ベイズ推定を用いたニュートリノフラックスシミュレーション用岩相分布モデル

Lithology Distribution Model for Neutrino Flux Simulations Obtained by Using Bayesian Inference

*竹内 希[1]、KamLAND Simulation Project Team
*Nozomu Takeuchi[1], KamLAND Simulation Project Team

1. 東京大学地震研究所
1. Earthquake Research Institute, University of Tokyo

It is well-known that geo-neutrino observations provide critical constraints on the mantle chemistry. Because chemistry (i.e., distribution of U and Th concentration) in the local crust also affects to the neutrino flux at the detector, it is widely recognized that developing local chemistry model is one of the most important steps in the geo-neutrino simulations. In previous studies, they used various geological insights to obtain the chemistry models, however, in most cases, the modeling is not well tractable, and the uncertainties of the obtained models are not very clear. Because our final goal is to obtain the probability density function of the neutrino flux at the detector, we need more quantitative and reproducible approach.

In this study, we propose Bayesian approach to obtain the statistical chemistry model. To do this, we adopted two-step approach; we fist obtain statistical lithology distribution model and then combine it with the statistical concentration model for each lithology type that is presented by Ueki (2017, this meeting). In this presentation, we focus on the method and results of the first step.

The lithology model in this study consists of probability of the lithology type at each point in the local crust. It is definitely different from the previous models that definitely state the lithology type. To obtain this probability, we use the Bayesian theorem. We first define some a priori probability and then modify it using observational and experimental information. To take the regional specialty of Japanese crust into account, we assume the bulk composition of the Hidaka metamorphic belt as the a priori probability. To modify it, we use the information of the P wave tomography model by Matsubara et al. (2008), laboratory measurements of P-velocity of each lithology by Christensen and Mooney (1995), and the temperature structure model by Furukawa (1995). The detailed method and results will be shown in the presentation.

キーワード：ニュートリノ、岩相、トモグラフィー
Keywords: neutrino, lithology, tomography

