

Welcome everyone to the 53rd ISCWSA meeting.

Chairman's Update:

- Sub Committees work continuing
- Fee for Attendance to Cover ISCWSA running costs
- Online ISCWSA Training Course
- Continuing to pursue external funding

Quantitative Analysis of Geological Data Uncertainty to Increase Positional Confidence

Nico Cosca, Marc Willerth, Brian McManus, Alec Bararducci

Helmerich & Payne

Depth and Vertical Errors:

- Pipe Stretch
- Thermal Expansion
- Pipe Tally
- Surface Surveying
- BHA Sag
- Accelerometer Errors
- Survey Aliasing

Previous Work

- Geological data has been used to aid in positioning
- Usually, Qualitative
- Quantitative data could be implanted in the error model
- Several applications could be considered (target sizing, SAGD, CA...)

Formation Top Detection

- Algorithmic approach to pattern recognition
- Option for human interpretation
- Traditionally used for:
- Earlier target changes
- Reduce the need for corrective doglegs

Use of a "forward model" using empirical data to TVD correct a reference log

- Gamma is automatically correlated
- Notifications when a marker is crossed
- Is this accurate and repeatable

In Practice

- Data from 4 pads in North Dakota, USA
- 8 wells crossing same formations
- Compared to independent model
- Consistency in measurements
- Relative error is crucial

Outliers

- Gross error detection
- Land surveying

- RKB Measurements
- Pipe Tally

Top Detection

- Using a Single well
- Suggests Depths to consider switching error terms
- Assumed to be depth-independent
- With Higher Resolution Data
- Suggests Very Low Error
- Almost Immediate Error Reduction

Potential Ways to Fit into the Error Model

- Option 1 Combined Uncertainty
 - Geologic Variance considered to be constant
 - Survey Variance for ISCWSA test well 1 is known
 - Combination of independent measurements
- Option 2 User vertical uncertainty from the geologic tie-on
- Uncertainty remains relative and not absolute

Error Reduction – Combined Surveys

- Precedent in Application
- Reduction in error using a weighted average method
- Implementation into Error Model

Error Reduction – Geologic Tie-On

- Once the marker is reached, vertical uncertainty can be “reset”
- “Collapsing” the vertical error terms
- “No-Error with surface uncertainty?”

Questions:

Benny Poedjono -Independent

It's a good work because there is a pro and con on the method that you propose.

Personally, I like option one combining all the uncertainties because that many work.

I've done that already. It is not dealing with vertical, we're dealing the position, especially when you're dealing with crossing the fault, all the formations bearing, and so on, there's a lot of questions. The challenge that I've been having is when you say the geological marker is a certainty. Very certain. That's different than when you see the road sign. The road sign you can GPS those locations and the geological you cannot. GPS updates to get a higher accuracy. if you rely on the seismic, that's 2000-meter TVD. That's close to three to four meters. So that's always the drawback and depending on what seismic you use and so on to make this measurement, it's very difficult to understand that. I think in my view the best approach is combining that into probably the best way you can handle in any different situation.

Nico –

Thank you. Thanks Benny. Yeah, that's a good point, so I appreciate your input on that because that's what I'm looking. Some more input and when it comes to the actual marker like you were saying with the sign, we're really looking at the repeatability of the

data so we're looking more at just the empirical data that we're measuring as opposed to GPS'ing the highway marker. Thank You

Robert Wiley - XNdrilling

Nico, I think it's exciting work. I think it's an area we need to explore. I've just put a comment in the chat about a reminder that there's a presentation by Aaron Britton and Rachel Grandy in ISCWSA 48 in Dallas on anti-collision horizontal wells where they used a lot of geological markers to try and identify the relative uncertainty between the wells they were trying to avoid. I think that scared the pants off a lot of us with what they were doing, but I think to me it comes down to looking at relative tie-ins and I must agree with Benny in terms of the absolute uncertainty of geological stuff. It's hard to come up with absolute positioning, and I think all you're doing is worth exploring and I think it's very good for the result of what the goal is, to produce hydrocarbons and understand the reservoirs, so I look forward to seeing more.

Nico –

Thanks Robert, the presentation from Aaron and Rachel is interesting to read through so that's a good place to get some more data as well.

