# Seismic Velocity Structure and Segmentation of southwestern Somali Plate along the Central and Southwest Indian Ridges near the Rodrigues Triple Junction – SO301

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## Introduction

The Rodrigues Triple Junction (RTJ) in the southern Indian Ocean (Fig.1 ) is formed by the Central Indian Ridge (CIR), Southeast Indian Ridge (SEIR), and the ultra-slow spreading Southwest Indian Ridge (SWIR).

The southernmost segment of the CIR features an Oceanic Core Complex (OCC) where tectonic extension takes over from magmatic accretion as the mechanism for the formation of the seafloor.

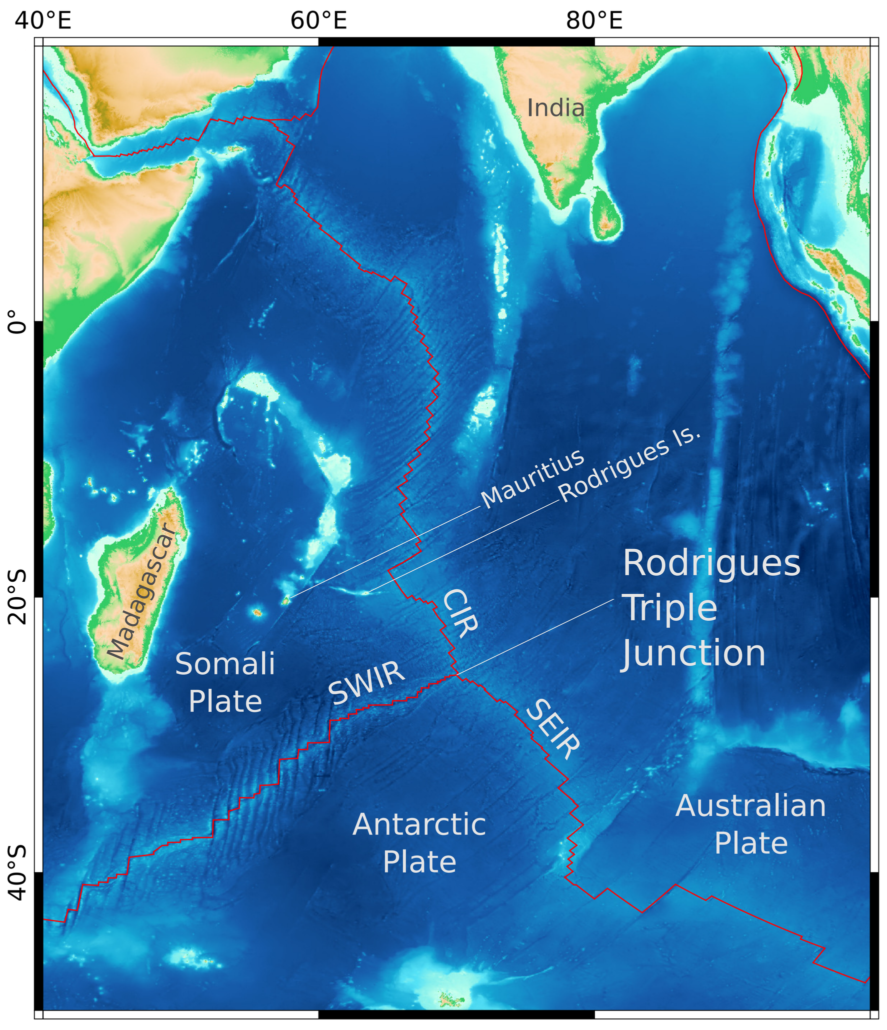


**Figure 1:** Rodrigues Triple Junction (RTJ)

In order to study the structure of the OCC, we carried out a 104 km long seismic refraction experiment (P200 in Fig. 2) as part of a multi-disciplinary geophysical survey within the research project SCIROCCO.

