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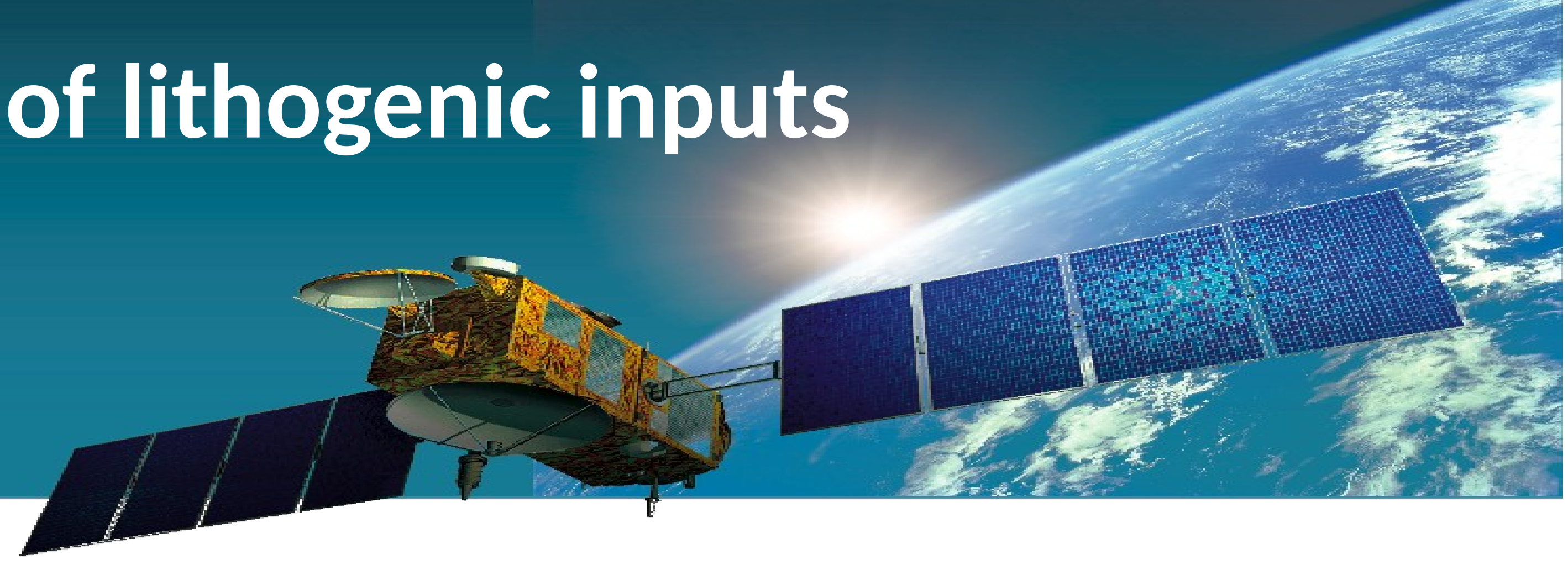
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Internal tidal wave energy responsible of lithogenic inputs along the Iberian shelf

S. Barbot, M. Lagarde, F. Lyard, C. Jeandel
LEGOS, CNRS, IRD, CNES, Université Toulouse 3-Paul Sabatier, France



Sediment resuspension off the Iberian margin

The analysis of particles sampled during the GEOVIDE cruise (May/June 2014, *R/V Pourquoi Pas?*) brings to light high Rare Earth Elements (REE) concentrations close to the Iberian margin, due to strong lithogenic inputs ^[1].

