

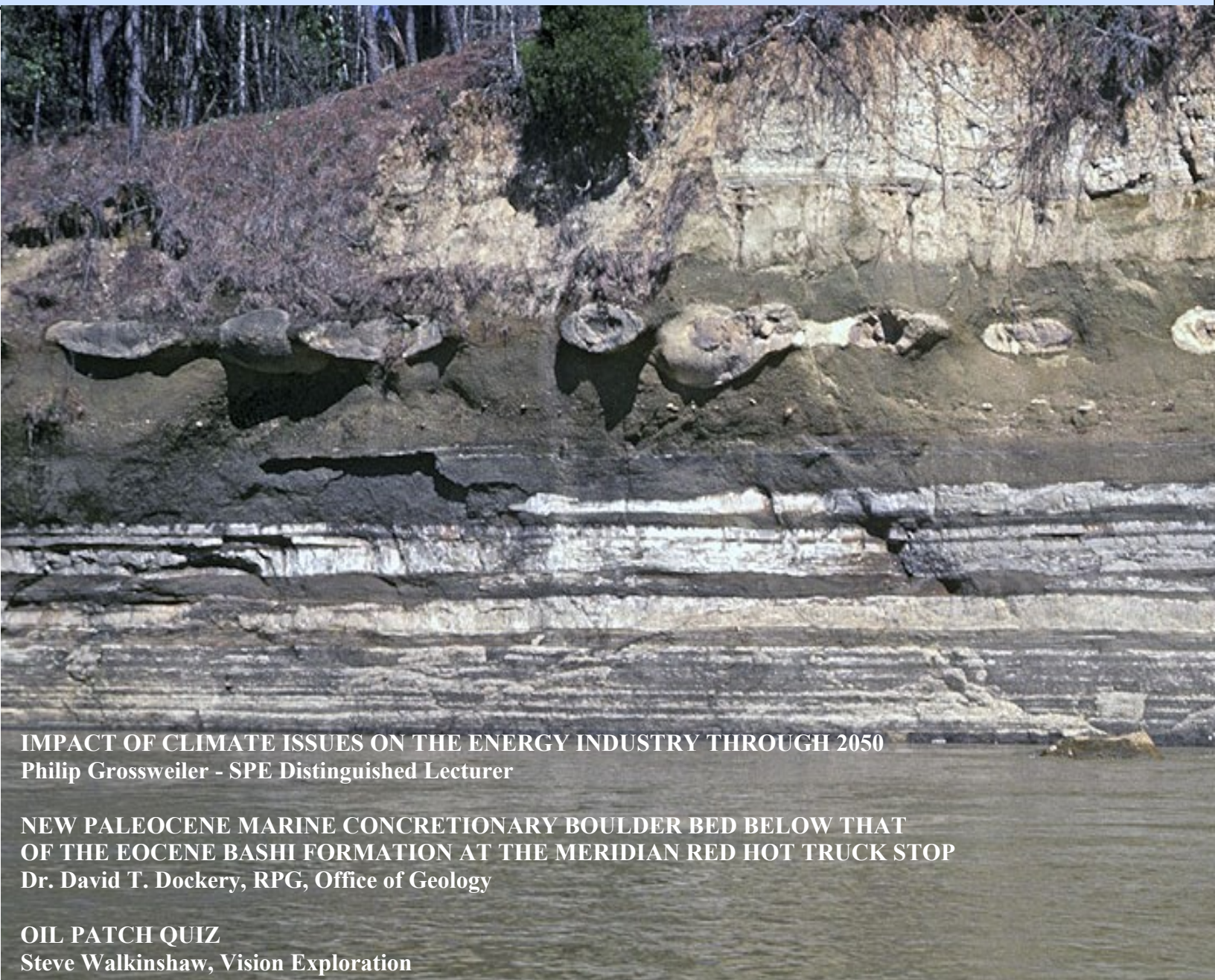
**MISSISSIPPI GEOLOGICAL SOCIETY**

# eBULLETIN

**Volume 70**

**No. 4**

**December 2021**



**IMPACT OF CLIMATE ISSUES ON THE ENERGY INDUSTRY THROUGH 2050**

Philip Grossweiler - SPE Distinguished Lecturer

**NEW PALEOCENE MARINE CONCRETIONARY BOULDER BED BELOW THAT OF THE EOCENE BASHI FORMATION AT THE MERIDIAN RED HOT TRUCK STOP**

