

Hello and welcome to the August 2021 edition of the Basin Dynamics Bulletin. Thanks again for tuning in.

August is *continuing education* month. Did you know that many explorationists are using the summer months to plan their continuing professional education for 2021-2022 in upstream geoscience? What are the **top 4 ways to build your expertise in upstream geoscience**? Here are some to think about.

1. **Add to your inventory of deep-water prospects.** Recognize 5 ways to immediately propel your exploration and appraisal program by reading about some of the latest applied research in deep-water stratigraphy and reservoirs.
2. **Increase your competitive advantage with online training.** We have developed new cutting-edge online courses for integrated business units using the latest research covering i) deep-water depositional environments and basin analysis, ii) applied deep-water sedimentology, and iii) masterclass topics in deep-water depositional systems. Links to courses are here.
3. **Interested in group field trips?** Get outdoors and look at the rocks safely by following these simple recommendations.
4. **Register for Houston Explorers Club.** We're now accepting more nominations! Improve your exploration and appraisal game by registering to attend one of our business events.

In this issue, we sat down with Paul Mann, the Robert E. Sheriff endowed professor of geology in the Department of Earth and Atmospheric Sciences at the University of Houston, where he also directs the CBTH Project. Anyone who has met Paul or read his team's work understands his prolific understanding of rifted passive margins from the Caribbean to the Gulf of Mexico to the Atlantic and Pacific margins. Read the interview starting on page 3.

Other opportunities to increase your effectiveness in subsurface interpretation:

- *Online* – August 18: Register here for the presentation **Deep-water Sedimentation** organized by Subsurface Consultants and Associates, LLC.
- *Online* – September 14–17: New dates released for an encore of EAGE's **Integrated Methods for Deep-water Reservoir Characterization**. Register here.
- Houston – September 17: Register here for the September **Houston Explorers Club** leadership forum. Vicki Hollub, President and CEO of Occidental, will present *Occidental's Pathway to Net-Zero*. If not a member, request the new member nomination form here.
- Houston – October 11–15: **Applied Deep-Water Sedimentology and Stratigraphy** is now offered through the Subsurface Consultants and Associates, LLC training program. Learn more here.
- Austin – October 27: **GeoGulf** offers a one-day seminar on **The Future of Deep-water Sedimentation** – registration available soon.

- *Online* – November 2–4: Register [here](#) for the course **Practical Methods for Mapping and Interpreting Deep-water Stratigraphy and Reservoirs (GEO53)** with updated case studies and applied exercises to help you gain confidence in your exploration and development programs.
- Lisbon – May 18–19, 2022: AAPG GTW on **Mixed/ Hybrid Systems (Turbidites, MTDs and Contourites) on Continental Margins**. Submit your abstracts soon and learn more [here](#).

For additional online and in-person training opportunities, follow our LinkedIn page or Twitter. As *always, we appreciate your referrals.*

Be sure to stay tuned in by following www.basindynamics.com and our **LinkedIn page**, which now distributes up-to-date information to over 1275 members of the global energy industry. We couldn't have imagined this number of deep-water E&P professionals a few years ago, and we are continually thankful for your interest and enthusiasm for the applied aspects of sedimentary basins research. We have a **Twitter account** @BasinDynamics. For some of the up-to-date publications and research releases, see **Research Gate**.

The article of the month titled **Contourites and reworked deposits** (Bulletin v. 3, no. 7, p. 1-6) describes contourites and reworked deposits. Understanding these often mischaracterized and underestimated deposits is critical for characterizing the range and variability in subsurface reservoir models. Submit a request [here](#) to download the paper. *Express your interest and submit your technical article abstracts for a chance to appear in next month's Bulletin [here](#).*

Due to the ever-changing nature of the business environment and training courses in stock, we ask you to check our currently available listings and submit a course request via our website: <http://www.basindynamics.com/course-registration.html>.

Have a safe August – *and find more oil.*

Sincerely,



Jon R. Rotzien, Ph.D.
President
Basin Dynamics



For this month's edition of the Bulletin, Jon sat down with Paul Mann to learn about the Conjugate Basins, Tectonics and Hydrocarbons Research Group (which is now in its *sixth* phase) at University of Houston. Paul Mann received a B.A. in geology from Oberlin College and a Ph.D. from the State University of New York at Albany. His main interest area is the tectonics of sedimentary basins in the Caribbean, Gulf of Mexico, circus-Atlantic margins, and southwest Pacific. He is currently the Robert E. Sheriff endowed professor of geology in the Department of Earth and Atmospheric Sciences at the University of Houston, where he directs the CBTH Project: <http://cbth.uh.edu/index.php>. Read the first half of the interview below.