## Data & Methods

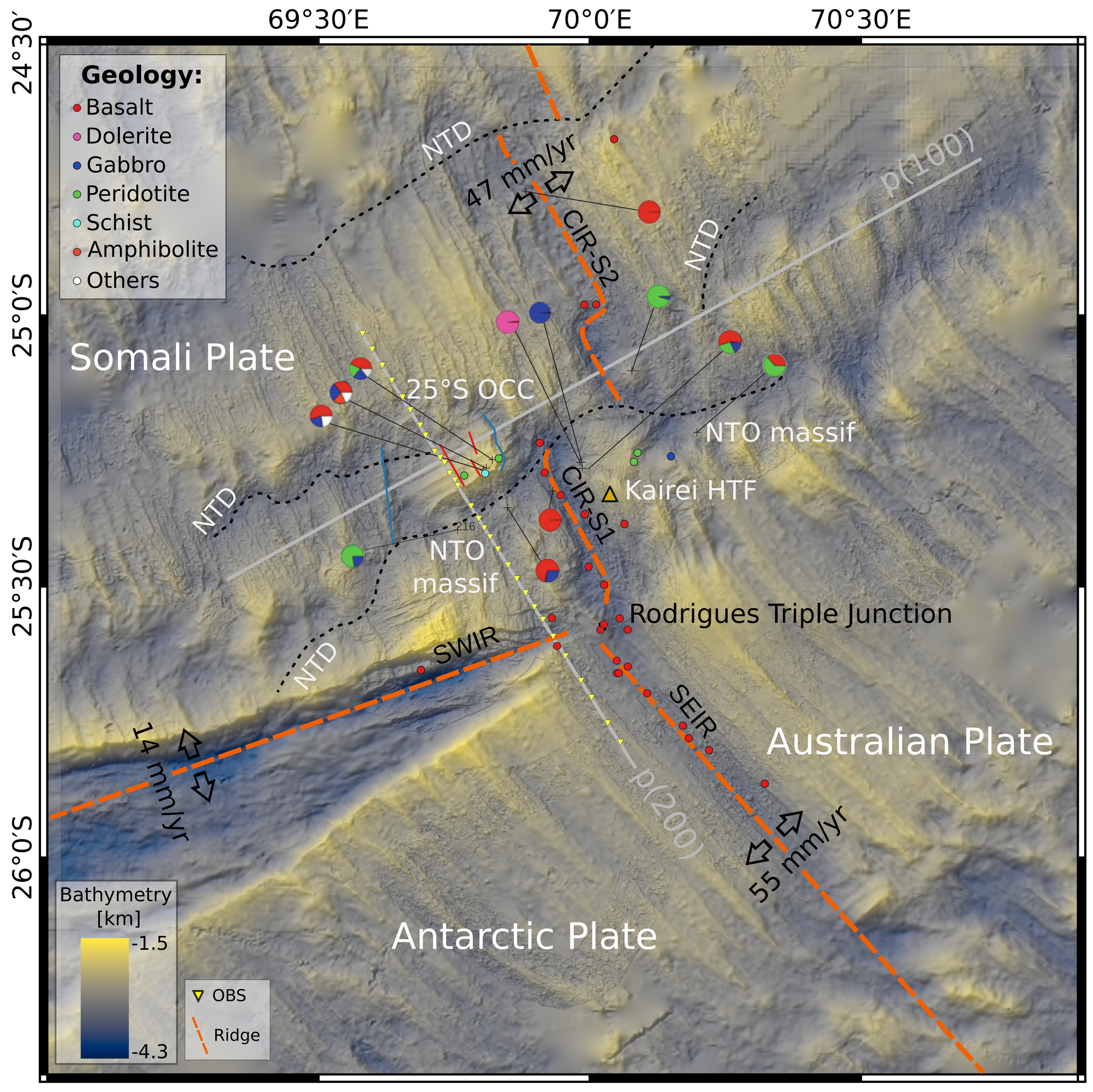


**Figure 2:** Geological setting and structure at the 25°S OCC. Geological data from Okino et al (2015), Morishita et al (2009); NTD modified from Sato et al (2009)

The 25°S Oceanic Core Complex (OCC) is located at the southern end of the Central Indian Ridge.

The setting is characterized by the segmentation of the ridge by means of Non-Transform-Discontinuities (NTD). These structures border the OCC toward the SE and partially to the NW.

Associated with the NTDs there are several Non-Transform-Offset massifs composed of mafic and ultramafic material such as a peridotite NTO massif that borders the OCC to the south along the profile p200.