Dr. David T. Dockery, RPG, Office of Geology

**OIL PATCH QUIZ**

Steve Walkinshaw, Vision Exploration



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# PRESIDENT'S LETTER

*David Snodgrass, MSOGB*



Merry Christmas and Happy Holidays to all.

The MGS and SPE are planning to resume in person luncheon meetings starting January 2021. The meetings will be, as usual, at 11:30 AM at the River Hills Club. Details will be forthcoming. If members have any requests and/or would like to present please let me know as soon as possible and we can get you scheduled. Also, December 9, 2021, MGS will be cohosting a Christmas cocktail party along with MAPL, SPE, and Oil & Gas Lawyers Association. The party will be held at Anjou Restaurant in Ridgeland beginning at 5:30pm. I think this will be a great event...please join us ! That is all for now. Take care.

David H. Snodgrass

MGS President







**Don't miss this SPE Distinguished Lecturer!**

## **Impact of Climate Issues on Energy Industry Through 2050**

**Philip Grossweiler**

**11:30 AM**

**Wednesday, December 08, 2021**

**Mississippi Section**

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# MGS SCHOLARSHIP AWARDS

Faculty & Students,

This is a new year and the Mississippi Geological Society along with the Boland Scholarship Fund would like to remind you that we want to honor the most outstanding overall students for the 2021-2022 year.

Each year, the Boland Scholarship awards 1 student from each institution a check that rewards students for their hard work and dedication to the Geosciences and their community.

We look forward to a great year and hope to see you at our monthly meetings.

Best Regards,

Matt Caton  
Editor



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# MONTHLY POST

## *Dr. David T. Dockery III RPG*

NEW PALEOCENE MARINE CONCRETIONARY BOULDER BED BELOW THAT OF THE EOCENE BASHI FORMATION AT THE MERIDIAN RED HOT TRUCK STOP LOCALITY.

David T. Dockery III, RPG

The classic section at the Red Hot Truck Stop (RHTS) at Meridian in ascending sequence consists of (1) the basal clay of the Hatchitegbee Formation, (2) marine fossiliferous concretionary boulder bed at the top of the Bashi Formation, (3) lowstand sands and fossil leaf-bearing clays in the lower Bashi Formation, (4) a series of glauconitic sands and clays in the upper Tuscahoma Formation, at the top of which is the T-4 Sand containing fossil shark, ray, and fish teeth, along with fossil mammal teeth of the Wasatchian North American Land Mammal Stage. The upper glauconitic sands of the upper Tuscahoma in Lauderdale County, Mississippi, contain the large 3-5‰ negative carbon 13 isotope excursion and the *Apectodinium* dinoflagellate complex, which characterized the Paleocene-Eocene Thermal Maximum (PETM) and contain the second oldest known fossil primate *Teilhardina magnoliana*.

The Tuscahoma Formation in Mississippi is better known for its fluvial and deltaic deposits and associated lignite seams than for marine beds. David Thompson (2014, MDEQ Office of Geology Open File Report OF-264) included the upper marginal marine section of the “Tuscahoma” in the Bashi-Hatchitegbee interval on his geologic map of the Meridian South Quadrangle, with the Bashi concretionary boulder bed of the RHTS marked with a green dashed line. The classic glauconitic beds of the upper “Tuscahoma Formation” at the RHTS contain occasional small concretionary boulder, but ones much smaller than those of the Bashi boulder bed above the PETM section.

While driving on a family Thanksgiving vacation to a mountain cabin in Blue Ridge, Georgia, I spotted a lone very large boulder east of the Highway 45 interchange and north of Interstate 20. On the way home, I searched for that boulder again only to find a piled-up field of boulders just north of the interstate. The next day at work, I located the pile on the Google Earth image (dated November 30, 2019) in Figure 1.



