Everglades Geological Society

BULLETIN

Volume 16, Number 2 January 2010

Meeting This Month: January 19, 2010
6:00 P.M. at the Edison, Tower Room
(Social hour starts at 5:00)

Speaker: Kevin J. Cunningham
USGS – Florida Integrated Science Center

Topic: Discovery of Upper Pleistocene Reefal Sponge Biostromes within Relict Tidal Channels of the Miami Limestone, southeastern Florida

INSIDE THIS ISSUE

Everglades Geological Society
P.O. Box 61684
Fort Myers, FL 33906

The Everglades Geological Society is an organization which seeks to promote interest in and understanding of Geology and the related Earth Sciences, and to provide a common organization for those individuals interested in geology and the related earth sciences. The Bulletin is a publication of the Everglades Geological Society, Inc.

EGS MEETING THIS MONTH
TUESDAY January 19, 2010

The Edison
3583 McGregor Boulevard
Fort Myers, Florida

Members and prospective members come join us!

www.evergladesgeologicalsociety.org

President's Address
Andrew McThenia

In SW Florida we have very few occasions to consider ice. Unless we happen to need a few cubes for our drink or a bag for our cooler, we don't deal with the stuff. Granted, we might think about our particular rock of the day in terms of the sea level stand during its deposition; but in the course of any normal day, we probably don't consider the part of the hydrosphere that is ice. I might use the term cryosphere but I don't want to get too technical; besides, what goes around comes around, and it's the same molecule.

I want to discuss a particular aspect of global warming that has begun to increasingly manifest itself and perhaps become very relevant to our futures in SW Florida. Accelerated melting of sea ice, ice shelves, permafrost, and glaciers has caught the attention of many scientists and their observations indicate an unprecedented rapid decline of ice occurrence and duration on earth.

In August of 2000, a Russian icebreaker called *Yamal*, which had been converted into a cruise ship for polar tourists, arrived at the North Pole to find open water. This is the first known instance of an ice free North Pole. Since humans have been able to map the extent of the Polar Ice Cap, its area has declined by more than 20%. This figure underestimates the actual loss of ice; as it does not speak to thickness.

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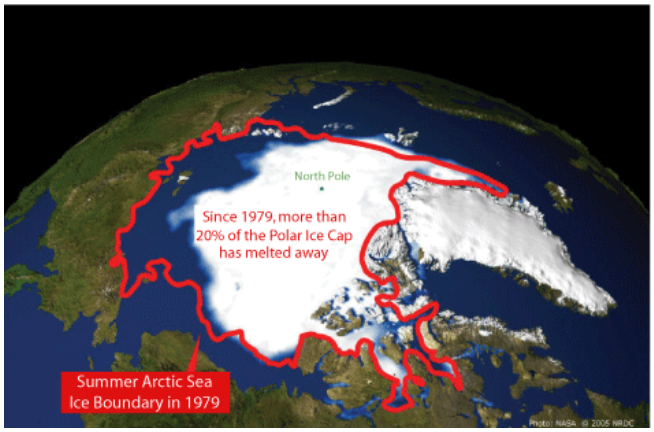
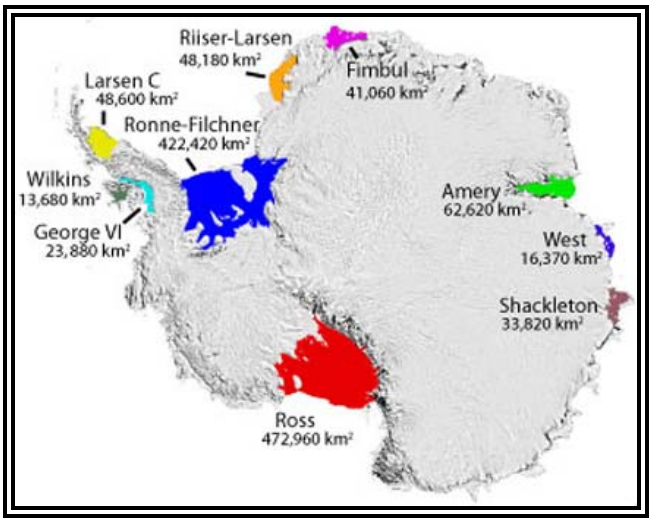


