**Title:**

Data presented in Zhao et al. 2021, ‘The onset of secondary seed dispersal is controlled by germination-features: A neglected process in sudden saltmarsh establishment’ in *Limnology and Oceanography*.

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**These files include the raw data used to create each figure in the manuscript, organized as follows:**

1. Flume study

a. Seed characteristics

b. Secondary dispersal onset of superficial seeds

c. Secondary dispersal onset of sedimentary seeds

1. Field investigation

a. Tidal current conditions

b. Bed elevation changes

c. Water level

d. Monthly temperature

**Flume study - Seed characteristics**

* *Data*

‘Scirpus.xlsx’

‘Spartina.xlsx’

* *Description*

To explore how seed traits affect secondary hydrodynamic transport, and to what extent this may be altered by seeds being germinated. Before proceeding flume test, morphological traits of all seed categories were measured and calculated. These data can be found in the data frame within the file “Scirpus.xlsx”, which shows the data regarding *Scripus mariqueter*, and the file ‘Spartina.xlsx’, which shows the data regarding *Spartina alterniflora*. Within each file, the columns include the stage (which categories and groups the seeds based on their germination day and morphological characteristics), the mass after blotting dry, volume, density, superficial area, thickness and length of buds (i.e., embryo shoot, which develops into a leaf). These factors were all considered key physical attributes that affect the potential of seed dispersal. Volume was determined using the water displacement method. Density was calculated by dividing mass by volume. Superficial area was retrieved using Vistar Image 4.0 after obtaining the top and frontal images using a stereomicroscope with a digital camera.

**Flume study - Secondary dispersal onset of superficial seeds**

* *Data*

‘Superficial seeds.xlsx’

* *Figures*

‘Scirpus-superficial seeds.tif’

‘Spartina-superficial seeds.tif’

* *Description*

In this flume experiment, seeds of two species (*Scripus mariqueter* and *Spartina alterniflora*) at one of the six germination stages were placed on the sediment surface to simulate the seeds retained on the tidal flat surface after primary dispersal. The lift-off ratio of seeds was recorded following the application of various flow velocities. These data can be found in the data frame within the file “Superficial seeds.xlsx”. The file includes two sheets, sheet 1 named “Scirpus-Superficial seeds”, which shows the data of *Scripus mariqueter*, and can be used to produce ‘Scirpus-superficial seeds.tif’; sheet 2 named “Spartina-Superficial seeds”, which shows the data of *Spartina alterniflora*, and can be used to produce ‘Spartina-superficial seeds.tif’. Within each sheet, the columns include the “Germination stage”, which indicates the germination stage of the seed used in each run of the experiment; the “Velocity (m/s)”, which describes the flow velocity imposed in the flume in each run of the experiment; the “Lift-off ratio (%)”, which records the ratio of moved seeds in each run of the experiment.

**Flume study - Secondary dispersal onset of sedimentary seeds**

* *Data*

‘Sedimentary seeds.xlsx’

* *Figures*

‘*Scirpus*-sedimentary seeds.tif’

‘*Spartina*-sedimentary seeds.tif’

* *Description*

In this flume experiment, seeds of two species (*Scripus mariqueter* and *Spartina alterniflora*) at one of the six germination stages were lightly pressed into the sediment (ca. 5 mm) while the bud remained exposed, to simulate the seeds stored in the local soil bank after the primary dispersal. The lift-off ratio of seeds was recorded following the application of various flow velocities. These data can be found in the data frame within the file “Sedimentary seeds.xlsx”. The file includes two sheets, sheet 1 named “Scirpus- Sedimentary seeds”, which shows the data of *Scripus mariqueter*, and can be used to produce ‘Scirpus-sedimentary seeds.tif’; sheet 2 named “Spartina- Sedimentary seeds”, which shows the data of *Spartina alterniflora*, and can be used to produce ‘Spartina-sedimentary seeds.tif’. Within each sheet, the columns include the “Germination stage”, which indicates the germination stage of the seed used in each run of the experiment; the “Velocity (m/s)”, which describes the flow velocity imposed in the flume in each run of the experiment; the “Lift-off ratio (%)”, which records the ratio of moved seeds in each run of the experiment.