Jon Rotzien (JR): Paul, I'm so thankful you had the time to visit today and share your story.

Could you share a bit on your background? What led you to become a geoscientist?

Paul Mann (PM): I went to small liberal arts college and wasn't really sure what to major in. I ended up getting into archaeology, probably because our family had gone on some epic summer vacation trips to Europe, the Mediterranean, and East Africa when we were kids. Part of the curriculum for anthropology and archaeology was to take a physical geology course. In my first geology class, I immediately seized on the field and geosciences and the dynamic, fun group of people that were geology students. Fortunately for our cadre of about 10 geology majors at the time, our newly arrived structural geologist was Grant Skerlec, who was finishing up his PhD on the Villa de Cura thrust belt in Venezuela with John Suppe at Princeton (now a colleague at UH). Grant took our structure class on our first extended field trip to the Delaware Water Gap in Pennsylvania, and that was a real turning point for me in the geosciences. Grant had been there many times as part of the Princeton program and we undertook a mapping and cross section exercise of some overturned folds. I recall him patiently explaining to me, "That is not a formation – that is a bed of sandstone that forms part of the x formation."

Grant was a really critical person in my development. His first recommendation was, "You need to go to field camp between junior and senior year" - since our small college did not operate a field camp. The IU field camp was a great introduction to field geology and the northern Rockies. I came out the camp feeling like a field geologist who could figure out any area. Back in the fall, Grant asked me as we passed in the corridor: "What are your plans after graduation next spring? I think you should consider going to graduate school in geology." Grad school was a fuzzy concept to me but in the course that short interaction and later interactions he explained the process of visiting and applying for grad school. He recommended SUNY Albany as a place to consider for structure and tectonics. He said, "You need to go out there and visit and make sure that it's a good fit for the type of project you are interested in."

I have since given that same five minute grad school pep talk to many undergrads – especially at UH where I have had more interactions with undergrads. It has worked for some, but not all. Timing and mindset are key: *When the student is ready, the master will appear.* You can facilitate learning and point out the many opportunities that exist but that person has to actually commit to that path

My path began when I boarded a plane from Cleveland to Albany. Grant also told me, "You need to read up on ophiolites." While I had never heard of ophiolites, I remember flying out there with an Elsevier volume on ophiolites on my knee. During the visit, I met the faculty and many students that included Doug Nelson, Eric Rosencrantz (who I worked with for years when we were both at UT), Jack Casey (a colleague now at UH), Dave Rowley (now chair at

University of Chicago) who graciously toured me around Albany and the department, amongst many others. By the end, I thought “this is where I want to go!”

Back at Ohio, I received a call from Win Means, one of the structural professors at SUNY. He said, “We’d like to offer you 3-year fellowship” that came with no TA or RA responsibilities. This was a really great opportunity as I was finally on my own and financially independent from my parents.

JR: What great guidance from many mentors in your academic training. IU’s challenging field camp has produced a number of successful geologists over the years.

I’ve seen you present a number of times and have learned so much every time, including at the AAPG Deepwater Conference in Houston in 2017, the GCAGS and GeoGulf conferences in San Antonio and Houston in 2017 & 2019 – as well as during CBTH research meetings. You’re one of the foremost experts in the geology of Latin America, the Caribbean and especially the Gulf of Mexico. It’s hard to read a paper on one of those regions and not see your research group’s work cited.

What are some of your recent findings?

PM: For years, I worked in the Caribbean, which is a small plate with all the tectonic environments in close proximity: subduction, transpression, transtension, a small oceanic spreading center, internal plate deformation, and much more. But with our CBTH group, it’s not just about me. It’s about me being able to find data the students working in the group – I call it “feeding the monster” –

JR: A monster?!

PM: Which another way of saying: “I’ve got to get them data to develop into MS and PhD projects!”

JR: Absolutely.

