SURFACE WATER LEVEL VARIATIONS INSIDE EVERGLADES NATIONAL PARK AND EFFECTS ON CONDUCTIVITY AND SALINITY ALONG THE MANGROVE ECOTONE

Xavier Zapata and Rene' Price. Department of Earth Sciences and SERC, Florida International University, Florida, FL 33199

INTRODUCTION

Water is an essential resource for life in Everglades National Park (ENP). Water in the Everglades drives physical, chemical and biological processes. Hydrological conditions that are so important in the park are sensitive to natural and anthropogenic changes. This is especially true along the mangrove ecotone area inside ENP. This area is along the interface where fresh water and saline water mix and many sensitive living organisms are adapted to these conditions. Therefore, any change in fresh water resources availability inside ENP can alter multiple variables in this ecotone. For instance, how salinity concentrations and conductivity in surface water along the mangrove ecotone have changed as a consequence to different extreme surface water levels inside the park?

OBJECTIVES

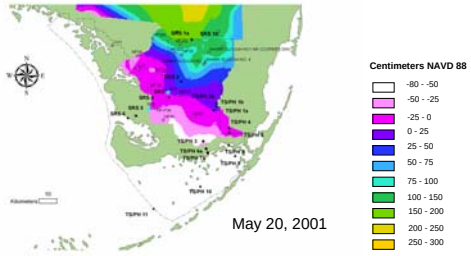
The objectives of this study are twofold: first, to document the spatial and temporal surface water level changes inside ENP; and second, to analyze how these changes affect conductivity and salinity along the mangrove ecotone .

METHODS

Available water level, conductivity and salinity data from LTER and USGS have been gathered. Data from the Depth Estimation Network (EDEN), a USGS project, provided water level inside the Park. This database comprises 2905 raster images with daily water level measurements from 2000 until 2007. These images provide a good overview of spatial and temporal water levels variation inside the ENP. In addition to stage data, conductivity and salinity records from some research stations located in the mangrove ecotone where related to surface water levels. Finally the correlation between surface water, and conductivity or salinity was analyzed

RESULTS AND DISCUSSION

As an example of spatial surface water variability inside ENP, figure 1 presents two days of high and lower water levels since January 2000. The maps present elevations in cm related to the NAVD88. May 2001 was a dry month, and the map depicts one day of lower water levels. On May 10, 2001 surface water levels ranged from -80 cm in the southeast to 150 cm along the north boundary. Conversely, higher water levels occurred during October 2003 and levels inside ENP ranged from 0 cm in the south east to 300 cm in the north.



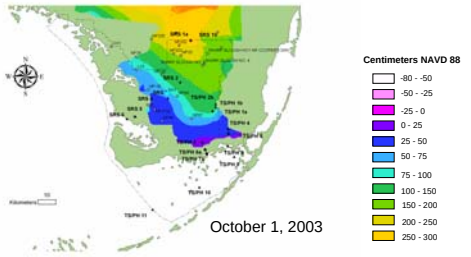


Figure 1. Water levels inside the Everglades National Park
Source: EDEN project

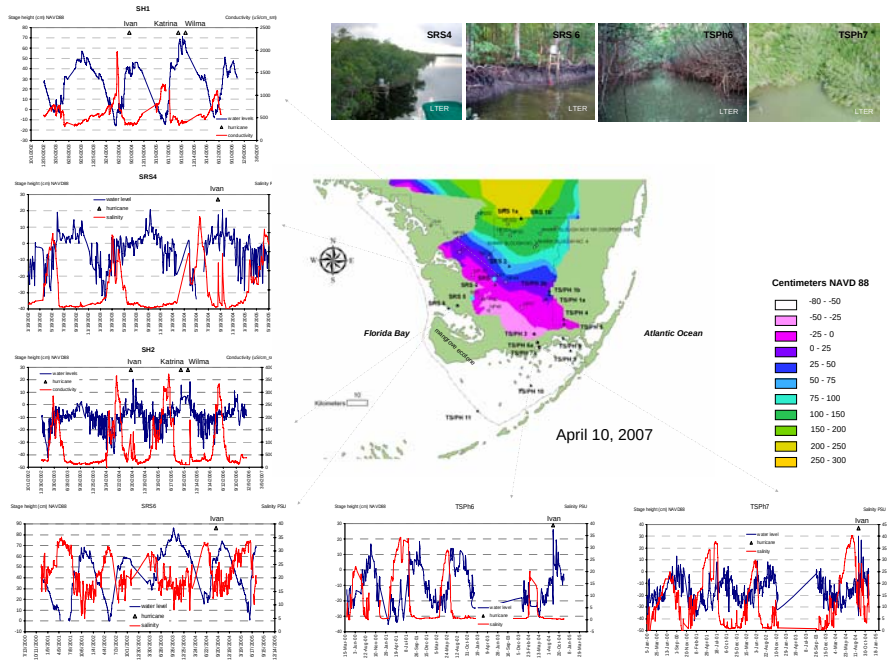


Figure 2. Everglades National Park and LTER research stations

The stations selected for analysis along Shark and Taylor Sloughs were SH1, SH2, SRS 4, SRS6, TSPh6 and TSPh7. From this group of stations, some were located in the mangrove ecotone and some stations were farther inland (Figure 2). As a final analysis conductivity and salinity values were plotted with water levels. Although 2007 was a dry year, water levels during this year do not correspond to the lowest surface water levels recorded since 2000 (Figure 2). Instead, the lowest water levels recorded at the selected sites was in 2001.

EDEN' maps as well as stage height data from the LTER project show a dynamic spatial and temporal variability of surface water levels inside the park. In a manner of few days the variation in some areas can be larger than 50 cm as can be seen in Figure 1 and Figure 2. In addition, the occurrence of hurricanes Ivan (Sep 4, 2004), Katrina (Aug 23, 2005), and Wilma (Oct 15, 2005) correspond very well to higher water level peaks recorded at the stations.

On the other hand, conductivity and salinity values shown in Figure 2 have to be analyzed in two groups. Stations located along the coastal border (SRS6, TSPh6, TSPh7) present a different conductivity and salinity variation than stations located farther inland (SH2, SRS4). Stations located along or close to the coastal border show salinity peaks that precede the surface water level peaks. In contrast stations located farther inland in Taylor and Shark sloughs present higher salinity values during low surface water levels and lower salinity and conductivity during higher surface water levels. In brief, salinity and conductivity values of stations located farther inland are controlled by surface water level variations.

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