## P-Wave velocity model

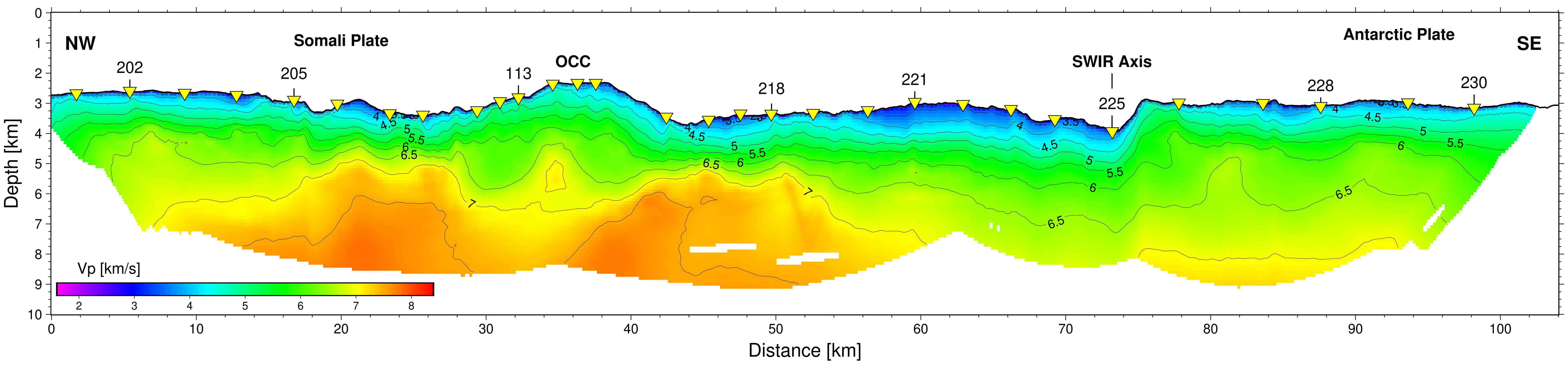


**Figure 3:** P-wave velocity model from traveltime tomography using Tomo2D (Korenaga et al., 2000)

The OCC shows high P-wave velocities associated with gabbroic and ultramafic compositions bound by slower velocities indicating faulting and serpentinization of the shallow flanks.

High velocities are present at both ends of the core complex, related to ultramafic non-transform offset massifs.

The Antarctic Plate shows a typical layered structure toward the southeast.