Figure 1. Boulder field of marine concretionary boulders excavated from a drainage canal just to the east and north of Interstate 20. Google image taken on 11-30-2021.





# MONTHLY POST

## *Dr. David T. Dockery III RPG*

The boulders appeared to have been excavated from a drainage cut just the east. The straight-line distance from the RHTS exposure to the new boulder field east of the 45 Bypass is 4.4 miles to the east northeast along the stratigraphic dip of the formations. In neighboring Kemper County, Hughes gave the dip rate for the Tuscaloosa Formation as 42 feet per mile (MGS Bulletin 84, p. 169), so  $42 \text{ feet} \times 4.4 \text{ miles} = 184.8 \text{ feet}$  of section. Two concretionary boulder beds occur in the Paleocene Tuscaloosa Formation of Alabama, which in ascending order are the Bells Landing Marl Member and the Greggs Landing Marl Member. *The Geology of Mississippi* (on page 313) recognized marine outcrops in Mississippi equivalent to the Greggs Landing Marl Member. Work by Toulmin published in 1951 recognized the Bells Landing to be 25 feet above the Greggs Landing Member in Alabama and 125 feet below the Bashi Formation.

So, is the new boulder bed just another one in the Bashi Formation as mapped by Thompson, or could it be equivalent to the Greggs Landing Marl Member of Alabama? The Bashi boulder bed at the RHTS is shown in Figure 2, and the type locality of the Bells Landing Marl Member in Alabama is shown in Figure 3.



Figure 2. David Thompson holding survey rod at the contact of lowstand and overlying concretionary marine deposits in the Bashi Formation at the bridge construction site for the Walmart store in Meridian, Mississippi. To the left is shale excavated from the basal Hatchetigbee Formation. Picture was taken on August 18, 2000.



Figure 3. Concretionary boulders in the Bells Landing Member at Bells Landing on the left bank of the Alabama River in Monroe County, Alabama. Here the fossiliferous sand is 9 feet thick and the concretions are 5 to 6 feet thick. Picture taken on March 24, 1979.





# MONTHLY POST

## *Dr. David T. Dockery III RPG*

Figures 4 and 5 show the new boulder field north of Interstate 20.



Figure 4. Carolyn Dockery on a very large boulder in a recently excavated field of boulders with other boulders as high as her shoulder. White specks are fossil shells.



Figure 5. These concretionary boulders create mimetoliths of other objects. Do you see a face, a frog, or something else?





## MONTHLY POST

### *Dr. David T. Dockery III RPG*

Fossil seashells in these boulders are shown in Figure 6. Fossils consist largely of bivalves with very fragile shells. Age diagnostic fossils that could distinguish between the Bashi and Bells Landing were not found in the short visit to the boulder field. Though the new boulder bed is below the PETM and is Paleocene in age, it could have a transitional molluscan fauna between that of the Bash and Bells Landing.



Figure 6. External mold of a large planicostate veronicard shell surrounded by other shell fragments on a boulder surface.



# CURRENT PRICES

## Crude Oil WTI (NYM \$/bbl) Front Month

[+ WATCHLIST](#)

☀ OPEN

Last Updated: Dec 8, 2021 at 10:11 a.m. EST - Delayed quote

# \$71.80

▼ -0.25 -0.35%

SETTLEMENT PRICE 12/07/2021

\$72.05



## Natural Gas Continuous Contract

[+ WATCHLIST](#)

☀ OPEN

Last Updated: Dec 8, 2021 at 10:13 a.m. EST - Delayed quote

# \$3.852

▲ 0.144 3.88%

SETTLEMENT PRICE 12/07/2021

\$3.708







# MONTHLY QUIZ

*Steve Walkinshaw*

## OIL PATCH QUIZ

**ALGAL BLOOM CHRONOLOGY**

**A**

November 2019

December 2019

January 2020

February 2020

Chlorophyll-a Anomaly (mg/m<sup>3</sup>)

