Detailed revision:

As you said that, “the values of temperature and pressure in boreholes seem to be quite far away, and this fact is a weakness of the manuscript”. Maybe the length of my manuscript is too long and the layout of charts is not reasonable, the highest measured temperature reached 177.8°C in CCSD SK-2 east borehole, which is shown in Table 9, and I will add this data in Section 4.1.3. In addition, the high temperature reached 300°C indoor test has been also completed, and due to reason of paper’s length, we did not include this part, we will put the test results in the appendix for reference.

Then you said that, “I find it is missing a more detailed analysis on the data obtained through the experimental measurements here presented”. This comment we think is very important and useful, data analysis in Section 4.1.3 and Section 4.2.3 mainly comprised the error of zenith and azimuth between the downward and upward measurements, and the measured temperature value at 5800m at the bottom of the hole, where the highest temperature reached 177.8°C. The section of Data analysis is to verify the stability and parameters of the DTMI. According to this comment, we add a more deeply analysis to reach stronger conclusions.

Then we revise the manuscript and respond to expert opinions one by one.

Specific comments：

(1) Introduction section. I would have expected here a wider explanation of the state of the art in the topic.

Modification: Table 1 in page 3 shows the key technical parameters of some existing FOG-based drilling trajectory measuring instruments, which are produced in USA, France, Germany and China. From Table 1 we can know that the instrument that can withstand the highest temperature and pressure is the Keeper type produced in USA, and the maximum temperature is 200°C, the maximum pressure is 140MPa. However, in the introduction I wrote that, “when the borehole depth reaches around 8000m, the temperature will reach 250°C, and In hot dry rock, areas of high geothermal energy and other areas with anomalous geothermal gradients, the temperature will be higher (Osipova et al., 2015; Chen et al., 2015)”, therefore we lack a trajectory measurement instrument that can withstand such high temperature and pressure.

(2) Discussion section. A significant part of this section is not really a discussion; rather than that its contents might better fit in an introduction or conclusions section.

Explanation and modification: In the process of data investigation and instrument trial production, we found that the most important factor affecting the DTMI’s measurement accuracy is the external temperature. For temperature error compensation, most manufacturers use error compensation experiments to correct the error for each instrument, so it takes a lot of time. So we need to explore a fast and reliable method of temperature compensation, and what method is needed, this is a discussion point. We have begun to use some methods, such as neural network method, uniform design method and fuzzy mathematics method. Therefore, this is also the focus of the future work. In my opinion, research on compensation methods as part of the discussion should be reasonable.

And for the manufacturing process of the external confining tube, the research and development of measuring movements and algorithms, and other technologies have been relatively mature, the main research direction in the future should be to improve the azimuth measurement accuracy of DTMI. Anyway, discussion section is relatively short and we will extend it.

(3) Figures. Some figures which are actually photograph pictures might be removed, as they do not seem to provide significant information.

Modification: As you said, some of figures in my manuscript do not seem to provide significant information, so we have deleted Figure 23-25, because they are just working photos, it is inappropriate to appear in scientific papers. And most of the figures are original for this paper, we will mark it as reference if it has been used before.

(4) Figure captions are often extremely short, and consider clarifying the reference system and/or using different colours or width/type lines for each kind..

Explanation and modification: According to your suggestion, we have appropriately added figure captions for authors. We also added explanation information about the coordinate system, the curve and the angle of Figure 1 under it. In the previous manuscript, Figure 1 is created by Microsoft Visio, so when it is directly converted to PDF, it is not clear. We will convert it into JPG format and it will be much clearer than before.

(5) Units and Tables. A couple of times (Tables 1 and 2) it is stated a voltage magnitude with corresponding units “MPa”, which seems strange to me. Please carefully check that it is properly stated which magnitudes (and units) are presented in all the tables, and is Table 5 content not available in handbooks?

Modification: “MPa” is a unit of pressure carrying capacity of the external confining tube. MPa = 10^6•Pa, and 1Pa = 1N/1m^2. And its function is similar to the unit "PSI" commonly used in European and American countries.

After our careful proofreading, all tables are necessary for our manuscript. Table 3 and Table 5 are available in Mechanical Design Handbook(Bangchun Wen and Zhongkai E, 2010). At last we carefully checked the units and format in the tables and added the reference after them.

(6) Language. It is sometimes not as fluent and precise as expected? Furthermore, some parts of the text are repetitive, which makes the manuscript less attractive. In addition, a few lines in different pages of the manuscript are written in a language which is not English.

Modification: For the unclear parts and unprofessional terms in the manuscript, we have made serious changes in English expression to ensure clearly presented, and proofreading also has been done, and the revised changes are in red in the manuscript, and we have made carefully proofreading to avoid Chinese words in the revised

manuscript.

Technical corrections

(1) Please check that all the acronyms are defined the first time they are mentioned.

Modification: We had added the full name such as fiber optic gyro with FOG, drilling trajectory measuring instrumentation with DTMI in the first mention in the manuscript.

(2) Lines 61-67: consider including some references here to support these statements.

Modification: You are right, the existing FOG-based drilling trajectory measuring instruments in Table1 should include the reference to support the analysis of existing products, and we added the references about this to support the following view, which are shown in the end of this revised file.

(3) Table 2: the way it is used the term “Units” here is confusing to me. Is it correct?

Modification: The term “Units” in Table 2 represents the three components of DTMI, it maybe be ambiguous with other “unit” in this paper. We have replaced “Components” with “Units”.

(4) Is the coordinate system in figures 20 and 21 the same as in figure 1?

Explanation: The curve OAC is the trajectory of the borehole in the coordinate system of figure 1, and the coordinate system in figures 20 and 21 is based on the ANSYS, which reflect the stress and strain of the DTMI. Therefore, the DTMI is in the borehole, or to say, the DTMI reflects the bending degree of borehole, we can think that the two coordinate systems are the same.

(5) Line 368: I think there is a missing dot over “T”. If not, what is stated there seems to me senseless.

Modification: In Eq. (11), there is a missing dot over “T”. Due to our negligence, the T(z,t) in Line 368 should be $\dot{T}(z,t)$, and we thank for your care.

(6) I do not understand why some tables appear at the very end of the manuscript, even after the references section.

Explanation: Because the Table7- 12 in Section 4 have a lot of data, so it takes up a lot of space in main body of the manuscript. So I want to put them as an appendix at the end of the paper, we will take them in right place when this paper is typesetting.

References:

Bangchun Wen and Zhongkai E: Mechanical design handbook: The Second Edition, China Machine Press, Beijng, China, 2010.

Maas S J, Metzbower D R. Optical accelerometer, optical inclinometer and seismic sensor system using such accelerometer and inclinometer: U.S. Patent 7,222,534[P]. 2007-5-29.
Cahill R F, Eck J A, Schwantz G L, et al. Fiber optic earth rotation gyro compass: U.S. Patent 4,712,306[P]. 1987-12-15.