

A methodology to identify complex reflector connections and potentially hidden geological structures on digital images

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Abstract

1 In this work we present a methodology for analysing and processing seismic
2 reflectors inside seismic digital images (bitmaps). Our proposed methodology
3 enables more flexible manipulation and projection of the seismic reflectors on
4 more complex regions of the image. Software commercial tools can help the ex-
5 perts to interpret seismic data, well correlation, build reservoir models, visualize
6 results, etc., in order to maximize reservoir exploitation. However, some results
7 on projections 3D are not very accurate. Visualizing the images, the expert
8 can interpret complex structures formed by the seismic data that are difficult
9 to interpret, in which process the software doesn't allow to handle adequately.
10 Those, the expert obtain, in most of the cases, poor results and 3D projections
11 physically inadequate.

12 We apply the proposed methodology on digital seismic images obtained through
13 seismic reflection. First, we take as input seismic images, defined in two colours,
14 and we apply to them specialized image enhancement processes. We simplify the
15 enhancement images using morphological techniques in order to obtain seismic
16 skeletons. Finally, we separate the colour paths in two different images (each
17 one with a channel's skeleton) and we process them separately. These skeletons
18 act as a guide for a computational deterministic automata, which follows the
19 paths to solve the discontinuity of seismic reflectors and to search potentially
20 hidden geological structures. This methodology has been implemented into
21 a software prototype that allows the expert to handle the seismic reflectors
22 located on complex regions of the image. Our results have been validate by the
23 expert in the interpretation process of seismic images and the result have been
24 satisfactory. This work is part of a research project whose main objective is to
25 provide greater flexibility in the management of seismic images and be a help
26 to those skilled in the interpretation process.

27 Keywords

28 Seismic images processing, seismic skeleton, morphological skeleton, skeletoniza-
29 tion.