expansion strategies driving cliff formation at marsh edges**

Description of the dataset per column:

**Sheet1**

**#Mesocosm exp1\_Plant traits#**

**Speceis:**

1=*Spartina anglica*; 2=*Phragmites australis*; 3=*Scirpus maritimus*;

**Sediment type:**

1=Sand; 2=Sandy-mud; 3=Mud;

**Plant height:**

=10 random shoots in the mesocosms;

**Tussock size:**

=distance between the two furthest shoots in the longitudinal direction, i.e. parallel to the 70-cm box sides;

**Shoot density:**

=total shoot numbers in each mesocosm;

Note that mesocosm size= length × width × depth = 70 cm × 40 cm × 30 cm, replicate mesocosms=5 for each species each sediment type;

**Sheet 2**

**#Mesocosm exp1\_Step-lengths#**

**Speceis:**

1=*Spartina anglica*; 2=*Phragmites australis*; 3=*Scirpus maritimus*;

**Sediment type:**

1=Sand; 2=Sandy-mud; 3=Mud;

**Clonal step-length:**

= measuring of the distance of tillers to the original tussock boundary in the longitudinal direction;

Note that mesocosm size= length × width × depth = 70 cm × 40 cm × 30 cm, replicate mesocosms=5 for each species each sediment type

**Sheet 3**

**#Flume exp\_elevation change#**

**Speceis:**

1=*Spartina anglica*; 2=*Scirpus maritimus*;

**Flume run:**

Replicates of flume run for three hours with identical waves (water depth=26cm; salinity=31 ppt; wave paddle setting resulted in waves with an average period of 1.5 s, maximum height of 10 cm, and peak bed shear stress of 0.46 N m-2, calculated from wave properties; c.f. Jonsson et al. 1966; Balke et al. 2011);

**Flume section:**

1=mimicked tidal flat, 2= mimicked marsh canopy;

**Surface elevation change:**

surface elevation of sediment after wave exposure (the vertical distance to the sediment surface)

Note that the SEC for the tidal flat section (67\*44cm) was measured by an ADV (Nortek Vectrino), and the SEC for the marsh canopy (50\*25) was measured manually using the sedimentation erosion bar (SEB) method, due to the technical constraints of the ADV.

**Sheet 4**

**# Flume exp\_volumeloss & cliff#**

**Speceis:**

1=*Spartina anglica*; 2=*Scirpus maritimus*;

**Flume run:**

replicates of flume run for three hours with identical waves;

**Flume section:**

1=mimicked tidal flat (67\*50cm), 2= mimicked marsh canopy (25\*50cm);

**Average SEC:**

average surface elevation change of each section;

**Volume loss rate (cm3/h):**

the average net sediment volume loss rate (cm3/ h) of each section was calculated by multiplying the average SEC and surface area of each section and dividing it by the time the flume experiment had been run (i.e. three hours);

**Cliff height (cm):**

the maximal height difference measured when approaching the vegetated area from the bare area (Relative elevation marsh edge — tidal flat edge).

**Sheet 5**

**# Mesocosm exp2\_Plant traits#**

**Speceis:**

1=*Spartina anglica*; 2=*Phragmites australis*; 3=*Scirpus maritimus*;

**Cliff height:**

1=0 cm; 2=2 cm; 3= 4 cm; 4=8cm; 5=16cm;

**Plant height:**

=10 random shoots in the mesocosms;

**Tussock size:**

=distance between the two furthest shoots in the longitudinal direction, i.e. parallel to the 70-cm box sides;

**Shoot density:**

=total shoot numbers in each mesocosm;

**Cliff front tillers:**

number of tillers that expanded to the cliff front;

**Number of tillers expansion succeed:**

number of tillers that expanded to the soil ground in front of the cliffs;

Note that mesocosm size= length × width × depth = 70 cm × 40 cm × 30 cm; replicat mesocosms=5 for each species each cliff height; \*\*\* indicates for data (tussock and total tiller numbers) lost for one mesocosm (*P. australis*, cliff=2 cm)