In March of 2000, a slab of Antarctic Ice, designated by some geeks at the National Ice Center as B-15, separated from the Ross Ice Shelf and had an estimated area of 4,250 square miles. This event, although it was the largest documented calving of Antarctic ice, is apparently not uncommon and such calving is a normal occurrence as a part of a cyclical process. However; Antarctic ice scientists have noted a dramatic and unprecedented decrease in the area of relatively small ice shelves fringing the Antarctic Peninsula over several decades, and the disintegration of the northern-most section of the Larsen Ice Shelf in January 1995. These changes have accompanied a warming of several degrees observed since the 1940s in the Peninsula region, with mean summer temperatures approaching 0°C, and significant melt water production on the surface of many of the ice shelves. Re-freezing in crevasses of melt-water runoff has progressively weakened the structure of those shelves. Additionally, NASA has found clear evidence that extensive areas of snow melted in west Antarctica in January 2005 in response to warm temperatures. This was the first widespread Antarctic melting ever detected with NASA's QuikScat satellite and the most significant melt observed using satellites during the past three decades. The affected regions encompass a combined area as big as California.



In Greenland, NASA scientists have found that the ice sheet is shrinking dramatically at the edges and growing at its higher interior elevations, such that there is a net loss of ice that is far greater than it was in the last decade. These losses are a result of increased melting, and faster flow at the edges as the floating ice that surrounds parts of Greenland and buttresses some of the outlet glaciers melts. The albedo, or ratio of reflected light to incident light, of ice is much higher than sea water or land; simply put, a lower albedo equates to increased solar energy retained on our planet.

Not only is ice melting at ever faster rates at the poles, permafrost is also losing its permanency. Areas of permafrost occur over 20% of the Earth's land surface and are experiencing unprecedented degradation via accelerated melting from the top down. Aside from the potential negative impacts on such things as the Alaska Pipeline and other infrastructure built atop permafrost, a major natural source of atmospheric methane is released from melting permafrost. Atmospheric methane concentrations are now at 2.7 times preindustrial levels. Methane is a potent greenhouse gas and will feed a positive feedback loop as permafrost melting further contributes to global warming.

The natural ice that is nearest to us is in the form of mountain glaciers. In almost every case studied, mountain glaciers worldwide are in rapid decline. The cluster of ice

that I once knew was located in Glacier National Park. If the current rate of melting in that park continues, a USGS source working in the park estimates that the glaciers will be gone by 2020.

A 2009 prediction of a sea level rise of 1 meter in the next 100 years incorporated the recent acceleration in global ice melting, but failed to include ice sheet collapse, runaway glaciers, or methane from melted permafrost in the model. I'm glad such things are still too mysterious for equations. The figure (FGS RI 103) showing sea level within the past 7,000 years indicates that during the most recent high stand, sea level was between 1 to 3 meters higher than current MSL around 2,000 years ago. I would venture that the timing of this "recent" high stand corresponds to the construction of the indian mound in Ortona. I suspect that much of the local caprock was deposited during one or another of these recent transgressions and I predict that manmade cement will be part of the inevitable next generation of caprock.

Because we have the I-75 and I-95 escape exits, SW Floridians are not as SOL as the Marshal Islanders; however the loss of dry land will be quite dramatic in our flat landscape. I considered including a figure of our future coastline at 1 meter higher sea level, but I ran out of room and I'm sure the disaster folks have made one available online. Sea level rise is a classic slow moving train wreck and I plan to watch our local presentation of natural disaster theatre from my box seat in the balcony; I invite all of you to join me.

