continental LAB is difficult in comparison to Moho. In this thesis, the upper mantle surrounding a craton is postulated to create a differential flow due to difference in rheological properties, resulting in seismic anisotropy. The purpose of the analysis in chapters 4 and 5 of this thesis is to create a self-consistent numerical craton model that incorporates petrophysical and seismic anisotropy parameters. Seismic signatures are generated using this model to understand the sensitivity of existing methods to infer the location and characteristics of the LAB. Seismic anisotropy was incorporated and a self-consistent numerical model was generated. To observe seismic signatures like P-wave receiver function and S-wave receiver function 3D finite difference waveform analysis was performed for the model.

The main contributions for each chapter are as follows:

- Chapter 1 introduces the concept of various seismic discontinuties such as Moho, Mid-Lithospheric discontinuity and lithosphere-asthenosphere boundary. This chapter also presents some of the basic principles and tools used in this thesis including seismic anisotropy, LitMod3D, receiver function and 3-D finite difference wave propagation.

- Chapter 2 describes P-wave receiver functions methods. A brief discussion of the RAYSUM method is presented. This approach is used for forward modelling of transverse and radial functions. This chapter includes a discussion of the theory of Moho depth determination through $H - \kappa$ analysis as well as the effect on receiver function due to transverse anisotropy and dipping isotropic reflectors. Splitting of Moho Ps predicts the presence of anisotropy in a layer only if the other phases are well isolated from it. In the case of transverse receiver functions, both transverse anisotropy and dipping isotropic boundaries produce an asymmetric variation along the back azimuth. The RAYSUM package method is also applied to observed waveforms from two stations: IU.WCI a station in the cratonic region in Indiana and TA_A14A a station in Montana that lie at the boundary of cratonic and cordilleran