

Interactive comment on “Impact of variable sea-water conductivity on motional induction simulated with an OGCM” by C. Irrgang et al.

Anonymous Referee #1

Received and published: 31 October 2015

General comments: This paper provides a simple comparison for the magnetic fields induced by ocean circulation under different oceanic conductivity assumptions and finds that spatially variable conductivity significantly alters the induced magnetic field strength. This is a very important topic with widespread implications. I recommend publication with minor revisions, which are mostly technical in nature, but as stated below in the first scientific comment, I would recommend incorporating one additional figure.

Scientific comments: - It would be nice for this paper to not only discuss how conductivity causes the magnetic fields to change in terms of percentage, but also in terms of nT value so those values could be more easily compared the amount of influence expected for varying lithospheric/mantle conductivity (for example, see Schnepf et al

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2015, GRL). I recommended slightly altering Figure 5: have the current figure be part B and make part A a figure showing the results of the magnetic field strength for spatially-variable conductivity in terms of nT.

- Page 8, last two lines: FYI, Manoj et al (2006) used a mean sea-water conductivity for obtaining the exciting current, but then a incorporated spatially variable ocean conductivity scheme as part of the laterally varying model shell in which the exciting current was then evaluated.

Technical corrections: In general, please use an English spell-checker and grammar check.

Page 2, lines 1-2: "(1983) discussed electromagnetic induction due to ocean dynamics and the effects of coastlines and the electrical structure of the Earth." → "(1983) discussed electromagnetic induction due to ocean dynamics, as well as the effects of coastlines and the electrical structure of the Earth."

Page 2, lines 11-12: "Despite the varying research in these studies focuses on different oceanographic processes and spatio-temporal scales," → "Despite the varying research focus of these studies on different oceanographic processes and spatio-temporal scales,"

Page 2, line 20, "Both," → no comma is needed

Page 3, lines 4-7: Move this to earlier in the section when you say that the atmosphere & upper mantle are given as insulators so the reader immediately knows how you are treating the sediment layer.

Page 8, line 2: "gobal" → "global" This typo occurs multiple times, so use Ctrl-F to convert all the "gobal"s to "global"s.

Page 8, line 7: "polward" → "poleward"

Page 8, line 18: "postitive" → "positive"

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Page 9, line 14: "prominent" → "prominent"

Page 9, last line: "Largest decrease" → "The largest decrease" or "Largest decreases"

Page 10, line 26: "distinguishes" → "distinguishes"

Page 12, line 12: "the small variability" of ocean induced magnetic fields "and,..."

Page 12, line 18: "to easier" → "to more easily"

Interactive comment on Ocean Sci. Discuss., 12, 1869, 2015.