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Supplement of

The dynamics of marsh-channel slump blocks: an observational study using repeated drone imagery

Zhicheng Yang et al.

Correspondence to: Zhicheng Yang (yang-thinkmore@outlook.com)

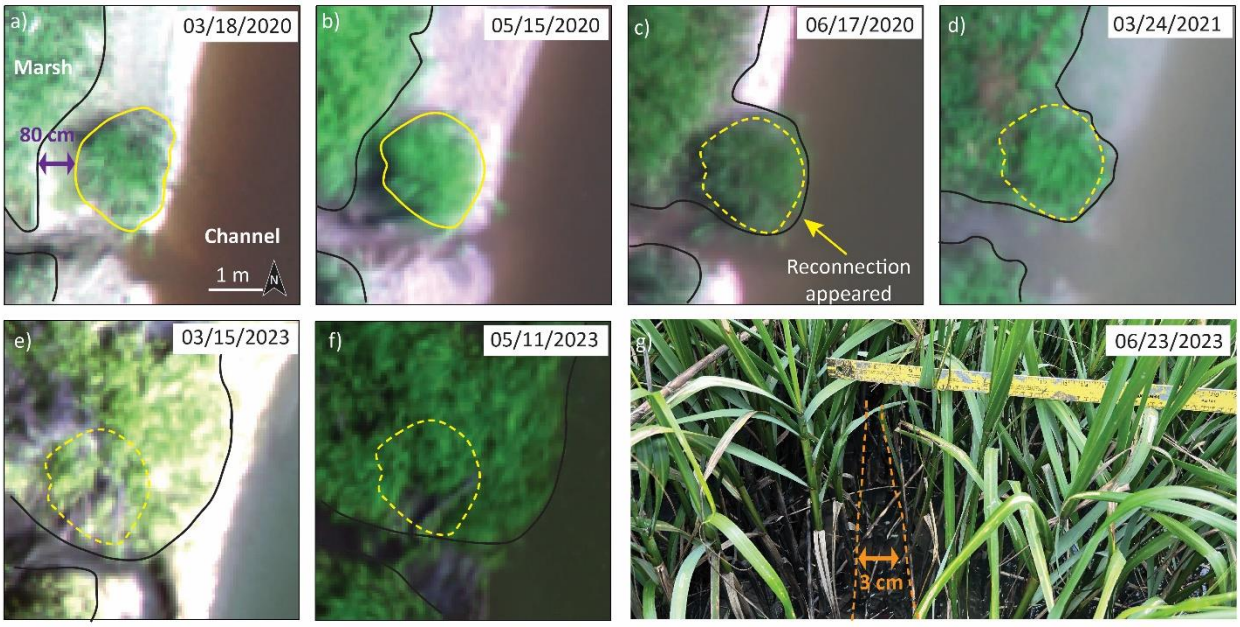

Fig. S1. The extended tracking of the reconnected block (See Figs. 2i-l). (a-d) are the same as Figs. 2i-l, showing reconnection of a slump block through 03/24/2021, with the intact marsh boundary shown as a black line and the yellow line indicating the slump block. The initial width of the gap between the block and the marsh is indicated in panel a. The dashed yellow line represents the boundaries of the location of the block on 05/2020. (e-f) are additional observations of this block in March and May 2023. (g) is a photo taken in the field at the site. The area between the orange dashed lines represents the possible area remaining from the initial gap between the block and the main marsh platform seen in panel a. Other than this, we did not observe any obvious space between vegetation patches in the surrounding areas