**Field investigation – Tidal current conditions**

* *Data*

‘Current conditions.xlsx’

* *Figures*

‘Scirpus-201710-DEPTHDIRECTION.png’

‘Scirpus-201710-VELOCITY.png’

‘Scirpus-201804-DEPTHDIRECTION.png’

‘Scirpus-201804-VELOCITY.png’

‘Spartina-201710-DEPTHDIRECTION.png’

‘Spartina-201710-VELOCITY.png’

‘Spartina-201804-DEPTHDIRECTION.png’

‘Spartina-201804-VELOCITY.png’

* *Description*

To verify whether changing physical factors between the primary seed dispersal period (October) and the seedling establishment period (April) relate secondary dispersal to the moment of observed rapid colonization, hydrodynamic forces from current were measured in situ at both the *Scirpus*- and *Spartina*-sites. Tidal current velocity and direction was measured using an Electromagnetic Current Meter (ALEC AEM-USB, JFE Shoji Trade Corporation, Japan) in eight consecutive tidal cycles during the spring tide in October 2017 and April 2018. At the same time, a Tide Logger (RBR, RBR Ltd., Canada) was deployed to measure water depth. These data can be found in the data frame within the file “Current conditions.xlsx”. The file includes four sheets, sheet 1 named “Scirpus-site-2017.10”, which shows the data recorded in Scirpus-site in October 2017 and can be used to produce ‘Scirpus-201710 DEPTHDIRECTION.png’ and ‘Scirpus-201710-VELOCITY.png’; sheet 2 named “Scirpus-site-2018.4”, which shows the data recorded in Scirpus-site in April 2018 and can be used to produce ‘Scirpus-201804-DEPTHDIRECTION.png’ and ‘Scirpus-201804-VELOCITY.png’; sheet 3 named “Spartina-site-2017.10”, which shows the data recorded in Spartina-site in October 2017 and can be used to produce ‘Spartina-201710 DEPTHDIRECTION.png’ and ‘Spartina -201710-VELOCITY.png’; sheet 4 named “Spartina-site-2018.4”, which shows the data recorded in Spartina-site in April 2018 and can be used to produce ‘Spartina-201804-DEPTHDIRECTION.png’ and ‘Spartina-201804-VELOCITY.png’. Within each sheet, the columns include the “Date”, which indicates the date and time when the data was recorded; the “Water depth”, which records the water level of the tide at each time point; the “direction” records the direction of the tidal current at each time point (0 indicates east; 180 indicates west); the “Velocity”, which records the speed of the tidal current at each time point. Note: blank data column means that the instrument has not been inundated (i.e., low tide) at that time point, and there is no relevant data.

**Field investigation - Bed elevation changes**

* *Data*

‘Bed elevation changes.xlsx’

* *Figures*

‘Bed elevation changes.tif’

* *Description*

To verify whether changing physical factors relate secondary seed dispersal to the moment of observed rapid seedling colonization, net bed elevation changes in terms of the relative elevation change at the two case sites (i.e., Scirpus-site and Spartina-site) between October 2017 and July 2018 were measured. These data can be found in the data frame within the file “Bed elevation changes.xlsx”. The file includes two sheets, sheet 1 named “Scirpus-sit”, which shows the data recorded in Scirpus-site; sheet 2 named “Spartina-site”, which shows the data recorded in Spartina-site. Within each sheet, the columns include the “Date”, which indicates the months when the data was recorded; the “Relative elevation (mean)” shows the relative change in height from the top of the marker pole to the surface of the tidal flat. The initial elevations of the mudflat surface were set to zero as a reference elevation and the bed elevation changes were measured as the relative positive or negative changes from the initial elevations. As this value decreases, it indicates that the bed elevation is increasing. The “S.E.”, which shows the standard error of the data value of repeated measurements.

**Field investigation - Water level**

* *Data*

‘Water level.xlsx’

* *Figures*

‘Monthly highest water level.tif’

* *Description*

To verify whether changing physical factors relate secondary seed dispersal to the moment of observed rapid seedling colonization, the highest monthly water level was also determined since it is considered the key physical factor affecting seed germination and establishment. Tide information was collected at Sheshan station and obtained from the tide tables published by the National Marine Data and Information Service (http://www.nmdis.gov.cn). In ‘Water level.xlsx’, the columns include the month of data collection and the monthly highest water level. This data produce ‘Monthly highest water level.tif’.

**Field investigation - Monthly temperature**

* *Data*

‘Temperature.xlsx’

* *Figures*

‘Monthly temperature.tif’

* *Description*

To verify whether changing physical factors relate secondary seed dispersal to the moment of observed rapid seedling colonization, the monthly average temperature was determined since it is also considered the key physical factor affecting seed germination and establishment. Temperature data was collected from the meteorological observatory at the Chongming Dongtan Nature Reserve and provided by the local management office. In ‘Temperature.xlsx’, the columns include: the month of data collection, the monthly average temperature, the monthly average maximum temperature, and the monthly average minimum temperature. This data produce ‘Monthly temperature.tif’.