

TECHNICAL AND COMMERCIAL **PROPOSAL EXAMPLE**



Moscow-London-South Africa

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Prospecting for Oil and Gas by Remote Sensing:

a Technical and Commercial Proposal

1.) Technique

CST Specialists, lead by Prof P.V.Florensky, use his proprietary modification of a standard Russian procedure for the interpretation of space images for the purpose of oil and gas prospecting [1], [2]. These modifications are about analysis at several scale levels and the choice of these levels is part of the proprietary knowledge. We identify three scales:- overview, working and detailed scales, we then detect elements, at each scale, which constitute the structure of the area under investigation. The big advantage of this method is its ability to be adapted to very different tectonic and surface conditions since general prospecting criteria and indications of oil and gas presence vary depending on scale, drift cover, vegetation (eg forest, savannah, tundra, etc.), and geological conditions.

2.) Stages of the Analysis:

- (i) The defining (together with the customer) of the area to be studied, and the analysis objectives, given the particular geological, tectonic and surface conditions present;
- (ii) Generation of an initial information database for the project: maps where reference samples are located, the topographic basis of the working scales, and a local library of all the available relevant geological-geophysical data (together with the customer);
- (iii) Selection and preliminary geological interpretation of space images of an overview scale. Joint analysis of remote sensing data and geological-geophysical data;
- (iv) Choice of working images (types and scales), choice of detailed images and methods for their interpretation, adaptation of methods to objectives and requirements of the customer;
- (v) Geological interpretation of images of the working scale. Preliminary model of the geological structure of the territory being explored. Joint analysis of the preliminary model and available geological, geophysical and geochemical data [3];
- (vi) Field aero-visual work for the detection of special features of field indications of objects being investigated;
- (vii) The choice of additional images and interpretation methods if necessary;
- (viii) The compilation of the final set of maps and the preparation of a final report including recommendations for the next phase of exploration & development: either recommended areas for further detailed seismic and/or suggested drilling locations.

3.) Proposed Project Deliverables

For any area to be defined by the client, CST would make best endeavours, co-ordinating the resources of the above Russian Institutes, to provide within 6 months of commencement of an agreed project, the following deliverables:--

(1) A map of all the major fault lineaments indicated throughout the area from full integration of all the multispectral satellite data available, plus any satellite gravity or radar altimeter data. Integration with any surface or low level airborne gravity or magnetic data available for the area would improve the interpretation. This map would indicate the primary, secondary and tertiary fault lineaments, and through integration with global knowledge plus any geological well data and/or surface seismic data available: determine a best estimate of the phases and timing of these various fault movements. The primary map would be a paper print at (probably) 1:50,000 scale, at a projection, datum, and spheroid to be defined by the client to be compatible for overlaying their exploration maps.

An Adobe PDF of this Map would be included in the comprehensive digital report accompanying these deliverables.

(2) A map of the depth to the sedimentary rock basement generated by integrating all the satellite data available with the existing (raw and interpreted) gravity, magnetic, well and seismic data that The client is able to provide to Professor Florensky and his interpretation team. The accuracy of such a map would be much enhanced if the area chosen was expanded to include at least one or two properly logged control wells, plus if gravity and/or magnetic data was available.

Again the primary map would be a paper print at (probably)1:500,000 scale with the same projection, datum and spheroid as the map above. This would be accompanied by a PDF in the full digital report.

(3) The third key map of exploration significance to be produced by this study would be a “Top Main Reservoir Level Structural Form Map. This would be an extension of the “Form Maps” previously presented by Prof Florensky on many occasions in Moscow, to include all well, seismic and gravity data provided by the client, such that the level mapped in each sub-area is that for the expected major reservoir level there.

Again the primary map would be a paper print at (probably)1:500,000 scale with the same projection, datum and spheroid as the map above. This would be accompanied by a PDF in the full digital report.

All the raw and interpreted satellite data available, as listed above, and used for this study would also be appended to the final report. This data would be in the digital format.

4.) Data Requirements for this Study

For satisfactory completion of this study Prof. Florensky and his team would require, to integrate with all the satellite data which would be provided to the client as part of the current study, the following:-

1. Surface topographic maps of the area at 1:500,000 scale.
2. A shotpoint basemap showing the full 2D surface seismic available for the area, plus the surface location of any the wells available, at 1:500,000 scale.
3. Interpreted composite logs for any wells in the area showing at a minimum: Gamma, Sonic, Density, & Resistivity Logs, with current lithological interpretation against measured and true vertical depths. (Paper prints or PDF's to be determined by the client).
4. Well deviation data and checkshot data as available for the wells for time to depth conversion. (Format to be specified by Prof Florensky).
5. One copy of all the interpreted seismic lines, showing the most likely current interpretation of all the regional seismic horizons and their ties to the above wells. (Again format to be specified by Prof Florensky, but CST would suggest Adobe PDF).
6. Any surface or airborne gravity or magnetic data and reports available for the area (digital or paper).

5.) Other Project Requirements

Maximum understanding of all the satellite data is achieved through relating the initial findings to surface reconnaissance, once the project is under way. To this end a visit by Prof. Florensky plus two others (a co-worker and a translator) to the project area, roughly half way through the project would be required. In such circumstances CST would provide transport to and from Khartoum for such personnel from the project budget, but would seek transport on to the field area, plus regional accommodation, for the approx one week visit to be separately provided by the client. Local reconnaissance by helicopter is generally ideal.

6.) Timing and Financial Considerations

This Phase-1 study would have a total duration of 6 months from the date of project commencement. The final report, as specified above, for this phase would be completed within this timeframe irrespective of whether or not a phase 2 study as specified below is undertaken.

The total cost for this study would be in the region of UK £ 100,000 to £ 400,000, depending on the size of the area chosen, the amount of satellite data that exists for it, and the amount of conventional Well, Seismic, Gravity or Magnetic data that needs to be integrated into the study. The final report would include provision of copies of all the raw and interpreted data used, together with the full report specified above.

Since initial location and retrieval of all the satellite data is a substantial part of this cost, CST would require payment in three tranches as specified below:-

Tranch 1 – 45% of total budget payable at project commencement

Tranch 2 – 27.5% of total budget payable 3 months from the date of project commencement.

Tranch 3 – 27.5% of total budget payable on delivery of the final report on project completion.

7.) Phase-2 Study

Pending satisfactory completion of the above study to all parties, a similar study extending the methodology to cover specified areas within the previously defined Block at a more detailed scale over the most prospective areas could be undertaken. Scales of 1:100,000, or 1:50,000 have been suggested. However the precise objectives, costs and data requirements of such a study would be decided at a later date.

8.) Conclusion

CST would welcome any discussions which you may have with regard to this proposal, which has been necessarily only broadly defined at this stage. However CST has already demonstrated to other operators in Africa that this is a very cost effective way of enhancing their exploration objectives.

9.) References

1. Florensky P.V., The Complex of Geological, Geophysical and Remote Sensing Data for investigation of oil bearing areas (monograph) –Nedra Press, Moscow, 1987.
2. Miloserdova L.V., Matsera A., and Samsonov J., Structural Geology. - Textbook, Russian State Oil & Gas University, Moscow, 2004.
3. Miloserdova L.V., Block Structure of the Earth's Crust, by results of satellite image interpretation with LESSA software package. – 7th All-Russian Conference “Actual Development problems of Russian Oil & Gas industry”, Moscow, 2007.