Manoj Nair – NOAA Boulder

Hey nice presentation. I just have one question. Could you provide a little bit more in detail, explain what the algorithm you use for this pattern matching? I'm not completely familiar with the work you do, but I was curious to know what kind of algorithm you use for this pattern matching of your data with the geological signal. Thank you.

Nico –

Thanks Manoj, that is a great question. I'm going to do my best. I'm not the person that developed the algorithm, by any means, but I know that it was based on the shazam algorithm, if you're familiar with that, the basically song recognition app. It's implemented into one of our other products, and that's why we're able to do these basically, micro surveys and extrapolate out every three inches essentially, so that's how we TVD correct those logs to each other, and then basically match those peaks and valleys. If you do want to reach out to me though I can get you in contact with somebody who can dive much deeper into the algorithm. So, feel free to send me an email after the meeting.

Drilling Data Quality & Uncertainty Subcommittee Update:

- Official Designation
- Subcommittee of DSATS, WPTS, and DUPTS

Scope of work:

- The primary mission of this DDQUDS is to increase the awareness and understanding in the drilling community on how to describe drilling data quality and uncertainty.

Use Story description

- Geo-Mechanism convey prognosed geo-pressures with uncertainty

Conclusion:

- Drilling data quality and uncertainty depends on the interrelation with other data elements
- Semantic Graph allows to capture these interrelations

Survey QA/QC subcommittee Update:

API RP-78 documents

- Completed
 - Gyro, Depth, MWD, and Combined Gyro
- Not Completed
 - Directional Survey Records
 - Survey Records SOP

API RP-78 Documents Projections Actions:

- Minor Edits for the Directional Survey Records needed

ISCWSA E-Book Project update

Well Intercept Subcommittee Update:

Safety Moment

- Deepwater Horizon Study Group

Excessive Risk Taking – Elimination

Well Intercept Subcommittee eBook Update

IAOGP P7/17 Wellbore Positioning Data Exchange Format

Darren Aklestad

Outline:

- Overview
- Basic Example
- Error Model
- Raw Sensor Data
- Conclusion

Format Objectives:

- Provide a standardized way to permanently store final wellbore positioning data in an ascii file to report to regulators and exchange between operators and applications. It is not intended as protocol for real-time operational use (WITSML).

Update the IOGP (UKOOA) P7/2000 format to:

- Record Raw Sensor Data
- Add in Error Model Definition
- Handle multiple wells, wellbores, surveys
- Align with EPSG coordinate reference system handling
- Extendable

Terminology:

- ZDP = Zero-Depth Point: wellbore datum
- WRP = Well Reference Point: surface location
- SRP = Structure (Site) Reference Point

Define Record Identifiers

Format Layout:

- Common Header HC
- Data type specific header H7
- Data Section P7
- Utilizes object crosslinks

Main Objects:

- A survey is done:
 - In a wellbore
 - Which is in a well
 - Which is on a structure
- Which crosslinks to:
 - A ZDP point
 - P7 Table

Format Definition – P7 data record

Mandatory Coordinate Reference System Definition

Mandatory Entry Definitions

Mandatory Position Objects

Mandatory P7 Table (MD, INC, AZI)

P7 Table with calculated data

Survey Tool Error Model specification (optional records)

Conclusion:

- Both the P7/17 format description and its user guide are freely available from the IOGP bookstore

Education Subcommittee Update:

Mission statement

ISCWSA Course Progress

- Intro to Wellbore Surveying Course based on eBook
- It was offered by UHI. Now offered by ISCWSA
- Registration on ISCWSA.net
- Open EdX – Learning Management System LMS
- Material stored on Amazon Web Services
- ISCWSA Certified
- Ready / Offered in July – Tentative
- Robert Wylie is leading

SPE Distinguished Lecturers

- Nominees Harold Bolt / Nestor Eduardo Ruiz

ATCE Special Session

- Proposal submitted for special at ATCE September 2021 in Dubai
- Joint with DSATS
- Title: How can we define a holistic set of common industry well parameters for reservoir sections that drive life cycle value?
- Moderators: Ross Lowdon and John Hudson
- Speakers: key Industry Leaders in Regional operators covering drilling, production, reservoir, subsurface