## Gravity Data and Joint Density-Velocity Inversion

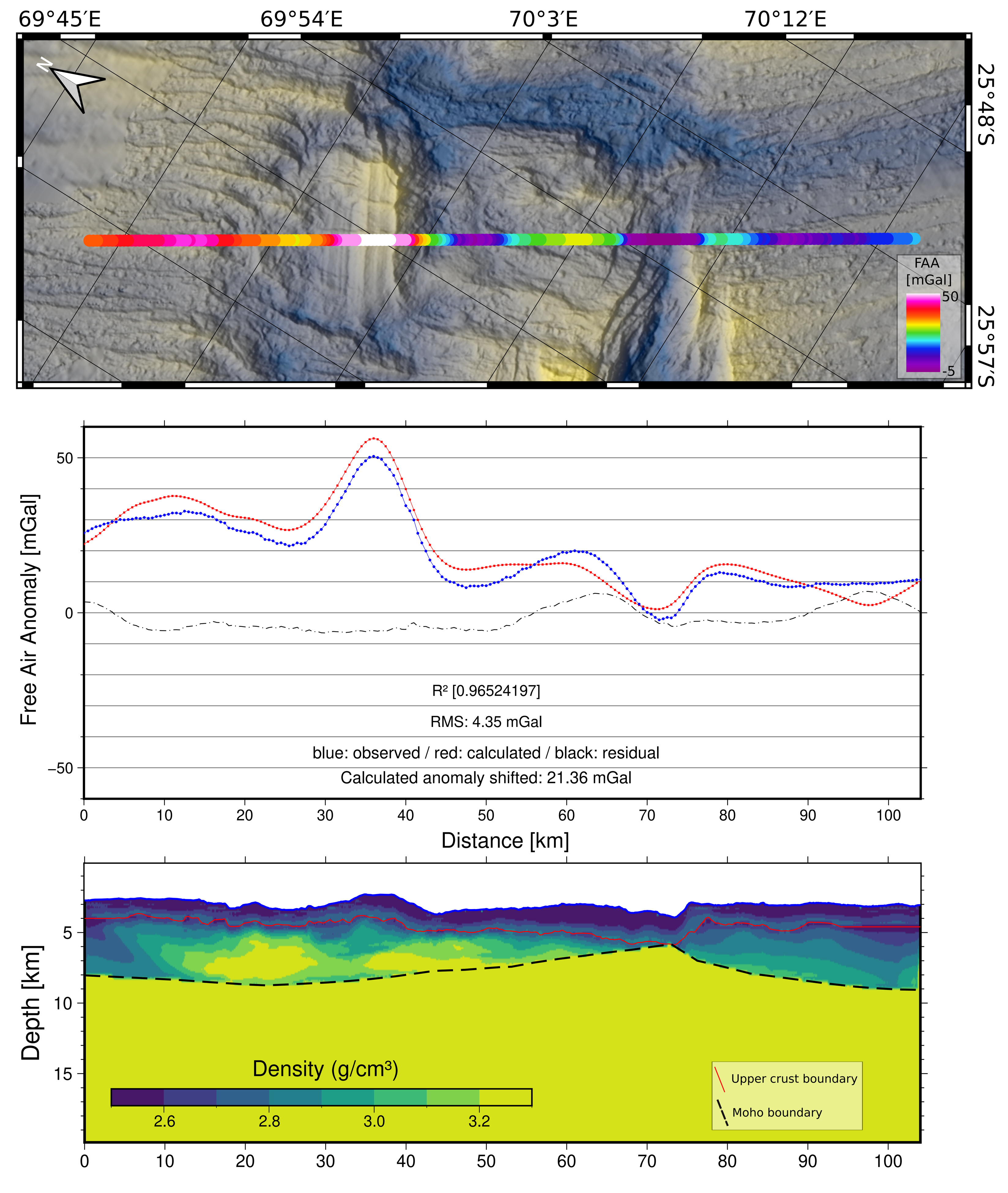


**Figure 4:** Density distribution form joint inversion with Tomo2D (Korenaga et al. (2000)

The joint inversion using the code of Korenaga et al. (2000) allows to reduce the non-uniqueness by integrating the P-wave velocity (Fig. 3) and gravity data (Figs 4 & 5). It considers the physical relationship between these properties.

The results from the joint inversion along p200 (Fig. 4) show lower densities (~2.7 g/cm$^3$) for the NW and SE shallow parts of the OCC. The centre part of the OCC shows densities of 2.9 - 3.0 g/cm$^3$ indicating the presence of gabbroic material in the shallow regions.

The southeastern flank of the OCC shows high densities reaching up to 3.2 g/cm$^3$ supporting the interpretation of the presence of ultramafic material for this area associated with the non-transform offset massifs.

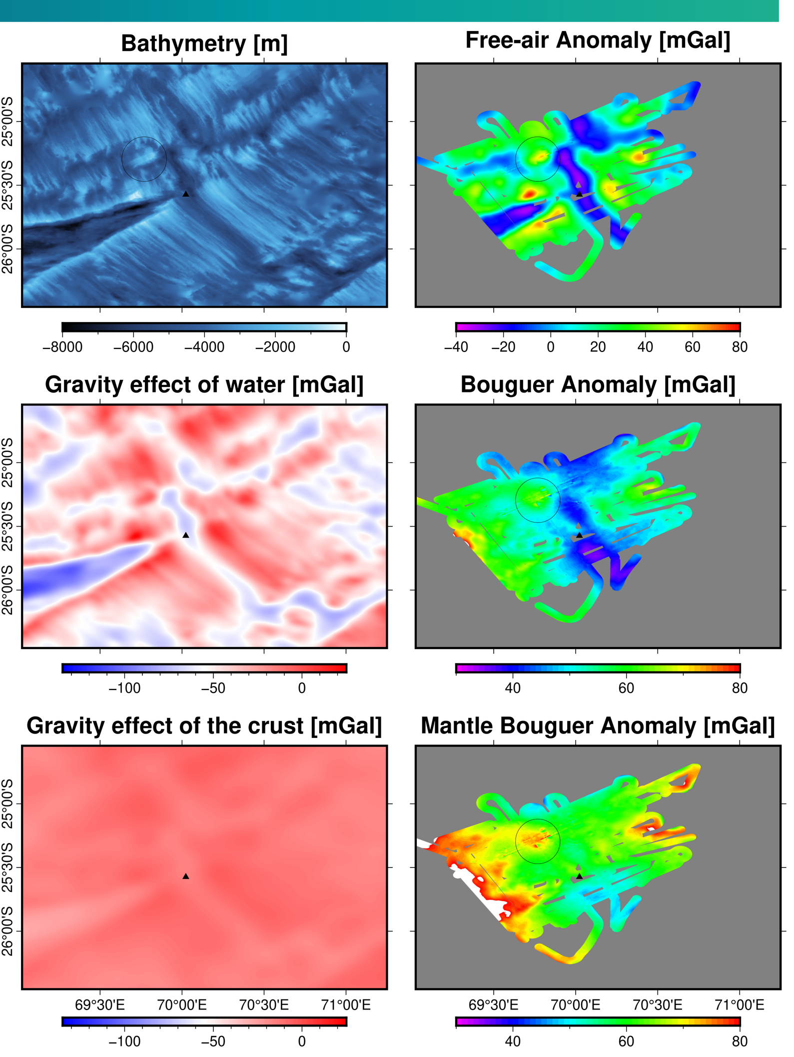


**Figure 5:** Mantle Bouguer Anomalies

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