INVESTIGATING THE ROLE OF IBERIA AND ITS INTERPLAY
WITH THE NEWFOUNDLAND AND IRISH OFFSHORE
MARGINS USING PLATE RECONSTRUCTIONS

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INTRODUCTION

• Project goals are to investigate:
  • The role of the Galicia Bank during the formation of the West Iberian (WIB) margin using deformable plate tectonic models created in GPlates.
  • Timing and extent of deformation throughout the WIB margin:
    • Relationship with the Newfoundland and Irish offshore margins.
    • Interplay between the Galicia Bank and Flemish Cap.
  • Independent motion of continental fragments and their interplay with inherited structures during rifting and subsequent opening of the southern North Atlantic.
• GPPlates 2.2 used to create deformable plate tectonic models of the WIB margin from 200 Ma to present day.
• Models built using:
  • Previously published constraints - Nirrengarten et al. (2018) (necking line and edge of continental crust shown in red) and Peace at al. (2019).
  • Newly defined geometries of polygons representing the Galicia Bank (white) based on gravity inversion crustal thickness.
  • New poles of rotation for the Galicia Bank.
• WIB margin deformable plate models @ 200 Ma.
• Variations in each model:
  • Galicia Bank (GB) geometry.
  • GB starting position at 200 Ma.
  • GB Jurassic and Cretaceous poles of rotation.
  • Attempts to account for the effect of inherited Variscan structures during rifting (Model 8b).

Deformable Domain

Continental Fragments
PRESENT DAY CRUSTAL THICKNESSES

Crustal Thickness (km)
Kinematics of the Galicia Bank produce crustal thickness variability mainly within the Galicia Interior Basin in all models tested. Models 8a and 8b provide the closest match to crustal thickness results obtained from gravity inversion. Differences between models 8a and 8b:

- Both use same poles of rotation for the Galicia Bank.
- Model 8b represents an attempt to account for the effect of inherited structures (highlighted in red) within the Galicia Interior Basin.
GRAVITY INVERSION COMPARISON

Model 8b
Undeformable GPlates domain

GPlates Model 8b
Gravity Inversion
COMPARISON WITH REFRACTION DATA

modified after Perez-Gussinye et al. (2003)

modified after Druet et al. (2018)

Undeformable GPlates domain

Rigid Galicia Bank
Proximal Domain
Gravity Inversion
Refraction (Profile d)
Model 8b
Model 8a
Moho
Sedimentary Basement
CONCLUSIONS

- GPlates has served as a useful tool for evaluating the plate kinematics of Iberia.
- The Galicia Bank and its independent motion played an important role during the formation of the West Iberian margin – Galicia Interior Basin in particular:
  - Models 8a and 8b provided the closest match with respect to gravity inversion results.
  - Structural inheritance was an important contributor during the evolution of the WIB margin – demonstrated by model 8b results.


