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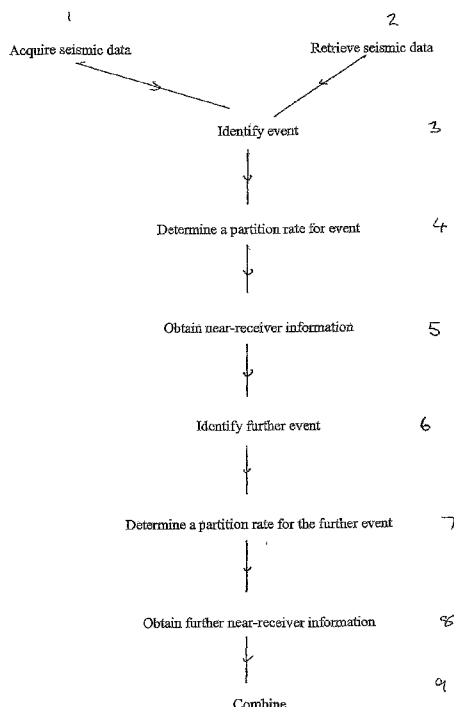
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[Continued on next page]

(54) Title: PROCESSING SEISMIC DATA



(57) Abstract: A method of processing multi-component seismic data is provided that comprises determining, in the time-offset domain, a first partition rate for a first event from the multi-component seismic data. Information about near-receiver properties of the earth may be obtained from the first partition rate. The method may further comprise determining, in the time-offset domain, at least a second partition rate for the first event from the multi-component seismic data and/or at least a third partition rate for a second event. Further information about near-receiver properties of the earth can be obtained from the second and/or third partition rate.

Figure 9(c)



SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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Published:

- *with international search report (Art. 21(3))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(88) Date of publication of the international search report:

25 November 2010

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2010/000088**A. CLASSIFICATION OF SUBJECT MATTER****G01V 1/28(2006.01)i, G06F 19/00(2006.01)i, G01V 1/30(2006.01)i**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G01V 1/28; G01V 1/32; G06K 9/00; G01V 1/48; G01V 1/36; G01V 1/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & "Keywords : multi, component, polarisation angle, P-wave, S-wave, velocity, slowness and similar terms"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2007-0115755 A1 (GRECHKA, V. & MATEEVA, A.A.) 24 May 2007 See the pages 5,6 and figure 1.	1,23
Y	US 7397728 B2 (MOORE, I.) 08 July 2008 See the abstract, column 6 and figure 1.	1,23
A	US 2005-0129332 A1 (LEISNER, C.J. & LUCIER, B.J.) 16 June 2005 See the pages 4-6 and figure 1.	1-3,7,13-15,23
A	US 6922373 B2 (ARMSTRONG, P.N.) 26 July 2005 See the column 6,7 and figure 1.	1-3,7,13-15,23



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

29 SEPTEMBER 2010 (29.09.2010)

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB2010/000088**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: 6,8,11,18
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

Claims 6,8,11 and 18 refer to claims 5,10 and 17 respectively. But claims 5,10 and 17 are multiple dependent claims that refer to other multiple dependant claim, which is contrary to the requirement of PCT Rule 6.4(a). Therefore, claims 6,8,11 and 18 are not clear and concise and do not comply with the requirement of PCT Article 6.
3. ☒ Claims Nos.: 4,5,9,10,12,16,17,19-22
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/IB2010/000088

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2007-0115755 A1	24.05.2007	None	
US 7397728 B2	08.07.2008	FR 2890178 A1 GB 2429527 A MX PA06009722A US 2007-0064530 A1	02.03.2007 28.02.2007 01.09.2008 22.03.2007
US 2005-0129332 A1	16.06.2005	US 6782138 B1	24.08.2004
US 6922373 B2	26.07.2005	US 2004-052159 A1	18.03.2004