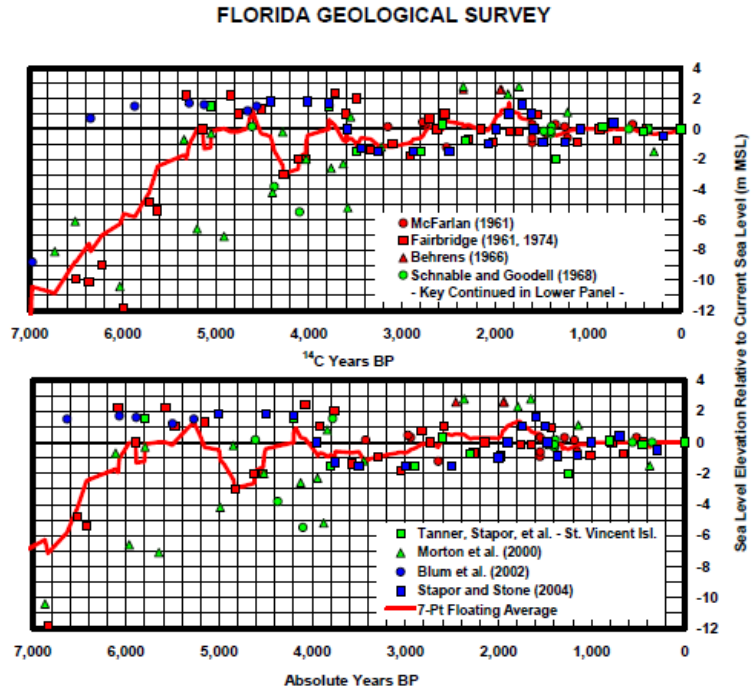
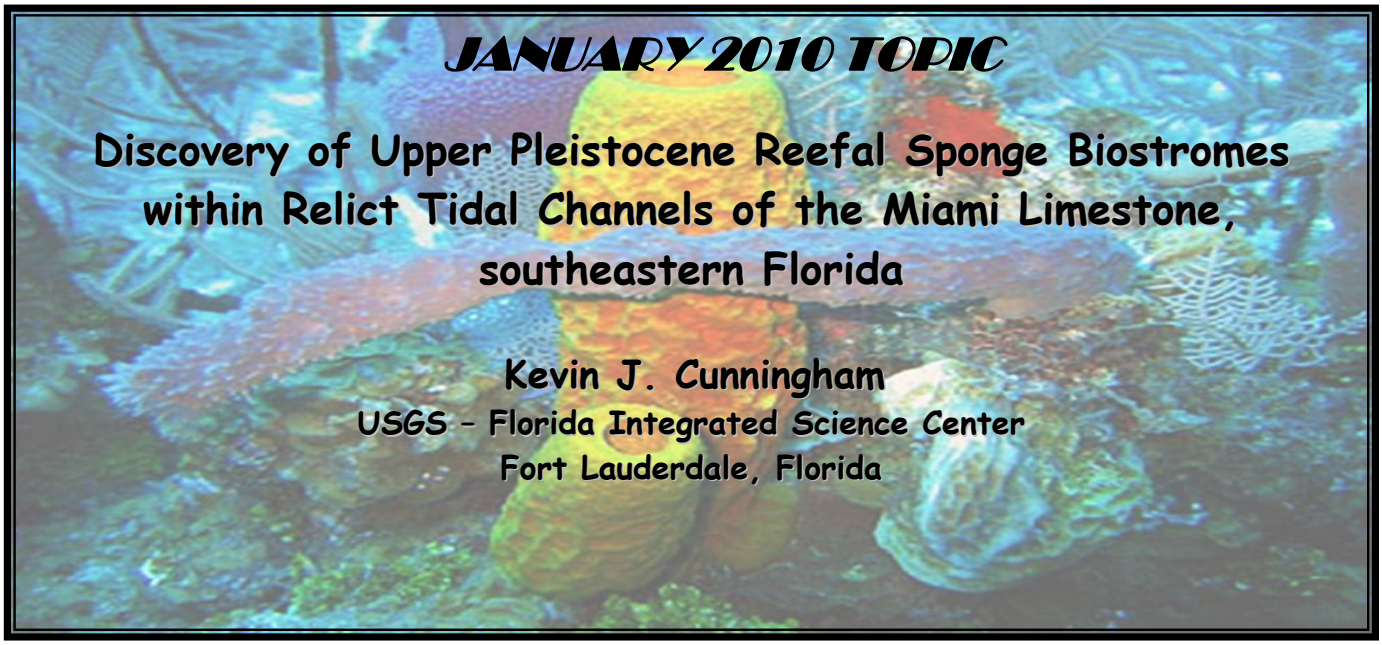


Figure 7. Gulf of Mexico younger data set B for dated sample sets collected onshore from the present shoreline. 7-point floating average curves have been fitted to the ^{14}C and absolute age data sets.



