WORKSHOP ON BAHAMIAN CARBONATE ROCKS AND ENVIRONMENTS: IMPLICATIONS FOR QUATERNARY SEA-LEVEL CHANGE

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Workshop on Bahamian Carbonate Rocks and Environments: Implications for Quaternary Sea-level Change

Convened by

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A field-oriented workshop on Bahamian Carbonate Rocks and Environments was held at the Caribbean Marine Research Center (CMRC) on Lee Stocking Island, Exuma Cays, Bahamas, on January 7-12, 1992. The nineteen participants in the workshop, representing nine of the consortium's institutions, met in West Palm Beach and departed for the Bahamas early on the morning of the 7th by charter aircraft. The workshop officially began with this overflight of the Great Bahama Bank, the Tongue of the Ocean, Exuma Bank, and the Exuma Cays chain to Lee Stocking Island (LSI) which lies at the south end of this small island chain, just northeast of Great Exuma Island. The weather was most cooperative throughout the time of the workshop, and the overflight provided spectacular panoramic views as an introduction to the diverse environments of this all-carbonates setting.

The Bahama platform complex is one of the few, major areas of active carbonate sedimentation on the earth's surface. As such, the Bahamas long has served as a model comparative area for geologists studying ancient limestones. In addition, the tectonically stable platform provides one of the world's best sites for the study of Cenozoic sea-level change.

The purpose of this workshop was the investigation and interpretation of the diverse modern, Holocene, and Pleistocene carbonate environments and rocks on LSI and in the nearby vicinity (see Fig. 1). Particular emphasis was placed on the implications of rock-record field relationships for interpreting late Pleistocene/Holocene sea-level change history. The modern environments of the islands and their surrounding shallow waters present analogues for better interpretation of the rock record. Field trips were about evenly divided between investigations of the rock record and examination of the modern settings, commonly by snorkeling. Evening lecture-discussions also were led by the instructors to help to put the field observations into a broader Bahamian and sea-level change context.

After arriving on LSI, quickly settling in to our quarters at CMRC, and having lunch, the group set out on its first field excursion, to the beaches on the windward side of LSI. Here modern sand beaches are well-developed and zoned and modern beachrock is present. Bill Fox, Brian White, and Al Curran were able to point out all of the typical Bahamian beach features, including those most likely to be preserved in the rock record. Some of these windward beaches are tied to Pleistocene headlands, and Long Beach backs up against Holocene cliffs, so Al and Brian introduced the group to the most typical Bahamian rock facies and began to talk about the significance of the various facies and their vertical sequence for the interpretation of sea-level history. After completion of the long beach hike, most in the group took the remaining hour of daylight to brush-up on their snorkeling skills by swimming from the CMRC dock area. The first evening's lecture was an introductory, dual presentation by Al and Brian on the geology of the Bahamas. This was followed by an excellent overview lecture by Bill on the mechanisms of sea-level change, with emphasis on the Pleistocene and Holocene record. Lively questioning followed, but, as this had been a long day of travel, hiking, swimming, and learning, the discussion did not go late into the night.

Following breakfast on day two, the group went on its first major snorkeling expedition. LSI is best known for Bob Dill's mid-1980's discovery of the occurrence of giant, subtidal stromatolites growing in 20 to 30 feet of water in the high velocity current-dominated channel adjacent to LSI (Fig. 1), and this was the site of our dive. We started with a most memorable and successful boat tow over the stromatolite fields and then did free snorkeling over the stromatolites at slack high water. The late morning was spent on the south end of Norman's Pond Cay investigating the small fossil coral patch reefs and associated facies that occur there.

In the afternoon, the group again went south on LSI, this time so that Brian and Al could show the dominant features of the Holocene eolianites that cap much of the island and explain some of their ideas about how these deposits formed. That evening Brian presented a background lecture on carbonate cements and cements stratigraphy, and Al talked about fossil coral reefs and sea-level change in the Bahamas.