-0.5   -0.25   0   0.25   0.5

**WEATHER-RELATED OCCURRENCE**

**B**

**ALGAL BLOOM OCCURRENCE**

**C**

**PHYTOPLANKTON BLOOM**

**E**

**ANOTHER BLOOM**

**D**

**OXFORDIAN LOWER SMACKOVER BROWN DENSE LIMESTONE (U.S. GULF COAST) - AREA OF MAXIMUM TOC**

**F**

**G**

**SMACKOVER PENETRATION - VOLCANICLASTIC COMPLEX (WEST)**

**Jackson Dome**

**Updip Limit Smackover**

**Geochemical Data Point**

Req TOC	Max TOC
< .50%	
.50% - 1.0%	
1.0% - 2.0%	
2.0% - 3.0%	
>3.0%	

FULL CREDIT FOR THE SOURCE OF THESE IMAGES TO BE PROVIDED ONCE THE QUIZ HAS BEEN SOLVED

Answers at end of Bulletin



# MONTHLY QUIZ

*Steve Walkinshaw*

## OIL PATCH QUIZ

Oil patch quiz time. High-resolution satellite imagery is providing valuable insights into the ways marine and lacustrine waters can be enriched with nutrients from a wide variety of sources. The influx of such nutrients often leads to "blooms" of microorganisms (such as phytoplankton, etc.) which, in turn, greatly enrich the "local" organic content of those waters.

By observing the occurrence ("cause and effect") of present-day blooms of algae and other microorganisms in modern marine and lacustrine waters, petroleum geologists can better understand the analogous origin and distribution of total organic carbon ("TOC") in the prolific source rocks of most basins.

This quiz focuses on some of the natural (not anthropogenic) sources of such enrichment.

Questions...

Part 1: See Image Panel "A". Recently, satellite imagery revealed the development (over a period of 4 months) of an enormous chlorophyll-a anomaly in the area labeled "H". What caused this anomaly to form?

Part 2: See Image Panel "C". Satellite imagery of the South Florida / Florida Keys / Bahamas area has documented the frequent occurrence of numerous large algal blooms. This image is from 2001. What caused these large algal blooms to form?

Part 3: A large phytoplankton bloom was observed recently off the coast of the landform shown in Image Panel "E". (a) What is the name of the landform ("J")? (b) What is occurring on its southern shores (south = left)? (c) What caused this large phytoplankton bloom to form?



# MONTHLY QUIZ

*Steve Walkinshaw*

Part 4: See Image Panel "D". What type of microorganism formed the large whitish / light blue bloom in the center of the image?

Part 5: See Image Panel "B". (a) What is labeled "I"? (b) What caused it?

Part 6: See Image Panel "G", which is a bubble plot of maximum TOC in the Oxfordian (Lower Smackover) Brown Dense Limestone source rock (each diamond symbol is a sampled well). This bubble plot indicates the area of highest TOC in the Brown Dense Limestone is in west-central Mississippi. This area corresponds to a local confluence of two sources of nutrient enrichment in the Brown Dense Limestone. One source is a Jurassic volcanoclastic structural complex located just west of this high-TOC area (see "F"). What is the name of this volcanoclastic complex (named for the shallow field discovered atop it)?

Part 7: (Follow-up to Part 6) What was the other significant source of nutrients to the Brown Dense Limestone in this high-TOC area?

Bonus:

Part 8: (a) What type of microorganism (not shown in the montage) is most often associated with "red tides"? (b) What is the name of the most common "red tide" species?

Part 9: What two image panels shown are "cause and effect" related? (In other words, which two are associated with the same natural phenomenon?)

Part 10: What Oceanic Anoxic Event ("OAE") appears to have been most impacted by the occurrence of widespread volcanic activity, leading to the substantive nutrient enrichment of its source rocks, worldwide?





# GEOLOGY POST

## ARTICLES, PAPERS or NEWS?

**ATTENTION!!!!!!** Industry, Professors and Students:

I am looking for more content from the industry and our schools.

Submissions can include anything from professional papers, thesis abstracts, job opportunities to pictures. Anything!!!!