Virtual Talks

- Impact on Poor Wellbore Surveying Impact Your Asset
- Case Studies on how important the wellbore surveying practices

eBooks Update:

- ISCWSA hosting/copy right of eBooks
- Intro to WBS
- Well Interception
- eBooks online webpage
- Online / Searchable
- Easy access by any device
- Easy update
- Allow readers to provide feedback
- Track topic views, rating, and searches

UHI Certificate in Wellbore Positioning

- UHI elected to stop offering the WPT Course which was based on our eBook
- The course will be offered as a certified course by the ISCWSA for a fee, following the UHI syllabus
- ISCWSA board has authorized funds to facilitate setting up the course and going live

Course Description

Features of open edX

Course Syllabus

Scope of Work

Schedule

Questions:

Knut Ness –

Just a quick general comment, it might be worth commenting on who this course is for. It's sure not necessarily directed directly to us. I believe it's maybe more generic than that, so it's important to also identify the target group here.

Robert Wylie –

This course is titled an introduction to wellbore positioning. It is quite a wide-ranging course, but it is targeted at all those using wellbore positioning data and going from surveyors to drilling engineers to subsurface people initially. So, it should be a good basis for everybody to understand what we're all talking about. It's not purely for the specialists. It's been pointed out that some of the information on there probably needs

to be updated and that will be updated in time, but it will give people a general basis where they can start to connect with ISCWSA on an intelligent educated basis and understand the revisions to error models, etc.

Knut Ness –

That's basically my main point as well. That you know for me as being with the operator I need to try and sell this course not to my drilling engineers only but also to the geologists and the other people that are less prohibited in this topic

William Allen –

This is good to see that course continuing in a more accessible way. I mean it was great before. I get the idea there's work yet to do still guys. Robert when it is ready to go I think bp would be interested in doing that as well. At least setting it up so we can do that. When will it be some sort of announcement? Do we just kind of watch that web page?

Robert Wylie –

That's a great question Bill and I'm looking for bp and others like yourselves to commit to that. I think it will be a great benefit to the industry. I think I haven't put that up there in terms of when we start to advertise it, but I think it will be later the year when we have a good handle on when we're ready to go to a wider audience and a bigger audience. I'm thinking that we'll probably have a smaller intake in the first group over summer of around 20 or so just to go through and make sure we have everything in line and sort of almost a gamma test of the course.

William Allen –

So, I do have a follow-up to that. One thing that's frustrating in my position with advocating for this and getting it set up is sometimes it's not always consistent with individuals. Do they get paid, they pay with their company card, do they have to pay privately? Is it paid contractually? I guess is there any plans for operators or larger companies to be able to set up something such that payment is not an issue, and it can just be basically pass through?

Robert Wylie –

We're lining it up, so it is registered single sign-on through iscwsa.net. That means that we will be able to control the registrations and I think that we will be able to set up something down the road where it is billed separately by a company under a contract. If a contract or if a company wants to bring many people through, we may be able to do something special for them going forward.

Harold Bolt -

It looks all pretty good. My favorite question about my favorite subject. Is it included?

Robert Wylie –

It's basically based on the e-book herald so whatever in the e-book this is this is the part that will be covered mainly. Depth design is involved in there. I'm not sure it's been updated to include the along hole depth yet, but as we move forward with the course materials, we can update them and add either section, or potentially other courses specifically related to topics. As far as I know the material hasn't been updated for the last two or three years. It's basically based on the last update on the eBook. There's been quite a bit of development in thinking, and you might as well have a course that starts off today. There's a lot of work to go in to put to put this together, and this is remember an introduction to wellbore positioning. I'm just looking through the curriculum and true long hole depth measurement is in teaching section four, so that's included. As we get more experience with this and get it up and going the students will be pointed to more advanced material, they can study themselves or we can add sections or courses later.

Webmaster Update:

Highlights:

- Page hit rate is up!!
- 918 in last 30 days 14th April 2021
- 637 in previous 30 days in October 2021

Lowlights:

- Membership is only at 32
- Keep trying to register

SPE.org Wellbore Positioning Technical Session

Twitter / LinkedIn

Questions:

Adrian Ledroz -

Can you clarify the registration process? You register there and then you will get emails on the upcoming meetings and open for proposals and so on?