PM: We mostly work with subsurface geology, so that means reaching out to oil companies and service companies for mainly seismic reflection and well data. But after about a decade of doing this in the Caribbean region, the group had analyzed almost every bit of subsurface data in the Caribbean that we could lay our hands on. At that point, we had to look wider – the data-rich Gulf of Mexico to the north beckoned.

The Caribbean and the GOM, they’re like twins in a conjugate margin sense. The Yucatan connects with the Texas coast to the northwest and to northern South America in the south.

We launched our research group into the Mesozoic opening of the Gulf of Mexico in 2013. We were the new kids on the block and had a steep learning curve to climb up which was facilitated by some nice data sets provided to our group by Spectrum (now TGS).

JR: Spectrum and now TGS gather and produce excellent data.

PM: The other event of 2014 was when David Sandwell at the Scripps Institution of Oceanography in San Diego made his global marine satellite gravity data available for the world. That data for the first time showed the Gulf of Mexico fracture zones and spreading centers deeply buried – but distinct. It was astounding for me to see an actual image of the

deep structure of the GOM and this energized our efforts as it appeared that the Mesozoic opening history was not that complicated: let's explore the geologic ramifications of the highly curved fracture zones of the Gulf of Mexico.

JR: That's so interesting, and I remember when Pindell gave that 2019 GeoGulf talk citing your team's work. Amazing how our understanding of the deep GOM has progressed over the last decade.

PM: We also had a student work on the Mexican Ridges and he came up with good results on how that structural system evolved from an early opening transform fault that ran along the east coast of Mexico.

But soon we started to burn through the GOM data we had access to. We had to start looking bigger – again – and this time we looked to the Atlantic margins. That's when we changed the name to *Conjugate Margins*, Basins, Tectonics and Hydrocarbons Research Group. In essence, we had a bigger hunting license, and could look at conjugate margins anywhere.

We went to Brazil in collaboration with ION and the ANP, the hydrocarbon agency of Brazil, allowed access to those data. We also developed another relationship with GEOX, working with Morocco data sets. Our study area became huge compared to the original Caribbean.

What I've found through these student-led studies is that these rifted passive margins seem a lot simpler than the stuff we grappled with in Caribbean. That pretty much summarizes the history of our Project.

JR: Can you tell us about some of the most unexpected finds as part of your career in research?

PM: I guess, this is a little awkward. I find with rifted margins, there are complexities. But there are a lot of simplicities to them, too. We coined the term "marginal rift" – that's when you thin continental crust and produce a necking zone, when you go from 30-40-50-km-thick continental crust to transitional crust, which can be 10-km-thick down to even 5 km and less. If you can imagine, this is a triangular zone in a 2D seismic data profile. This phenomenon occurs due to necking of that triangular wedge. That is what we call the marginal rift. There may be more than one, but usually just one. It's quite simple, this necking process. The marginal rift is usually full of salt, and it could be a half to full graben.

JR: Your students have shown great examples of marginal rifts in the GOM, Morocco, Brazil, to name just a few.

PM: People have argued what we call it. Other people interpret this area as exhumed mantle. But we find these marginal rifts to be sediment filled – and not characterized by protruding mantle. Not saying 100% of time in all areas, but this is a common theme we see in different places. It's exciting when you see the same thing in different settings. You start to think it's a fundamental process. When you know all models and can identify their variability, observing this simplicity is intriguing. So we're making our way to a simpler model of rifted continental crust.

JR: What was your inspiration for starting CBTH?

PM: My career has been a lot of twists and turns. For you youngsters out there, always remember careers don't always need to follow linear paths – in fact they may benefit from being

non-linear. My career is certainly an example of a non-linear path – partly related to the practical need to find projects that were fundable, partly related to allow curiosity to drive project selection, and partly by collaborating with others and getting pulled into their areas of interest.

Starting off as an undergrad and grad student, I had zero interest and exposure to subsurface data mainly because the curriculum at that time was mainly focused on preparation to do field geology. But field work just doesn't work in certain situations. I recall gazing across featureless plains or lakes in places like Hispaniola or Central America and starting wonder: *How could I access or collect new subsurface data to start filling in these blank areas?* The featureless plain to the field geologist is a whole other world to those with subsurface data.