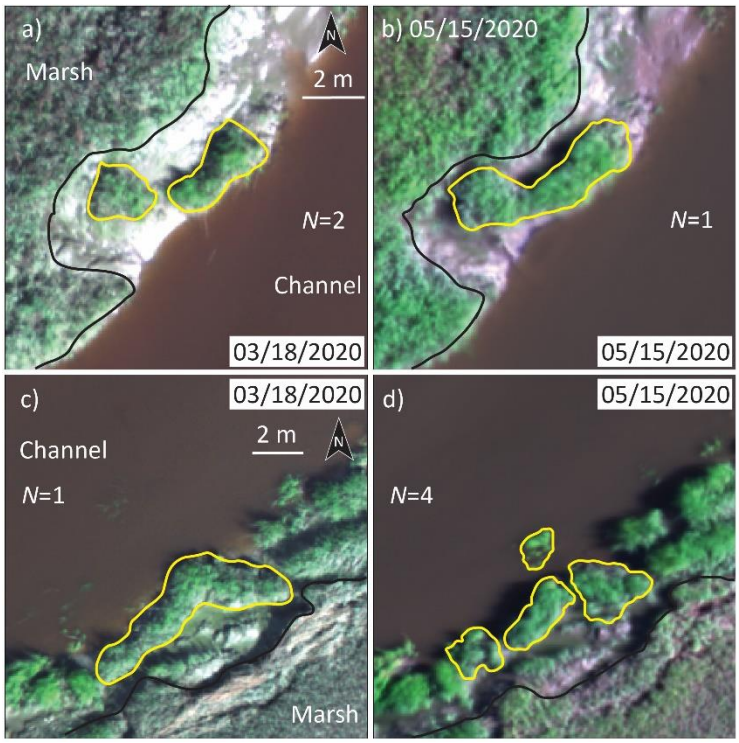

Fig. S2. Examples of block reconnection (a-b) and splitting (c-d). The number of blocks appearing in each panel is represented by *N*. The yellow lines in each panel represent the boundary of slump blocks, and the black line in each panel represents intact marsh boundaries. The 2 blocks in panel a are merged in panel b, whereas the block in panel c has split into 4 components in panel d.

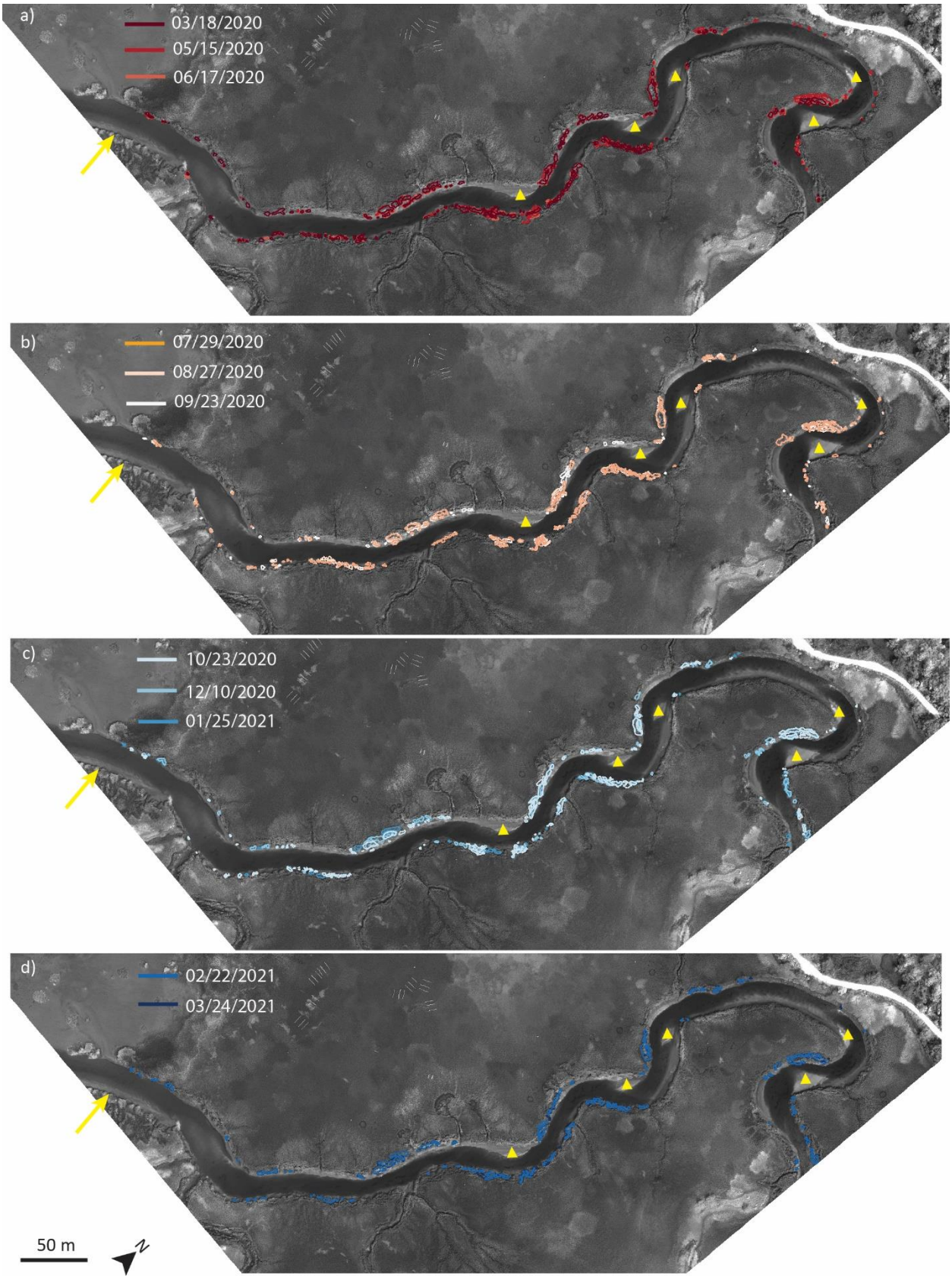
a)
03/18/2020
05/15/2020
06/17/2020
b)
07/29/2020
08/27/2020
09/23/2020
c)
10/23/2020
12/10/2020
01/25/2021
d)
02/22/2021
03/24/2021
50 m

