

**Characterization of the in situ magnetic architecture of oceanic crust (Hess Deep) using near-source vector magnetic data**

Masako Tominaga<sup>1\*</sup>, Maurice A. Tivey<sup>2</sup>, Christopher J. MacLeod<sup>3</sup>, Antony Morris<sup>4</sup>, C. Johan Lissenberg<sup>3</sup>, Donna J. Shillington<sup>5</sup>, and Vicki Ferrini<sup>5</sup>

1: Department of Geology and Geophysics, Texas A&M University

2: Department of Geology and Geophysics, Woods Hole Oceanographic Institution

3: School of Earth & Ocean Sciences, Cardiff University

4: School of Geography, Earth and Environmental Sciences, University of Plymouth

5: Lamont-Doherty Earth Observatory, Columbia University

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**Introduction**

We present an example of three-component ROV ISIS magnetic field data (S1) and a crossing tie-line profile (S2) for data quality assurance and to support our data analyses. We also present a complementary plot to support our discussion of the inversion phase test for block rotation (S3).

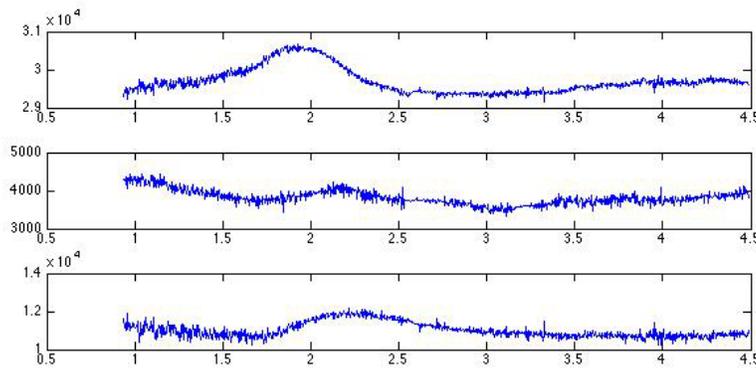


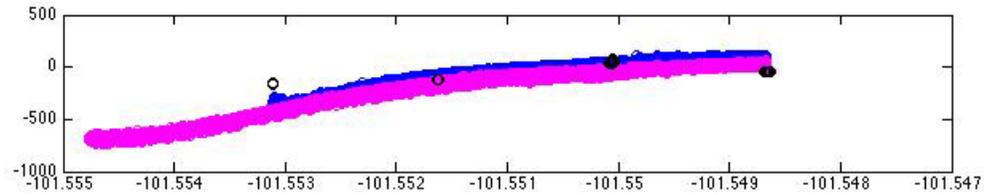
Figure S1. An example of three component magnetic field data of Dive67\_1 profile after the vehicle induced magnetic field correction (see Section 3.3) (Vertical axes are in units of nanoTeslas, horizontal axis are in units of kilometers (km)). Three component magnetic data of Dive67\_1: X (top), Y(middle), and Z(bottom) axis data. Note that the convention of the x-, y-, and z-axes follows the manufacturer of the magnetometer sensor (Honeywell HMR2300) and

30 how it was installed and recorded on ROV ISIS and does not follow the geomagnetic  
31 convention of X-, Y-, and Z.

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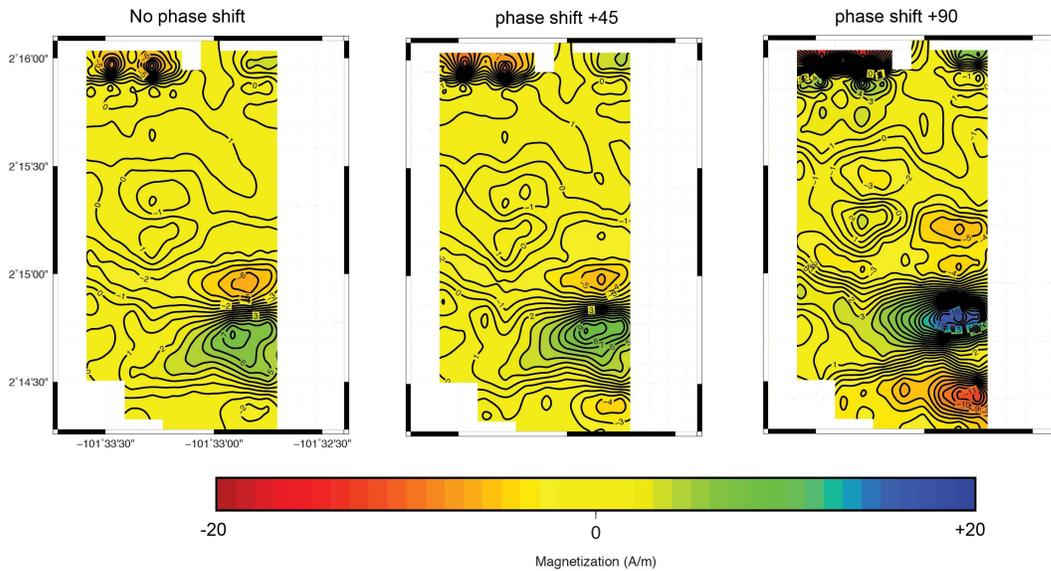
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39 Figure S2. Cross track tie-line check between ISIS Dive 67 and 71 (see orange lines in Figure  
40 3A). All the profiles/values are after vehicle-induced magnetic field calibration, IGRF and  
41 diurnal correction. Both eastward(blue) and westward (pink) lines indicate a part of Dive 71  
42 profiles that crossed four lines Dive 71\_2 (leftmost black dots), Dive 71\_1 (black dots, second  
43 from the left), Dive 67\_1 (black dots, third from the left), and Dive 67\_2 (black dots, rightmost).  
44 The match between these and all of the cross lines (black dots) indicate our calibration process  
45 was successful and that there is no significant discrepancy or offset in between dives. Vertical  
46 axis has units of nanoTesla, horizontal axis has units of longitude degrees.

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50 Figure S3. Testing phase-shift of inversion results: (left) inversion results (Fig.6A); (middle) 45°  
51 phase shift; and (right) 90° phase shift. There are only modest changes in the overall  
52 magnetization pattern although the 90° phase shift produces unreasonably large intensities.

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