

A long-term perspective on barrier-marsh interactions

Mark Schuerch

Mark Schuerch, School of Geography, University of Lincoln, mschuerch@lincoln.ac.uk

Project aims

The main aim of this project was to establish a long-term monitoring platform to (i) observe the vertical marsh elevation in the youngest part of the seaward-expanding barrier marsh system at the Nature Reserve Gibraltar Point (Lincolnshire) and (ii) analyse the barrier-marsh interactions in the system. The data collected within this project will feed into the growing network of marsh elevation data, as collected around the world (Webb et al., 2003). Characterized as a back-barrier marsh, located behind a dynamics sand barrier, this young saltmarsh is expected to interact with its protecting sand barrier (Schuerch et al., 2018), a process that is rarely investigated.

Methodology

The methodological approach adopted during this project is a combination of a permanently installed Rod Surface Elevation Table - Marker Horizon (RSET-MH) (Cahoon et al., 2002; Fig. 1) and a series of drone surveys conducted in the study area. The RSET installation has been installed on 27/03/2019 in the interior of the saltmarsh, located behind an overwash fan (in upper left of Fig. 1a and a tidal creek (in lower of Fig. 1a). The installed RSET consists of a 5-metre deep metal rod driven into the saltmarsh until reaching the uncompactable base layer. Four marker horizons, consisting of a 1 cm layer of feldspar powder, were distributed within 2 m around the RSET (Fig. 1b). The marker horizons were installed on 24/01/2020 (10 months after the RSETs). Using a horizontal bar (with glassfibre pins) attached to the deep rod salt marsh elevation change is measured over time (Fig. 1c).



Figure 1: Location (a) and setup (b) of the RSET-MH installation on the "New Saltmarsh" in the Gibraltar Point National Nature Reserve, and the RSET measurement setup (c).

Main findings

Three sets RSET measurements revealed an increase of the surface elevation of the young saltmarsh surface, with average rates of 1.18 cm yr⁻¹ (Fig. 2). However, early measurements are likely affected by the recovery of the soil from the compaction during the RSET installation (i.e. trampling). This has likely caused the observed decline in the rate of surface elevation change from 2.45 cm yr⁻¹ (April-October 2019) to 0.71 cm yr⁻¹ (October 2019-January 2020). This recent rate indicate a sediment rate comparable to other young saltmarshes (Spencer et al., 2012) Future measurements are not expected to be affected by

Three sets of RSET-measurements were conducted on 30/04/2019 (ca. one month after the installation), 17/10/2019 and 24/01/2020, but due to the delayed MH-installation, no MH measurements could be made. Following the end of the project, measurements will be continued ca. every six months to build a long-term dataset on marsh elevation, sediment accretion and shallow subsidence (Cahoon et al., 2002).

Three drone surveys (using a *Matrice 200*) were conducted on 27/03/2019, 17/10/2019 and 24/01/2020, and the images are being converted into spatial maps saltmarsh/sand/creek patterns to be evaluated in conjunction with the RSET-MH data and sediment samples from the saltmarsh layer accumulating on top of the marker horizons.

this recovery, hence time series of seasonal/annual elevation changes can be derived.

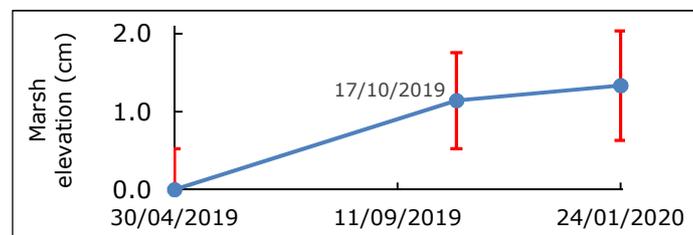


Figure 2: RSET measurements translated into average plot elevations, with error bars indicating the standard deviation within the plot.

Summary (for social media)

The first RSET-MH installation has been installed in the New Saltmarsh at Gibraltar Point (Lincolnshire), allowing long-term monitoring marsh elevations. Preliminary data indicate a healthy growth.