Fig. S3. Identified slump blocks in different months. The base map for each panel is the UAV image acquired in July 2020. The yellow triangles and arrows indicate the positions of point bars and banks with wide distribution of oysters, respectively.

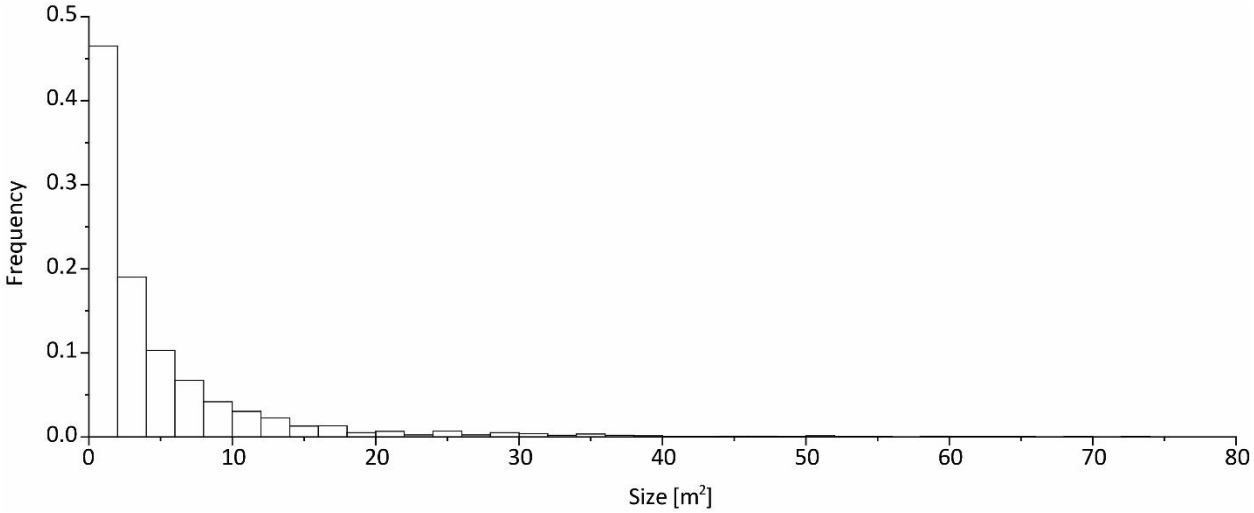

Fig. S4. The size frequency distribution of all blocks identified in the study.