If you have any information or news you would like to share with the Society **PLEASE** email them to the MGS Editor at:

[mcaton13@yahoo.com](mailto:mcaton13@yahoo.com)

Thanks & Regards,

Matt Caton  
Editor

# GEO LINK POST

**USGS TAPESTRY OF TIME AND TERRAIN** <http://tapestry.usgs.gov> The CCGS is donating to all of the 5th and 6th grade schools in the Coastal Bend. Check it out—it is a spectacular map. You might want a framed one for your own office. The one in my office has glass and a metal frame, and it cost \$400 and it does not look as good as the ones we are giving to the schools. Call Owen 510-6224 if you want one for your office for \$150. Duncan, Mike, Chris, Dave, Bob Randy, Seb., Kevin, Ken, Craig, Patrick, Robert.

**FREE TEXAS TOPO'S** <http://www.tnris.state.tx.us/digital.htm> these are TIFF files from your state government that can be downloaded and printed. You can add them to SMT by converting them first in Globalmapper. Other digital data as well.

**FREE NATIONAL TOPO'S** [http://store.usgs.gov/b2c\\_usgs/b2c/start/\(xcm=r3standardpitrex\\_prd\)/.do](http://store.usgs.gov/b2c_usgs/b2c/start/(xcm=r3standardpitrex_prd)/.do) go to this webpage and look on the extreme right side to the box titled TOPO MAPS DOWNLOAD TOPO MAPS FREE.

<http://www.geographynetwork.com/> Go here and try their top 5 map services. My favorite is 'USGS Elevation Date.' Zoom in on your favorite places and see great shaded relief images. One of my favorites is the Great Sand Dunes National Park in south central Colorado. Nice Dunes.

<http://antwrp.gsfc.nasa.gov/apod/astropix.html> Astronomy picture of the day — awesome. I click this page everyday.

<http://www.spacimaging.com/gallery/ioweek/iow.htm> Amazing satellite images. Check out the gallery.

<http://www.ngdc.noaa.gov/seg/topo/globegal.shtml> More great maps to share with kids and students.

[www.geo.org](http://www.geo.org) Don't forget we have our own web page.

<http://micro.magneet.fsu.edu/primer/java/scienceoptiscu/owersof10/>

<http://asterweb.jpl.nasa.gov/gallery/default.htm> Great satellite images of volcanoes

<http://terra.nasa.gov/gallery/> More here

[www.ermapper.com](http://www.ermapper.com) They have a great free downloadable viewer for TIFF and other graphic files called ER Viewer.

[www.drillinginfo.com](http://www.drillinginfo.com) This is an incredible (subscription) well and completion data service for independents. Can be demo'ed for free.

<http://terraserver.com/> Go here to download free aerial photo images that can be plotted under your digital land and well data. Images down to 1 meter resolution, searchable by Lat Long coordinate. Useful for resolving well location questions.

<http://www.fs.fed.us/gpnf/volcanocams/msh/> This is a live cam of Mt. St. Helens refreshed every 5 minutes. At the bottom are old videos of past eruptions in this cycle. It is worth a watch especially now.





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# MONTHLY QUIZ

*Steve Walkinshaw*

## ANSWERS

Alright! Have you ever stopped to think about the amount of nutrients transported in the smoke and ash from wildfires, which eventually settles in marine and lacustrine waters? There are around 70,000 such fires each year; if one assumes around 50,000 are caused by natural phenomena (lightning, for the most part), that's 5 million wildfires every century, or 50 million every millennium. More to the point, that's 50 billion wildfires every million years. Kinda puts it into perspective... And then, let's consider all of the additional ash and particulates from volcanic eruptions, which also occurred over the same time period. The wind-borne transport of such huge volumes of wind-borne nutrients over thousands of miles to settle in distant waters (and on distant lands) is truly impressive, and something we subsurface geologists really don't stop to consider when studying our "local" source rocks. Here's the quiz recap:

Part 1: See Image Panel "A". Recently, satellite imagery revealed the development (over a period of 4 months) of an enormous chlorophyll-a anomaly in the area labeled "H". What caused this anomaly to form? ashfall from the enormous Australian wildfires of 2019-2020