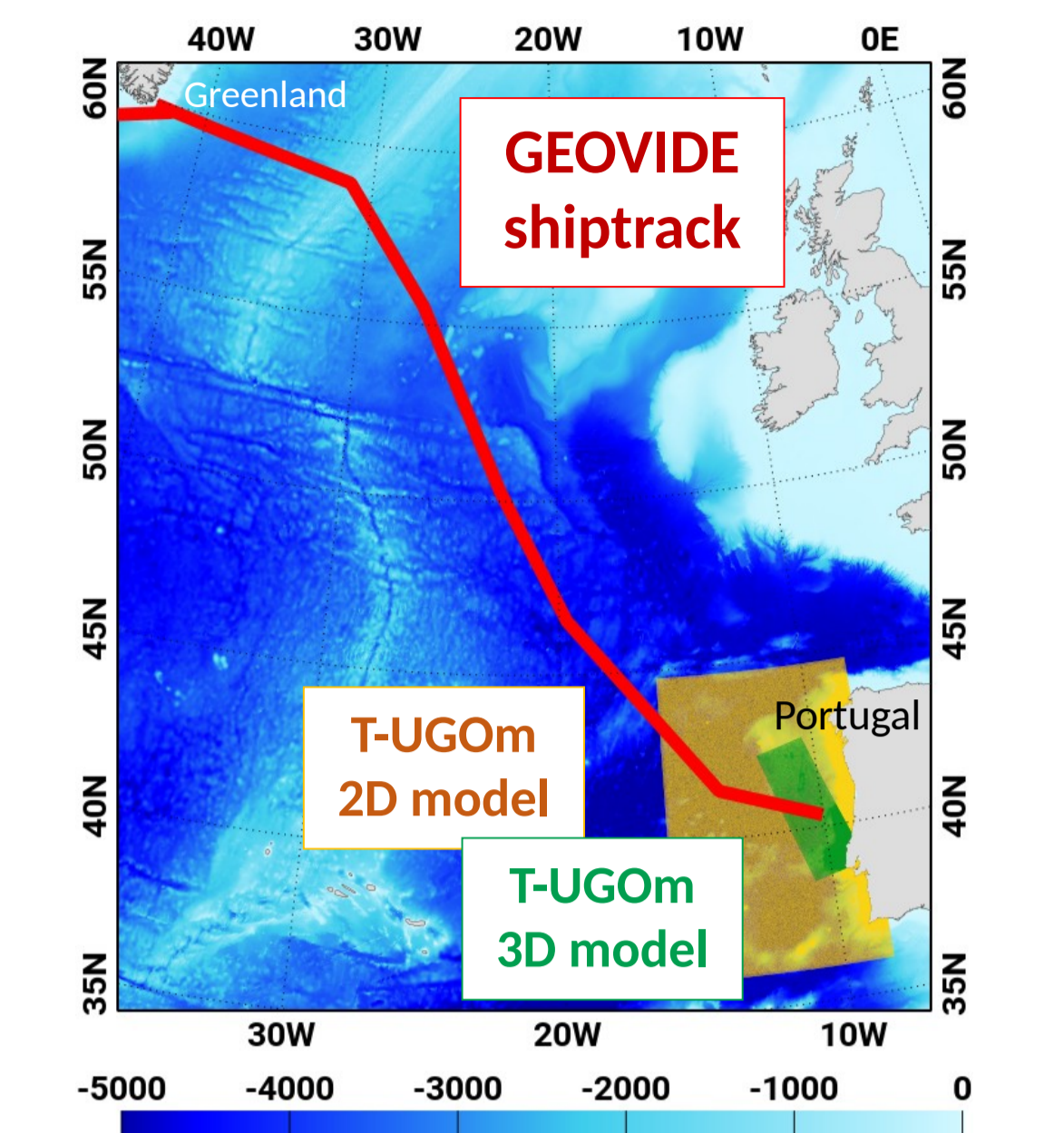


Fig.1 - GEOVIDE cruise transect over the bathymetry (in m)