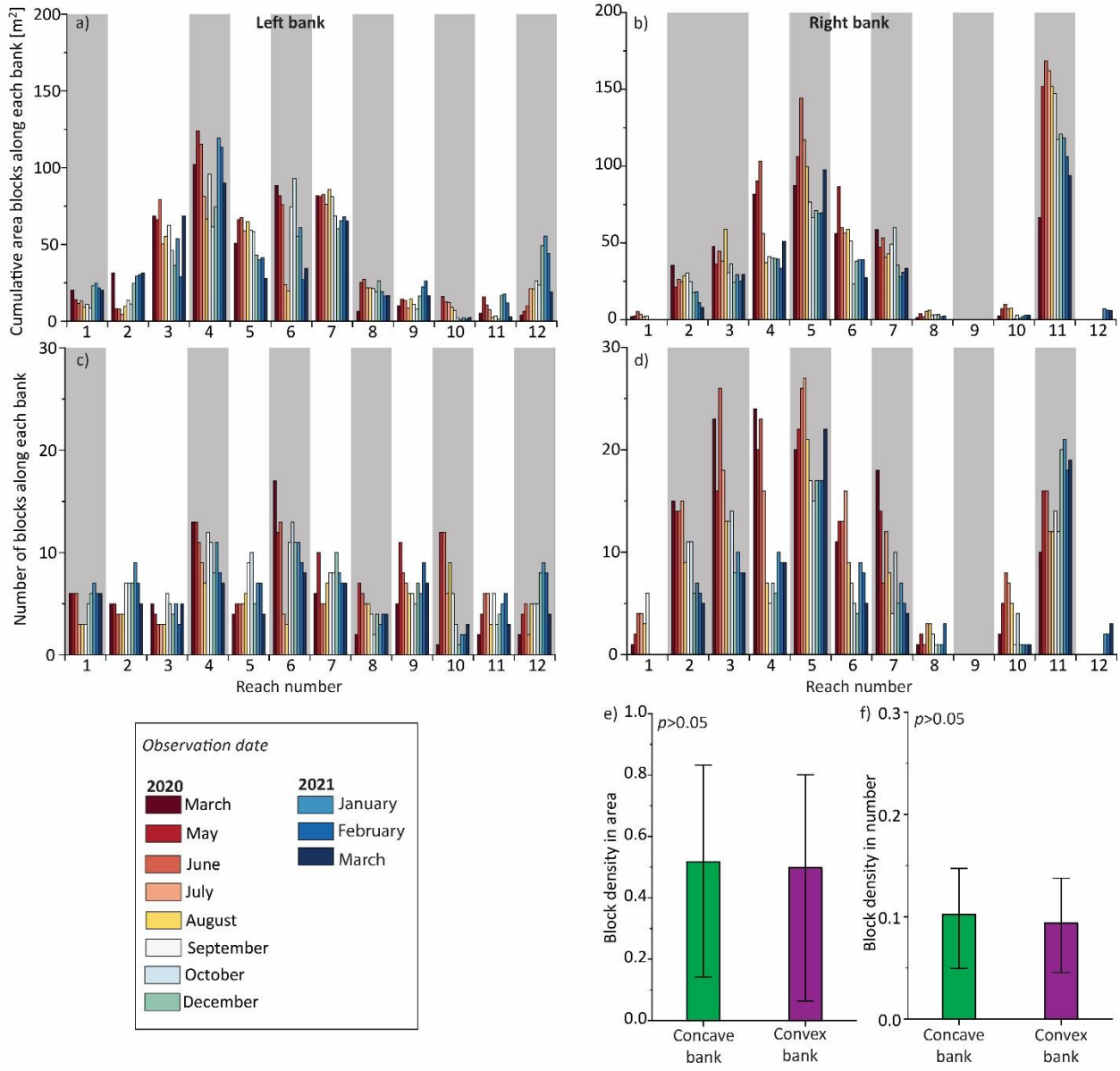

Fig. S5. The area (a, b) and number (c, d) of blocks observed within each reach along the left and right banks of Dean Creek over the course of the study (see Figure 1 for reach locations). We designated the left and right banks based on the flooding direction, so that if one were standing at the mouth then the left bank of each reach would be on the left. The gray and white backgrounds represent concave and convex banks, respectively. Plots (e-f) are comparisons of block density in terms of area and number observed per meter of shoreline within each reach along banks with contrasting shapes. The data are displayed as mean ± standard deviation and the p-value in each panel is the result of a one-way ANOVA test.

