

Fault detection using biometric identifier technology

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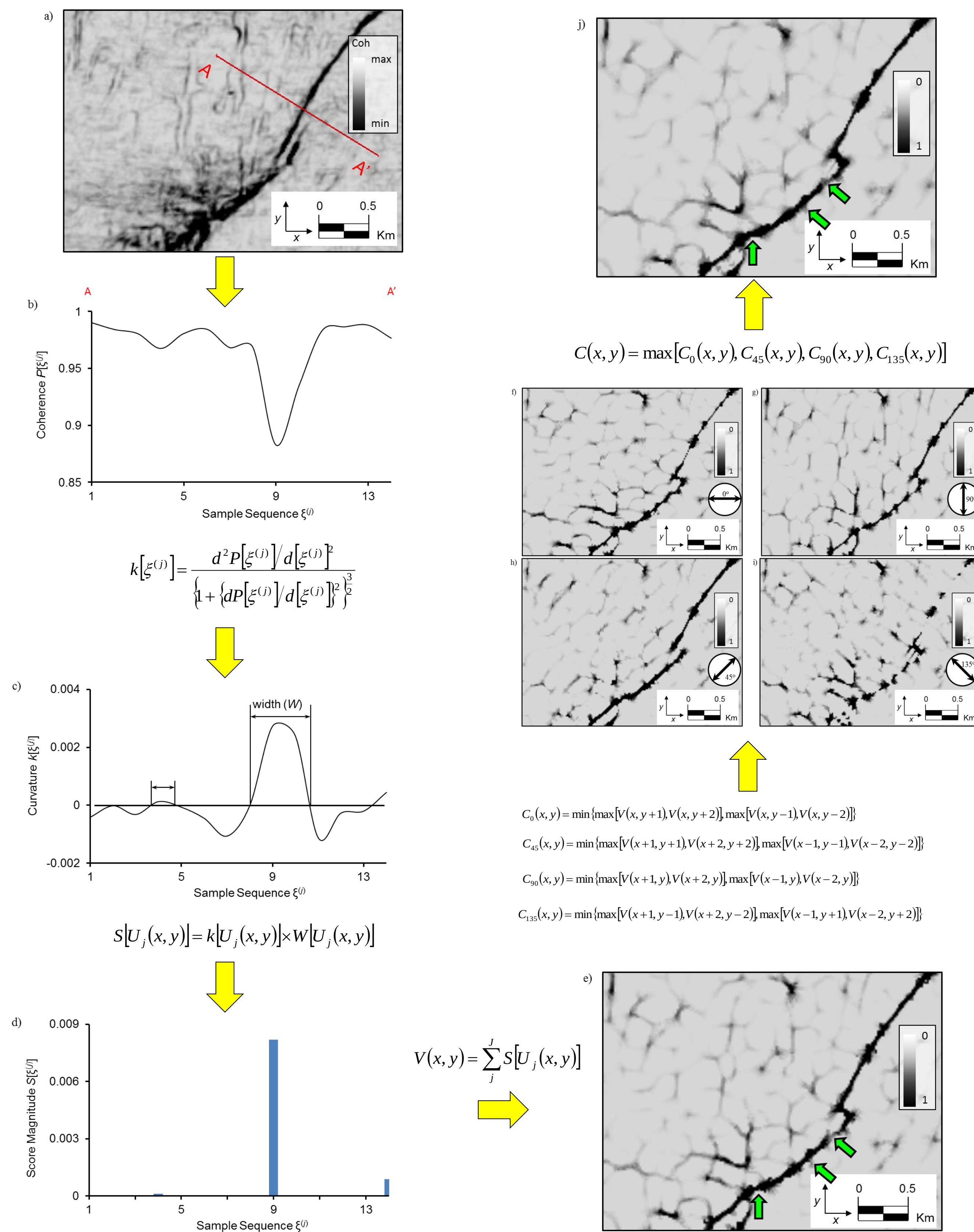
1. INTRODUCTION

3D fault interpretation is a time consuming and tedious task. Huge efforts have been invested in attempts to accelerate this procedure. We present a novel workflow to perform semi-automated fault illumination that uses a discontinuity attribute as input and provides labeled fault surfaces as output. The procedure is modeled after a biometric algorithm to recognize capillary vein patterns in human fingers. We illustrate this technique by applying it to a seismic volume acquired over the Netherlands Sector of the North Sea Basin and find that the proposed strategy can produce highly precise fault surfaces.