In recent years Bob Dill has become very interested in computer mapping using the Macintosh and the Magellan geographic locator system, and he is actively improving the maps of the LSI area. We started the

third day of the workshop with a field demonstration of the Magellan system. A subgroup of students then took over the Magellan and used it to take data points during all of the remaining excursions. After all had seen the Magellan in action, our next stop was the CMRC dock area where we boarded the R/V Exuma Hunter for a snorkel dive on Rainbow Reef, a beautiful example of an Atlantic-Caribbean patch reef. In November, 1990, the large corals of this reef were largely bleached, but most now have returned to their normal state. This is the site of a long-term CMRC study of the environmental factors affecting the health of Bahamian patch reefs. In the afternoon, we again set out on the Exuma Hunter for an excursion to Low Cay. On this small island, a variety of Pleistocene rock facies are well exposed, and several hours were spent examining them. In the evening, Bob talked about the modern giant, subtidal stromatolites and their significance. Brian then followed with slides from his work on Precambrian stromatolites and lively commentary on the contrasts and similarities between the ancient and modern columnar stromatolites. Everyone got involved, and the discussion was vigorous, long, and most informative and entertaining.

On the morning of day four, the group was out early, this time to investigate the interior lagoonal area of Norman's Pond Cay. This was a wading excursion, first through the inlet leading into the lagoon, and then along the margins of the lagoon itself. The sediment-binding action of red mangroves clearly is exhibited here, as is the sharp zonation of plants and animals responding to the controls of intertidal exposure, salinity, and substrate variation. Later in the morning, given the success of the initial boat tow experience, it was decided to do another tow, this time across the axis of the LSI channel, from Norman's Pond Cay toward the CMRC dock area (Fig. 1). This tow also proved most informative, as it clearly illustrated the diversity of bottom types that occur in the channel area. In the afternoon, the group went to Leaf Cay, another of the many small, uninhabited islands of the area. Here, with the guidance of Brian and Bill, we split up into small exploration and study groups so that all would have the chance to test what had been learned during earlier excursions by attempting to work out the facies patterns of the well exposed rocks of this cay. As was now usual, all got involved, and this proved to be a useful experience for summarizing much of what had been learned from previous examinations of the rock record. That evening, Al gave the final lectures, on the use of trace fossils as sea-level indicators and on the Curran/Dill geologic investigations of the deep submarine cave on Norman's Pond Cay.

The weather continued to hold clear for the final day of the workshop, and it was decided to go offshore aboard the Exuma Hunter to dive on a newly discovered area of stromatolites where long, linear forms occur. The offshore conditions were a bit choppy, causing some in the group to wish for an early landing. Fortunately, Bob was there with a small boat to answer their prayers and run them to an adjacent cay for recovery. The remainder of the group had an excellent dive on this most interesting site. We returned to the CMRC dock in mid afternoon, just in time for the long awaited basketball challenge match with the CMRC staff. Unfortunately, the Keck team, led by its center, Eric "dog-meat barbeque" Leonard, never quite figured out how to handle the trades winds twist that seemed to affect all of our shots. After months of practice, the CMRCers had that down pat, and they inflicted a resounding defeat upon the visitors from the mainland. Maybe we'll be back, better prepared, for a rematch at some future date! There was no formal program for the final evening, although much further discussion about all the we had seen and been doing continued. There was, however, one particular highlight to the evening when Mike Rahnis gave us all a good laugh with his most forgetable and very short Elvis imitation routine.

The planes arrived right on time on Sunday morning, the weather remained clear, and we had another excellent overflight, this time back to West Palm Beach. All in the group seemed to have learned much from the 5-day experience, and none were much worse for wear. Another most successful Keck event thus was completed.

