1) GEOLOGICAL INTRODUCTION
The Paraná-Etendeka region is a part of a Large Igneous Province (LIP) that formed in the opening of the South Atlantic Ocean. This volcanic region was the southwestern part of Gondwana, which belonged to one supercontinent, the Pangaea, before the opening of the South Atlantic Ocean, and it led to the separation of the South American and the African continents. The shallow layers are relatively well known, in contrast to the deeper lithospheric layers and concerning the magmatic origin of the LIP event. Here the lithosphere is investigated.

2) GOAL
Increase the knowledge of the lithosphere dynamic under this LIP and the lithosphere under the Paraná-Etendeka region (South America, W-Africa) increase the knowledge of the lithosphere dynamic under this LIP.

3) METHODOLOGY
- Make the inverse modeling to define the geometry (thickness and depth) of unknown layers inside the lithosphere.
- Make a forward modeling to compute the gravity effect of known layers and concerning the magmatic origin of the LIP event. Here the total gravity effect is provided (Fig. 5) instead of a density anomaly body.
- Thanks to the oceanic part, the gravity inverse modeling suggest missing mass inside the lithosphere under South America.

4) GEOPHYSICAL DATA
A) TOPOGRAPHY
ETOP01 (Amante and Eakins, 2009) resolution of 1 arc-minute (Fig. 1).

B) GOCE GRAVITY DATA
Thanks to the good quality of GOCE data it is now possible to study wide areas, crossing several states and continents; the resolution is 8 km (Fig. 2).

C) SEDIMENT ISOPACHS
Fig. 3 Sediment thickness onshore and offshore in SAM continent (A, B, C); D: SAM offshore according to NOAA dataset (Divins et al. 2003).

D) FORWARD MODELING OF SEDIMENT ISOPACHS
Table 1. Density values in SAM and Africa sedimentary rocks.

E) SEISMOLOGICAL-SEISMIC MOHO AND AIRY MOHO
In South America seismological models of Moho are available (a review in Mariani et al., 2013).

In the oceanic area the geophysical constraints are given by isostatic models (Fig. 6).

5) INVERSE MODELING
Gravity inversion models are offered to quantify the residual gravity anomaly as unknown body. The geological models are classified in two categories:

1) POSITIVE
- The positive gravity anomaly can be due to a magnetic activity connected to the Paraná-Etendeka province.
- The positive gravity anomaly is the presence of the sedimentary layers.
- To perform the inversion, the inversion function (Matlab) is applied.
- All the states of art the anomaly under the Paraná basin is preferentially inverted (SAM).

2) NEGATIVE
- The negative anomaly can be explained by a sedimentary basin on land, that was not integrated during the modeling. Continental density 2500 kg/m³.

5-1) MODELING IN CONTINENTAL AREA OF SAM

5-2) MODELING IN OCEANIC AREA OF ETENDEKA

6) PRELIMINARY RESULT
The gravity inverse modeling suggest missing mass inside the lithosphere under SAM.

3-1) INVERSE MODELING IN CONTINENTAL AREA OF SAM

3-2) PROPOSALS FOR FUTURE WORK
- The oceanic gravity observations are not integrated in the models.

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REFERENCES:
- Jackson et al. 2000; Marzoli et al., 1999.
- Feng et al. 2007.
- Deeper Moho belongs to Assumpção et al. (2013).
- Shallower belongs to Feng et al. (2007).
- In the oceanic part of the Paraná basin, near Congo basin. The model simulates a mantle densification.
- The density anomaly is provided inside the lithosphere under South America.
- Positive anomaly has almost the same location according to the three residual Bouguer anomaly models, with a range respectively from 125-75 mGal.
- The gravity anomaly can be explained by a sedimentary basin on land, that was not integrated during the modeling.
- Continental density 2500 kg/m³.