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Interactive comment on "Finite difference modelling to evaluate seismic P wave and shear wave field data" *by* T. Burschil et al.

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We thank the second Anonymous Referee for the review and the helpful comments that are answered item by item below.

RC1: *In the P wave imaging workflow (Table 1), what is the finite-difference migration? It seems it is a time migration, since there is time-to-depth conversion after. If so, some difference between the field P wave data image and the first synthetic P wave image may be caused by the time migration. Have you try depth migration? Please clarify this point.*

AC1: We applied finite-difference time migration, in particular the "Implicit FD Time Migration" of the processing-software ProMAX. We changed the specific entry in Ta-

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ble 1 accordingly. We also applied post-stack depth migration, using the two different migration algorithms 'Implicit Finite Difference Depth Migration' and 'Kirchhoff Depth Migration'. The depth-migrated sections differ only slightly in two small regions from the time-migrated and depth-converted sections, so that we cannot identify significant differences between the time-migrated and depth-migrated sections. Comparing depth-migrated sections with the time migrations shown in Fig. 6 and Fig. 11, we therefore come to the same result as we already presented. The differences between field data and synthetic data of the first model are related to missing layers and are not caused by migration and conversion. By introducing the improved model the mentioned differences were reduced. However, since the first subsurface model lead to some confusion (short comment C934-C935 by H. Wiederhold), we will exclude model 1 in the final version of the manuscript.

RC2: *It is a big jump in Figure 11. How to interpret the measured field data and then modify the input model? Do you use traveltime tomography to update the model, or simply draw the lines by geological knowledge? It is mysterious to me.*

AC2: We interpreted the migrated depth section (Fig. 5) by the additional use of geological and geophysical knowledge from boreholes and airborne electromagnetics (see Burschil et al., 2012a) that helped calibrating the reflectors marked. We clarified this point in the revised manuscript and described the process in more detail.

RC3: *Please spell out SOFI in the abstract.*

AC3: We spelt out SOFI at the first appearance in the revised manuscript.

RC4: *Section 6.1 could be shorter. Some paragraphs are too general, and not closely related.*

AC4: Section 6.1 highlights the influence of subsurface features on data quality in land seismic surveys in general. We compared the measured field data and possible influences on data quality with other people's work. It is true that some points in section

6.1, e.g. scattering and damping (Q), are not further considered in this manuscript. We shortened section 6.1 accordingly in the revised manuscript.

Interactive comment on Solid Earth Discuss., 6, 2169, 2014.

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