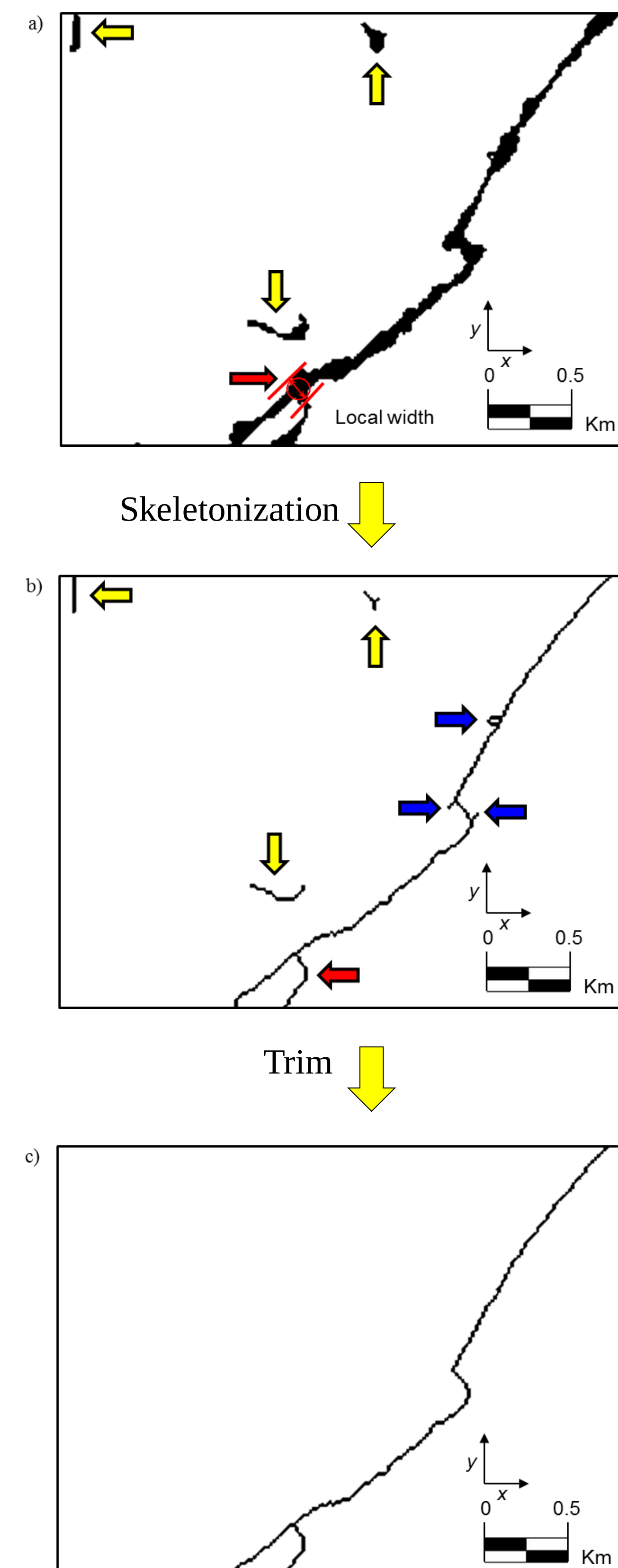
2. METHODOLOGY

The procedure consists of two main steps. First, a coherence or discontinuity volume is converted to binary form indicating possible fault locations. This binary volume is then skeletonized to produce a suite of fault sticks. Finally, the fault sticks are grouped to construct fault surfaces using a classic triangulation method. The processing in the first two steps is applied time slice by time slice, thereby minimizing the influence of staircase artifacts seen in discontinuity volumes.