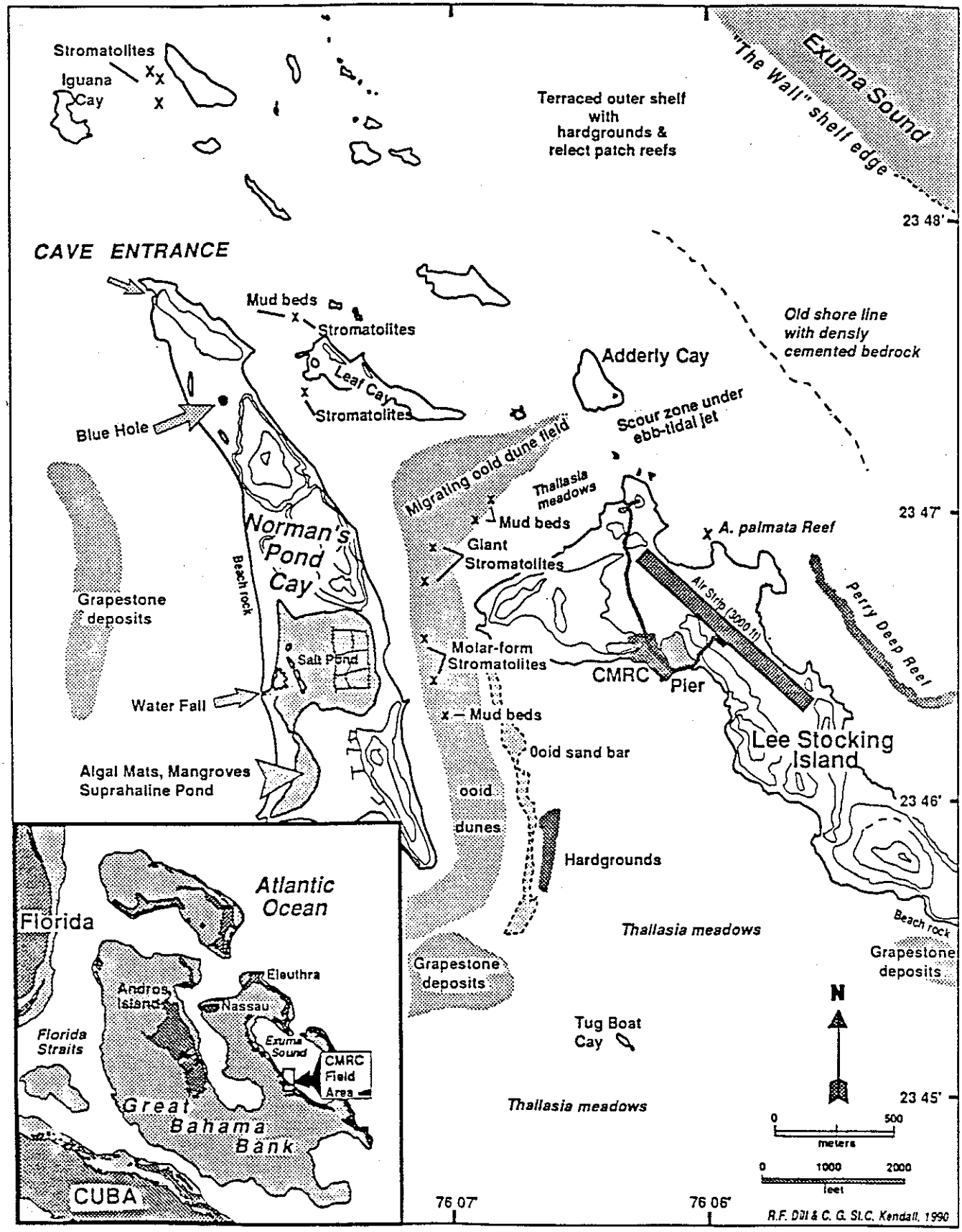

Fig. 1. - Inset index map to the Bahama Islands and the location of Lee Stocking Island. Larger map shows most of Lee Stocking Island and the adjacent areas visited during the workshop.