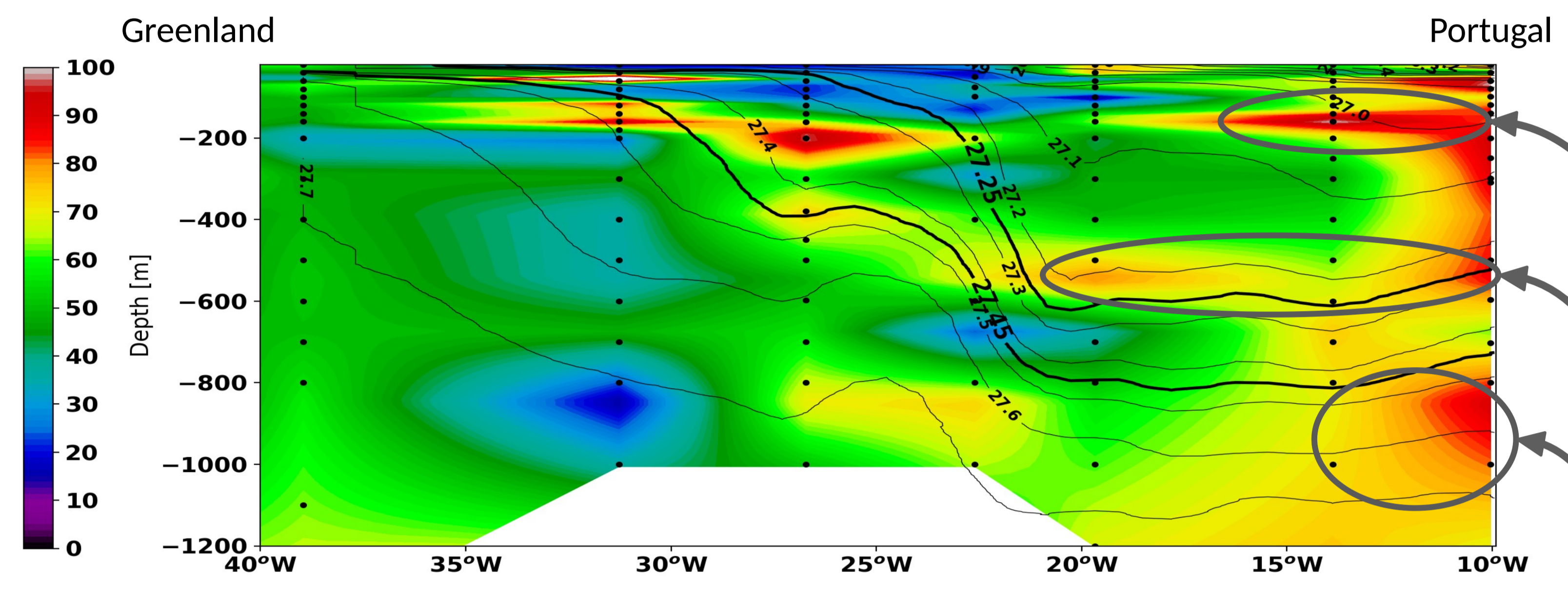
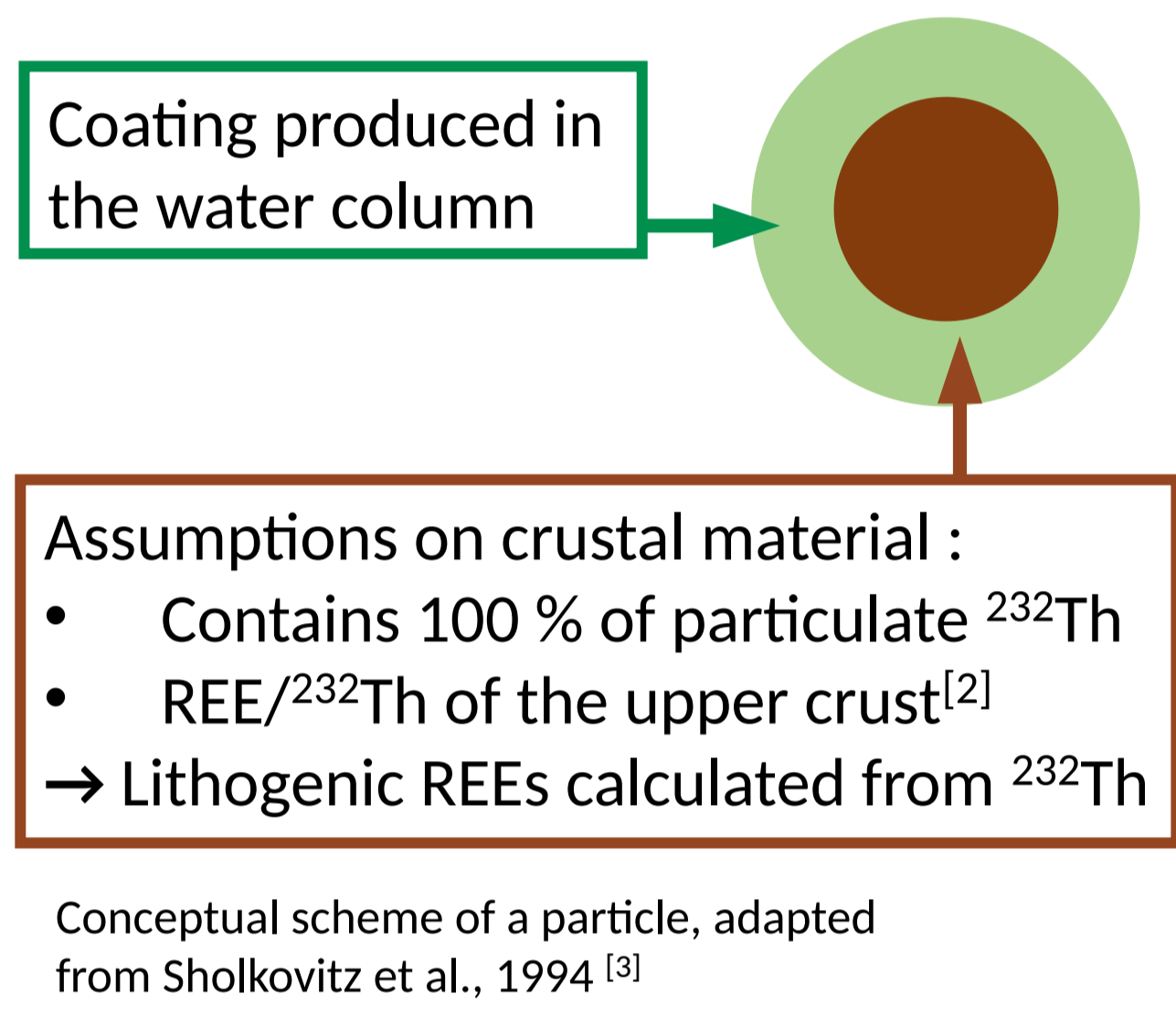


Fig.2 - Proportion of particulate lithogenic neodymium (in %) in Northern Atlantic Ocean from GEOVIDE measurements.