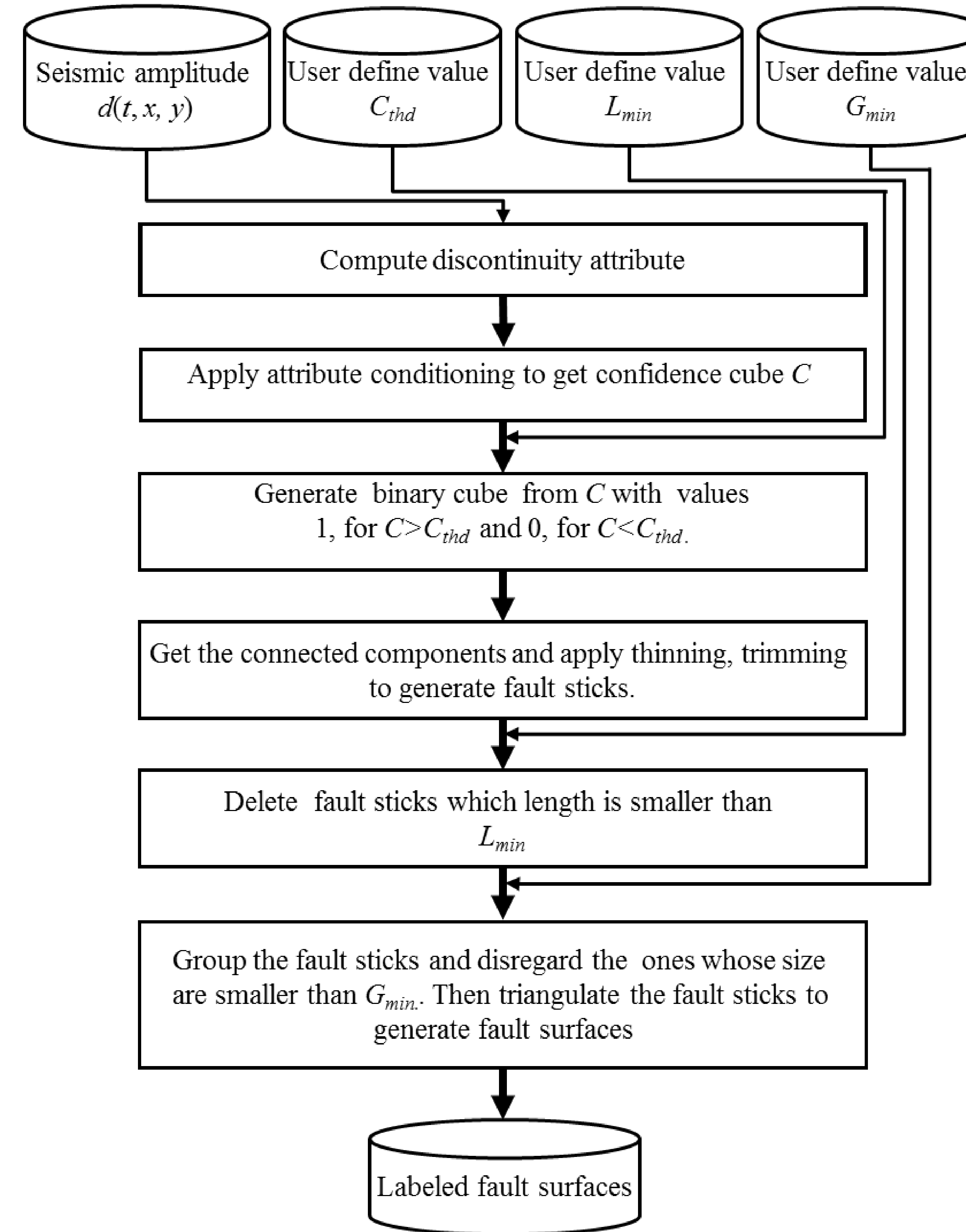
Seismic Attribute Conditioning



Generate fault sticks



3. WORKFLOW



5. CONCLUSIONS

The algorithm needs three threshold values to extract faults. The first threshold value is used for generating the binary cube. And the second and third threshold values are respectively the lateral length of the fault stick and vertical size of the fault.

6. REFERENCES

Miura, N., A. Nagasaka, and T. Miyatake, 2007, Extraction of finger-vein patterns using maximum curvature points in image profiles: IEICE TRANSACTIONS on Information and Systems, E90-D, 1185-1194.

4. APPLICATION

To demonstrate the capability and efficiency of our algorithm, we apply it to a subvolume of a seismic survey acquired over the North Sea Basin. Detailed mapping of the faults is critical to this survey because some of the faults may act as pathways for gas or fluids. The tested volume contains 250 by 200 traces and ranges from 300 ms to 700 ms with a sample interval of 4 ms.