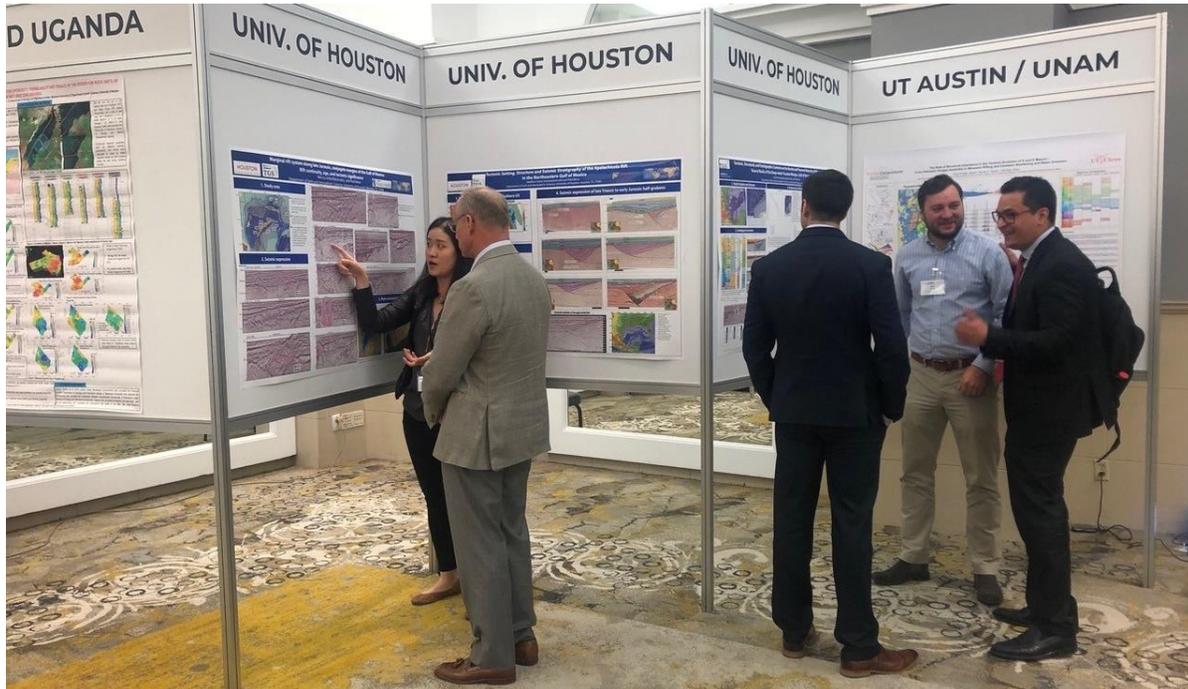
Sources for data varied. While at UT and then at UH, we had a steady supply of grad students from Venezuela, and Colombia and Trinidad who would arrive with subsurface data sets from their home countries. Oil companies were always helpful in providing data sets from obscure areas. Finally I was increasingly drawn into actual marine geophysical cruises to collect new data in the Cayman trough, the Puerto Rico trench, the Solomon Islands, and the Macquarie Ridge. These new data acquisitions were especially important for areas where there was no footprint of older industry data as for example in sediment-starved areas like the Cayman trough or Macquarie Ridge.

JR: You have used so many different methods for evaluating tectonic processes.

PM: In our group we use as many tools as we have at our disposal: seismic reflection, refraction, structural restoration, gravity modeling, burial histories, basin modeling, maps of outcrop geology, GPS geodesy. We use GIS as the merging tool to stack results on top of one another. You know are on the right track and close to a final result when all the methods are telling you the same result. The key is not to be intimidated. Everyone starts out knowing nothing about a certain method – but as you use that method more and more then you become more adept.

JR: Thanks very much Paul, we'll continue with the rest of the interview for next month.

This interview inspired by the Graduate School of Business "View from the Top" Speaker Series.



Above: CBTH PhD students Mei Liu (to left) and Jack Kenning (to right with blue shirt) presenting their research on the GOM at AAPG Hedberg Conference: Geology and Hydrocarbon Potential of the Circum Gulf of Mexico Pre-salt Section, Mexico City, Mexico.

Mei graduated in August 2021, and is starting a job as an explorationist with Sinopec in Beijing. Jack Kenning graduated in May 2019, and works as a Senior Geologist with the New Ventures group of ConocoPhillips.