Phil Harbidge –

Yeah, you can sign up for contact us, so then you'll be on a on a list, and then we can start to use that. That goes through the legal process where you agree to have your details stored in the icwsa.net site. So far, we don't have the capability to do an email blast, but within the within the subcommittees you can join one of those and you can join the general meeting and I guess at some point we can have it if someone wants to subscribe to email. It's an issue for us currently. It's very difficult for Tim as to now to

send an email blast through the Informz SPE site, and we have made a pact that we will not be exclusive, only including SPE signed up members. It's an open public access forum. All of our data. So, we need to get that up and running, and that was the intention of the website and it's not working. I know Jamie Dory has tried and I've sent all the feedback to tendency. We just need to get a bit faster at responding and fixing that and then the chairs will be able to organize meetings and data shares and so on. All that functionality is on the website, but we can't even test it without getting the member signed up. Maybe we'll get another email blast out soon and it will have mini training on how to sign up, which links to press, good help files on the website. If you go into help on the iscwsa.net they are good. They teach you how to do all of that, sign up and so on.

Bill Allen -

Phil this may not be so much a question, but and it may be unique to a very limited number on this call, but I think it's worth sharing that being a member of the group and having my work email be part of that distribution list as it used to be, I didn't realize we even had this going, is acceptable and expected but for some if you're like myself and my operator, we're not allowed to use our work email in social media type open formats. I'm starting to have to manage multiple emails, my personal email with my work email. A little bit weird. Now that's my problem, not yours, but I just want to share that for some people. Their organizations may not allow them to use their work email for what could be perceived or show up as a social media type thing. For example, LinkedIn I would not be joining up with my corporate email address. That's not allowed so just want to make sure that you're aware of trying to get lists and things together that it starts getting weird and I don't even know what the boundaries are for that going forward, but this it for myself. I'm going to choose to be the simplest option. I don't need 15 different emails to be tracking and not saying that's what it would be, but for me it's going to be a bit more complicated.

very well noted bill thanks we'll get there somehow

Navigating Remote Work Environments During a Pandemic

Jonathan Lightfoot

Occidental Oil & Gas Corp

2020, a year of Resilience, Agility, Flexibility, Innovation, and Compassion

2021, a year for Sustainability and Low Carbon Leadership

Necessity is the mother of invention

Remote Directional Drilling

- New Directional Drilling Business Models
- Safe Separation Dashboards
- OxyEye (Oman ROTC)

Questions:

Harald Bolt –

Jonathan that's quite interesting what you showed on a number of the images, you had showed your James Bond style walls full of videos and tv's and displays and screens, whereas the people at home are basically looking at their 12-inch diagonal laptop. How do you manage the information flow? How does the guy at home with his limited resources, manage to get the same sort of content and is able to react in in the same way?

Jonathan Lightfoot –

Yeah, that's a really good question. Thank You. I know the deployment of dashboards through web browser interaction makes it very easy. I can just go to chrome and click on the link, and I can see right away all the rigs running and details, whether I'm looking at a torque and drag or if I'm looking for survey data. You know technologies there definitely make it easy to give those views to the individual. It helps you have three screens on your desk, like I have, and one of those is a tv, so you know encouraging the employees to have a good workspace in the home is important. To support the cost of installing these sorts of facilities in your employees' homes, well we provide computers, employees provide their own internet. I stepped up mine because I have two kids at the University of Texas that needed high speed internet. I got rid of the one provider and expanded bandwidth to be able to effectively connect to the network and VPN and that allows us as employees to have a good work environment. Some employees can go to the office still and access data there, but you know we tried them this past year, we use innovation and necessity was the mother of the inventions. We had to provide very rapidly, but fortunately we were already far along in using teams and using these collaboration tools to put information right in front of the folks that are making decisions. It was well already kind of staged, just we jumped right into it headfirst, and it worked well. Other than some of us having to increase our bandwidth, but we were all forced to work in a different environment. I haven't been in the office but for one day for an hour. I went there to reboot my computer because I accidentally shut it down instead of restarting it one time, and that's the only time I've seen my office since last March.