Part 2: See Image Panel "C". Satellite imagery of the South Florida / Florida Keys / Bahamas area has documented the frequent occurrence of numerous large algal blooms. This image is from 2001. What caused these large algal blooms to form? wind-borne dust from the Saharan region of Africa

Part 3: A large phytoplankton bloom was observed recently off the coast of the landform shown in Image Panel "E". (a) What is the name of the landform ("J")? (b) What is occurring on its southern shores (south = left)? (c) What caused this large phytoplankton bloom to form? (a) the Big Island of Hawaii (Hawaii), (b) steam is rising where the recent (2019) eruption of Kilauea sent large volumes of lava flowing into the Pacifica Ocean, (c) the heat from those lava flows has warmed the surrounding deep, nutrient-rich ocean water, causing it to rise and carry those nutrients upward into shallow waters



# MONTHLY QUIZ

*Steve Walkinshaw*

## ANSWERS

Part 4: See Image Panel "D". What type of microorganism formed the large whitish / light blue bloom in the center of the image? coccolithophores

Part 5: See Image Panel "B". (a) What is labeled "I"? (b) What caused it? (a) large, dense smoke and ash clouds from (b) numerous wildfires along the eastern Australian coast

Part 6: See Image Panel "G", which is a bubble plot of maximum TOC in the Oxfordian (Lower Smackover) Brown Dense Limestone source rock (each diamond symbol is a sampled well). This bubble plot indicates the area of highest TOC in the Brown Dense Limestone is in west-central Mississippi. This area corresponds to a local confluence of two sources of nutrient enrichment in the Brown Dense Limestone. One source is a Jurassic volcanoclastic structural complex located just west of this high-TOC area (see "F"). What is the name of this volcanoclastic complex (named for the shallow field discovered atop it)? The Epps Structure, near Poverty Point; straddles the East and West Carroll Parish boundaries. There are other large volcanoes along the Monroe-Sharkey uplift, but most are younger in age.

Part 7: (Follow-up to Part 6) What was the other significant source of nutrients to the Brown Dense Limestone in this high-TOC area? the ancestral Mississippi River

Part 8: (a) What type of microorganism (not shown in the montage) is most often associated with "red tides"? (b) What is the name of the most common "red tide" species? (a) dinoflagellates, (b) *K. brevis*

Part 9: What two image panels shown are "cause and effect" related? (In other words, which two are associated with the same natural phenomenon?) panels "A" and "B"

Part 10: What Oceanic Anoxic Event ("OAE") appears to have been most impacted by the occurrence of widespread volcanic activity, leading to the substantive nutrient enrichment of its source rocks, worldwide? OAE 2, associated with the Cenomanian / Turonian



# MONTHLY QUIZ

*Steve Walkinshaw*

## CREDITS

Here are the credits for / sources of the images shown in the image montage.

Image "A": NASA,

[https://eoimages.gsfc.nasa.gov/images/imagerecords/149000/149039/pacific\\_tamo\\_2020\\_lrg.jpg](https://eoimages.gsfc.nasa.gov/images/imagerecords/149000/149039/pacific_tamo_2020_lrg.jpg)

Image "B": <https://www.newscientist.com/article/2289885-most-co2-from-australias-megafires-has-been-offset-by-algal-blooms/>

Image "C": NASA, <https://svs.gsfc.nasa.gov/vis/a000000/a002200/a002241/index.html>

Image "D": NASA,

[https://eoimages.gsfc.nasa.gov/images/imagerecords/146000/146897/englishchannel\\_oli\\_2020175\\_lrg.jpg](https://eoimages.gsfc.nasa.gov/images/imagerecords/146000/146897/englishchannel_oli_2020175_lrg.jpg)

Image "E": PBS, <https://www.pbs.org/wgbh/nova/article/kilauea-lava-phytoplankton-bloom/>

Images "F" and "G": "The Lower Smackover Brown Dense Limestone: Its Potential as a Hybrid Unconventional Resource Play" (Steve Walkinshaw), GeoGulf 2020 Convention, Lafayette, Louisiana, Oct 1, 2020