ISCWSA / SPE Wellbore Positioning Technical Section

Error Model Maintenance Work Group

Minutes of the Meeting at ISCWSA #56, Houston, 6th October 2022

Present

Andy McGregor	H&P	Pete Clark	Chevron
Jon Bang	Gyrodata	Patrick Knight	Halliburton
Andy Brooks	Independent	Brett Van Steenwyk	Algo & Analytical
Darren Aklestad	SLB	Anne Holmes	Halliburton
Benny Poedjono	Independent	Adrian Ledroz	Gyrodata
Mike Attrell	Mostar	Mike Calkins	Three Sigma
Eric Maynard	EQT	Scott Farmer	H&P
Bill Allen	BP	Curtis Cheetham	Corva
Phil Scott	DGI	Mohammadrezz Kamyab	Corva
Denis Reynard	Pathcontrol	Deep Joshz	Corva
Chad Hanak	SuperiorQC	Joel Dunn	SQC
Craig Sim	DGI	Ildiko Langaker	Aker BP
Dalis Deliu	Conoco Phillips	Petter Kvandal	Aker BP
Jerry Codling	Landmark	Suzanne Thompson	Baker Hughes
Kevin McClard	Performance Drilling	Kevin Sutherland	Chevron
Levi Smith	Icefield Tools	Adrian Castro	Turnazontal
Stephen Winchester	Baker Hughes	Spyridon Raizis	Baker Hughes
Manoj Nair	NOAA		

Website Updates

Andy McGregor summarised recent updates to the error model committee section of the ISCWSA website. There are three main pages, an entry page summarising the work of the committee, a page documenting the current status of the error model and an archive of useful historic documentation.

This includes the addition of a Powerpoint presentation to help educate management in the reasoning behind Rev5, and the addition of Roger Ekseth's PhD thesis which is one of the founding references for the original development of the error model. At the previous meeting the addition of a sine term to the XCLA weighting function was agreed. The documentation, diagnostics and examples have been updated to reflect this change.

In the past few months a few questions have arisen which were down to users not having the most recent version of documentation. Going forward, each link will include the date at which it was last updated.

Side-track Errors – Recommended Practices

The last details of the recommended practises for handling side-tracks were agreed after the last meeting. The document has now been issued and is on the website.

Side-track well profiles for diagnostics for this work have been agreed, but work is still needed to produce and agree and publish a final set of diagnostics files.

ACTION: Andy McGregor to add worked example spreadsheet of relative correlations to website.
ACTION: Andy McGregor, Craig Sim and Phil Scott to work on diagnostics.
ACTION Jon Bang & Erik Nyrnes to write up the matrix summation method for the definition document.

Handling of Site and Slot Uncertainties

Harry Wilson had agreed to produce a document describing how site and slot uncertainties should be handled and combined with error model results. With Harry having now retired, Jerry Codling agreed to take on the action.

ACTION: Jerry Codling to produce this document.

Contributors to Error Model Development

Benny Poedjono outlined the output from a working group which had been discussing the history of the error model and identifying those people who had made significant contributions to its development. Its proposed there should be a page on the website to recognise the contribution that these people made.

Location Based Magnitudes for Geo-magnetic Models

Some of the providers of global geomagnetic reference models are now able to provide uncertainty magnitude values which are location and model based, rather than using the existing, generic ISCWSA magnitudes for all locations. The location-based values can be obtained from online API calls.

For result comparison, audit and data transfer purposes the values used should be displayed in reports and stored in the database. A means is needed to make it clear in survey and anti-collision reports that a location-based magnitudes have been used. It is suggested that we this should at least be visible in the error model applied and a name like MWD+XXX should be used. There was no consensus in the meeting on what acronym should be used.

ACTION: Any suggestions for suitable naming convention to be sent to Andy McGregor and this topic discussed at the next meeting.

Depth Terms for Floating Platforms

Jerry Codling raised a concern that the depth reference terms for floating platforms (2.2m random and 1m systematic at 1-sigma) seemed to him and to one of his clients to be too large. These terms originate in Roger Ekseth's thesis and breakdown into Rig ballast uncertainty (systematic) 1.0m and the random is the root sum square of ocean tide uncertainty 0.75m and rig heave uncertainty 2.0m.

A few people in the meeting were familiar with floating installations and thoughts these values were not unreasonable. It was acknowledged that any user is free to reduce generic uncertainties if they do not fit their specific situation.

Relative Instrument Performance Tests

Jerry Codling presented some comparisons of gyro and MWD surveys. He identified various characteristics of the relative errors and his analysis suggested that the misalignments deep in the well could be better modelled.

At rev5 we modified the XYM3/4 terms which dominate in top hole. Jerry's work is leading towards a modification of the XYM1/2 terms which apply deeper. In future this might lead to a revision 6 recommendation.

Weighting Functions for Continuous Rotating MWD Surveys

Darren Aklestad and Chad Hanak presented some potential weighting functions for a six-sensor MWD model which takes surveys whilst rotating and drilling.

These terms are already in use in a SLB model but were presented to the committee with a view to having them incorporated into the error model framework. SLB intent is only to have the weighting function mathematics adopted and not to create a generic tool model with ISCWSA magnitude values.

Other companies may be working on similar tools, so it was considered important to get their comments and to see if these weighting functions would be suitable for all such tools, or if like the gyro model, various alternative formulations might be required to model differing tool designs.

The discussion also distinguished between this type of 6-axis rotating data and other continuous survey measurements which might give inclination only or which might rely on a reduced sensor set. At this time, these tools are not covered by this initiative.

ACTION: Andy McGregor to circulate Chad's derivation and Darren's detail to solicit comments from any other companies working on similar tools.