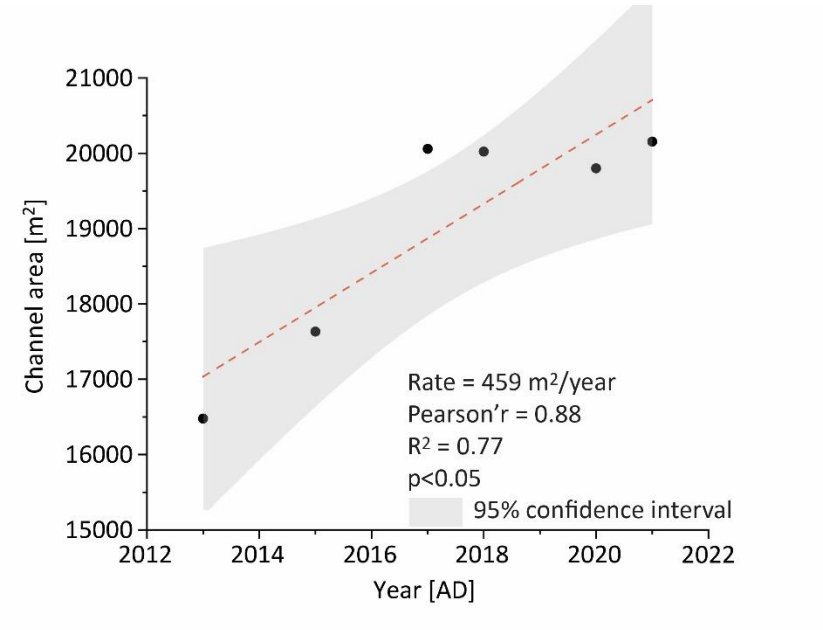

Fig. S6. Long-term change in channel area of the Dean Creek study site. Estimates of channel area between 2013 and 2018 were determined by digitization of marsh-channel boundary based on aircraft loaded aerial photo collected on 12/13/2013, 07/09/2015, 11/27/2017 and 10/31/2018, which can be found GCE-LTER archive data (gce-lter.marsci.uga.edu). Channel areas in 2020 and 2021 were determined by channel digitization carried out on drone images collected on 03/15/2020 and 03/24/2021 as part of this study. The rate of changes in channel area was determined by linear regression. The shaded area represents the 95% confidence interval. The p-value in the figure is the result of a one-way ANOVA test.

Fig. S7. An example of field observed cracks in the marsh platform that may be associated with slump block formation.

Table S1. The acquisition times and associated tidal elevations of drone imagery used in this study. The tidal elevation was measured by the tidal gauge in Fort Pulaski station with reference to the North American Vertical Datum of 1988 (NAVD 88), which is about 0.071 m higher than the mean sea level (MSL) (https://tidesandcurrents.noaa.gov/). Time = Eastern Standard Time (EST) of the United States. NAVD 88 = North American Vertical Datum of 1988; MSL = mean sea level.

Image date [MM/DD/YYYY]	Time [EST]	Tidal elevation NAVD 88 [m]	Tidal elevation MSL [m]
3/18/2020	14:06	-0.67	-0.60
5/15/2020	13:40	-0.85	-0.78
6/17/2020	14:20	-0.4	-0.33
7/29/2020	14:42	-1.2	-1.13
8/27/2020	13:55	-1.03	-0.96
9/23/2020	13:30	-0.30	-0.23
10/23/2020	14:00	-0.42	-0.35
12/10/2020	14:30	-0.98	-0.91
1/25/2021	14:05	-0.05	0.02
2/22/2021	14:50	-0.51	-0.44
3/24/2021	14:18	-0.46	-0.39

Table S2. The estimated accuracy of digitized slump block area. Block numbers #1 to #6, which varied in size, were each digitized 10 times. $\bar{\alpha}$ and σ_α are the average and standard deviation values of the 10 values; *CV* is the coefficient of variation (estimated as $\sigma_\alpha/\bar{\alpha}$ x 100).

Block Number	**Size of slump blocks α [m^2]**										$\bar{\alpha}$	σ_α	*CV*
	1	2	3	4	5	6	7	8	9	10			
#1	3.58	4.55	3.94	4.22	3.91	3.50	3.89	4.02	4.01	4.45	4.01	0.33	8.3%
#2	2.44	2.19	1.89	1.89	1.87	1.79	1.79	2.02	2.08	2.04	2.00	0.19	9.6%
#3	0.62	0.71	0.78	0.74	0.73	0.72	0.78	0.78	0.73	0.83	0.74	0.05	7.4%
#4	2.35	2.45	2.43	2.56	2.62	2.32	2.42	2.56	2.37	2.48	2.46	0.09	3.8%
#5	54.60	59.05	57.69	58.29	57.33	56.83	57.93	56.54	60.12	58.56	57.69	1.44	2.5%
#6	27.61	27.57	26.34	27.07	27.04	25.61	25.61	27.94	27.07	27.71	26.96	0.80	3.0%
												Average	4.9%