JANUARY 2010 TOPIC

Discovery of Upper Pleistocene Reefal Sponge Biostromes within Relict Tidal Channels of the Miami Limestone, southeastern Florida

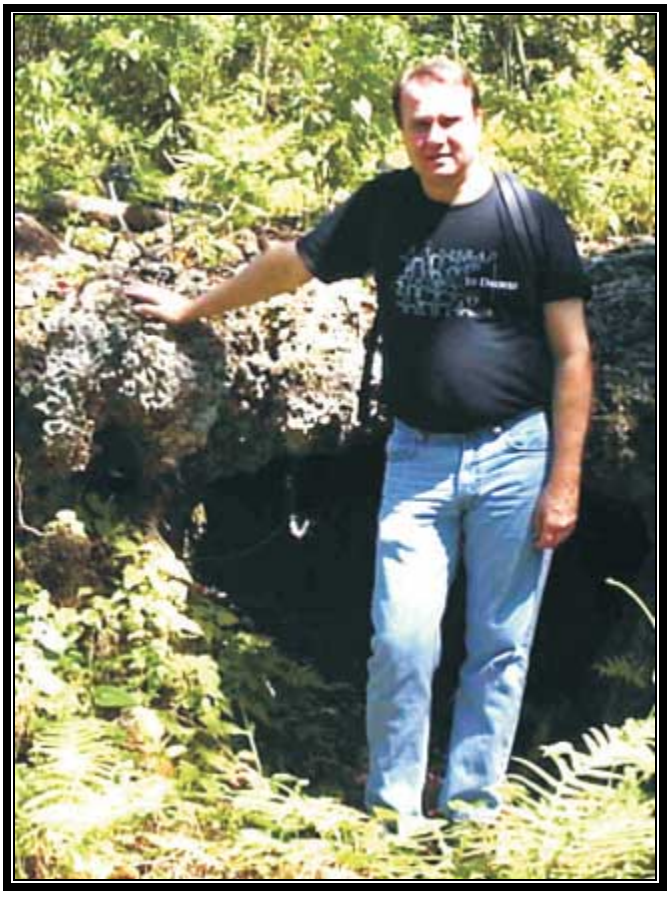
Kevin J. Cunningham
USGS – Florida Integrated Science Center
Fort Lauderdale, Florida

Abstract

Sponges are not a common principal component of Cenozoic reefs and are more typically dominant in deep-water and/or cold-water localities. This talk presents the recent discovery of extensive upper Pleistocene shallow-marine, tropical sponge biostromes from the Miami Limestone of southeastern Florida built by a new ceractinomorph demosponge These upright, barrel- to vase-shaped sponges occur in monospecific aggregations constructed within the tidal channels of an oolitic tidalbar belt similar to modern examples on the Great Bahama Bank. The biostromes appear to have a ribbon-like geometry, with densely spaced sponges populating a paleochannel along a 3.5 km extent in the most lengthy biostrome. These are very large (as high as 2 m and 1.8 m in diameter), particularly well-preserved calcified sponges with walls as hard as concrete. Quartz grains are the most common particles agglutinated in the structure of the sponge walls. Where exposed, sediment fill between the sponges is commonly a highly burrowed or cross-bedded ooid-bearing grainstone and, locally, quartz sand. It is postulated that the dense, localized distribution of these particular sponges was due to a slight edge over competitors for food or energy supply and space in a stressed environment of tidal-influenced salinity and nutrient changes, strong currents, and frequently shifting submarine sand dunes. To our knowledge, this represents the first documentation of sponge biostromes composed of very large upright sponges within high-energy tidal channels between ooid shoals. The remarkably well-preserved accumulations provide an alternative example of sponge reefs for comparative paleoenvironmental studies.

BIOGRAPHY

Kevin J. Cunningham is a research hydrogeologist at the U.S. Geological Survey in Fort Lauderdale, Florida. He joined the USGS in 1997. His current research focus is on the sequence stratigraphy, ichnology, digital borehole imaging, reflection seismic profiling as applied to aquifer characterization of Cenozoic karst carbonate aquifers of southern Florida, and trying to find time for geomodeling using ROXAR RMS. He began his career with the U.S. Geological Survey in 1997. Kevin earned his B.S. at the University of Wisconsin-Oshkosh, M.S. at LSU-Baton Rouge, and Ph.D. at the University of Kansas. He was a post-doctoral research fellow at the Comparative Sedimentology Laboratory, University of Miami from 1994-1996. He is an affiliated faculty at Florida International University. From 1981-1989, Kevin worked for Shell Oil in Houston, where he explored for hydrocarbons in West Texas, the Beaufort Sea, offshore California, and Michigan. Selected bibliography at: *http://sofia.usgs.gov/bibliography/cunningham.html*.



Everglades Geological Society

Meets on the Third Tuesday every other month at The Edison on McGregor Blvd at the Fort Myers Country Club in Fort Myers, Florida. Social hour starts at 5:00 PM. The meeting begins at 6:00 PM. No meetings are held in July or August

EGS MEETING CALENDAR 2010

March 16
May 18
September 21
November 16

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