Ross Lowdon –

Thank you, Jonathan. Thank you for your insight and I guess what the question I've got is what you would like to see from the ISCWSA subcommittees in terms of delivery. I can understand the ideas of coming up with a standard or some ideas if you like, about how we visualize well separation, but what I mean is that kind of what you were thinking that subcommittees could be looking at or having something else in mind?

Jonathan Lightfoot -

I think the way we transmit data on the well sites from the vendors to the EDR systems and how we manage the raw sensor data and the advanced survey corrections and the reference values and making sure that that we take some ownership in how that information is defined and used is as an area I think you know that the OWSG is looking

at that. We still use WITS primarily on the well sites and the survey level seven has 21 channels that aren't significant enough to really manage the data being shared or that needs to be shared for doing survey corrections and even the reference values aren't being transmitted. And of course, WITSML is something we all want to go to but we're not there yet as an industry, so we need to take some ownership on how we're using this information in the field, especially in the US land which is primarily still WITS based. That's the reason I could do the OWSG work group meetings for semantics to try to really push that the survey objects and the downhill physics-based measurement type data has some standardization in the future. Hopefully we'll get there.

Adrian Ledroz –

What do you see in your organization, let's say we get to some level of normalcy? and we can get together, vaccinated, do you see going back to the old days or to some mix with a hybrid work environment coming?

Jonathan Lightfoot –

We're supposed to start phasing back in in June. At least that's the target, but there will be a hybrid work environment. We've really done some innovative work type of accomplishments here that we can continue to use to improve the way that we communicate as an organization. Like I mentioned how many times we just sat out of rooms talking to a speakerphone and now we can see faces we can get engaged and you know utilizing teams into this capacity just like we're doing in this meeting really helps us to try to have a personal touch when we are remote because we can't always be in the same place at the same time. In terms of Occidental we are still figuring that out what the office environment looks like in the future. that's coming pretty soon, next month or so we'll have a better idea of what the office environment looks like moving forward.

Benny Poedjono

Thank you, Jonathan. That's excellent. As you know I still remember during my old days the communication used, the radio, CBS, and then with the radio VHF and then with the call box right with the callback electronics. Yeah, we don't even understand what you're saying and when I talk on the radio nobody understands what I'm saying either, so no it's very good progress and I really compliment that. That's excellent work. One of the challenges in industry I would say everybody's building their own system so now we have some communication issue or whatever you know you build your own system, somebody else built the other system. You know the challenge is how the system is going to talk to each other right so that's the only main challenge. The service company they build their own system as well.

Jonathan Lightfoot –

I think your dashboards are helpful and important, but it's also important to continue to contribute to the supplier base and the service providers capability and we haven't set on any one given method of delivering content to people to help make decisions, so you know we're looking at a variety of third-party providers as well. We sort of dabbled in that a bit, you'll learn about that tomorrow, but you know that isn't the end-all solution. We are continuing to develop our capabilities there, developing proof of concepts but also evaluating what vendors are doing out in the field for other operators and collaborating with suppliers and software developers as well that's ready with the data I brought up stream you know when you record a meeting in teams it puts that in stream, we we've done I've got 70 webinars that we've done this past year to try to give our different providers that don't work for OXY but that have new technologies an opportunity to present to OXY employees and I think that's been a positive thing to do, those webinars. Record them put them in an internal stream so that others that couldn't attend could see that and that's been really a positive thing for us as well to continue to keep our suppliers engaged with the technical staff in our organization and I appreciate everyone that's stepped up and contacted me and provided good content. We had a lot of good sessions this past year with the number of folks that are on the line here in the meeting thank you for that.

Treasurer's Report:

ISCWSA #52 (Virtual) Financials

- Virtual On-Line only meeting due to pandemic
- Hosted by PathControl on Teams

Approved Liabilities

- Website Hosting
- eBooks online at Manual.com
- Online Course Startup Approved by board
- Online Course Server Costs

Proposals

- API RP 78
- Drillbotics

Summary

Still in a healthy position

Need to look for additional funding for future outreach efforts

Questions:

Mike Attrell –

Will the online course fees being tried early be contributed to the ISCWSA balance?

Robert Wylie –

The profits from the online course will be contributed entirely to the ISCWSA balance but there are costs associated with running the course with examinations, professional administration and possibly some tutor costs going forward.

Adrian Ledroz Closes First day of Meeting