Resuspension and propagation of lithogenic particles at 200m, 600m and 800m
Which mechanisms are involved?

Conclusion:
ITWs involved in two ways

- 1 the ITWs are responsible for the high velocities along the slope of the continental shelf. This enhances the resuspension of the sediments.
- 2 the ITWs in the Iberian shelf propagate northward and can transport the lithogenic material away from the shelf.

Internal Tidal Waves (ITWs) : from a 2D model to a 3D model

The ITWs result from the coexistence of two factors :

- A steep slope
- The tidal flux \perp to the slope

Quantifying the energy developed by the ITWs at the bottom and the direction of ITWs propagation requires a 3D tidal model.

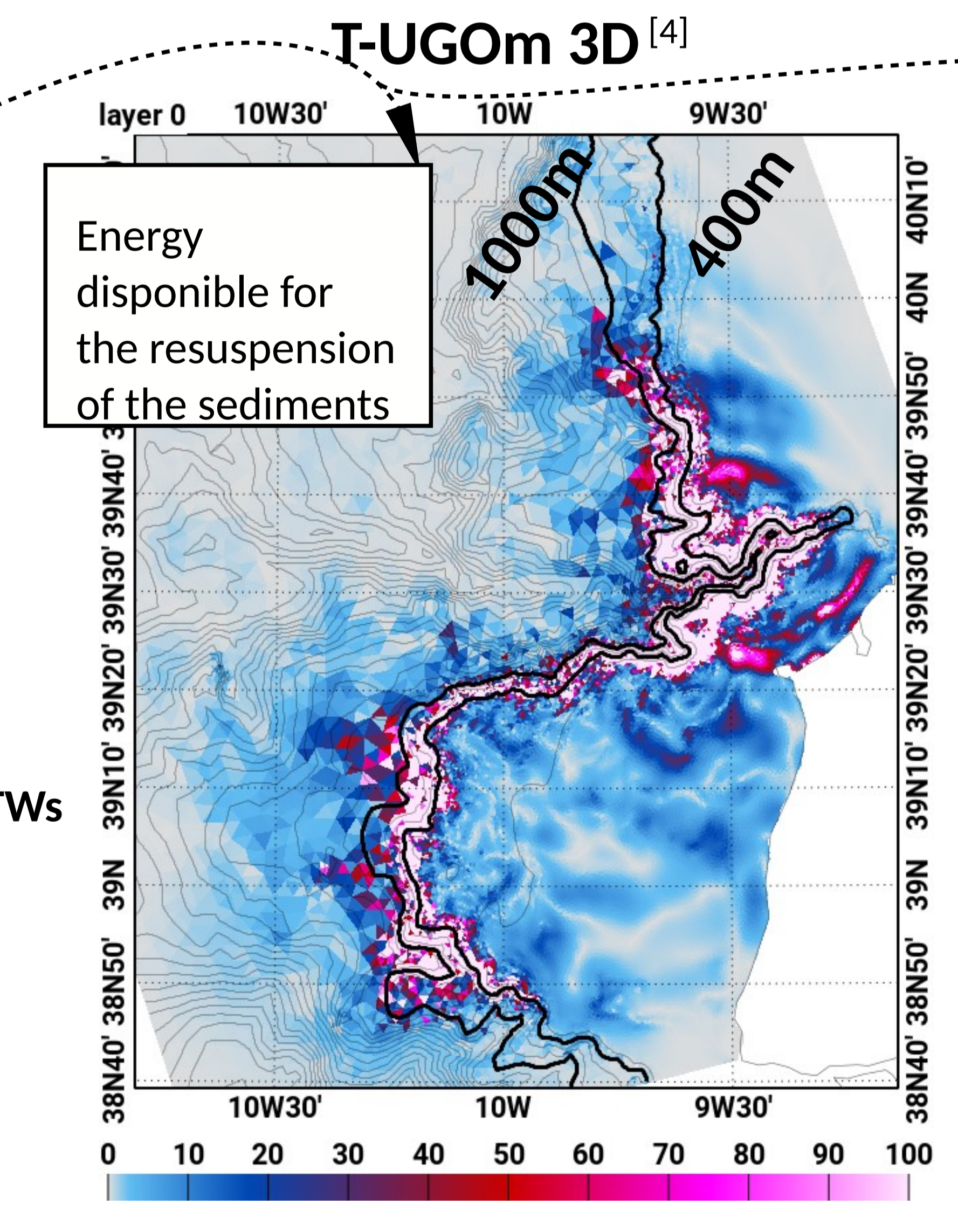
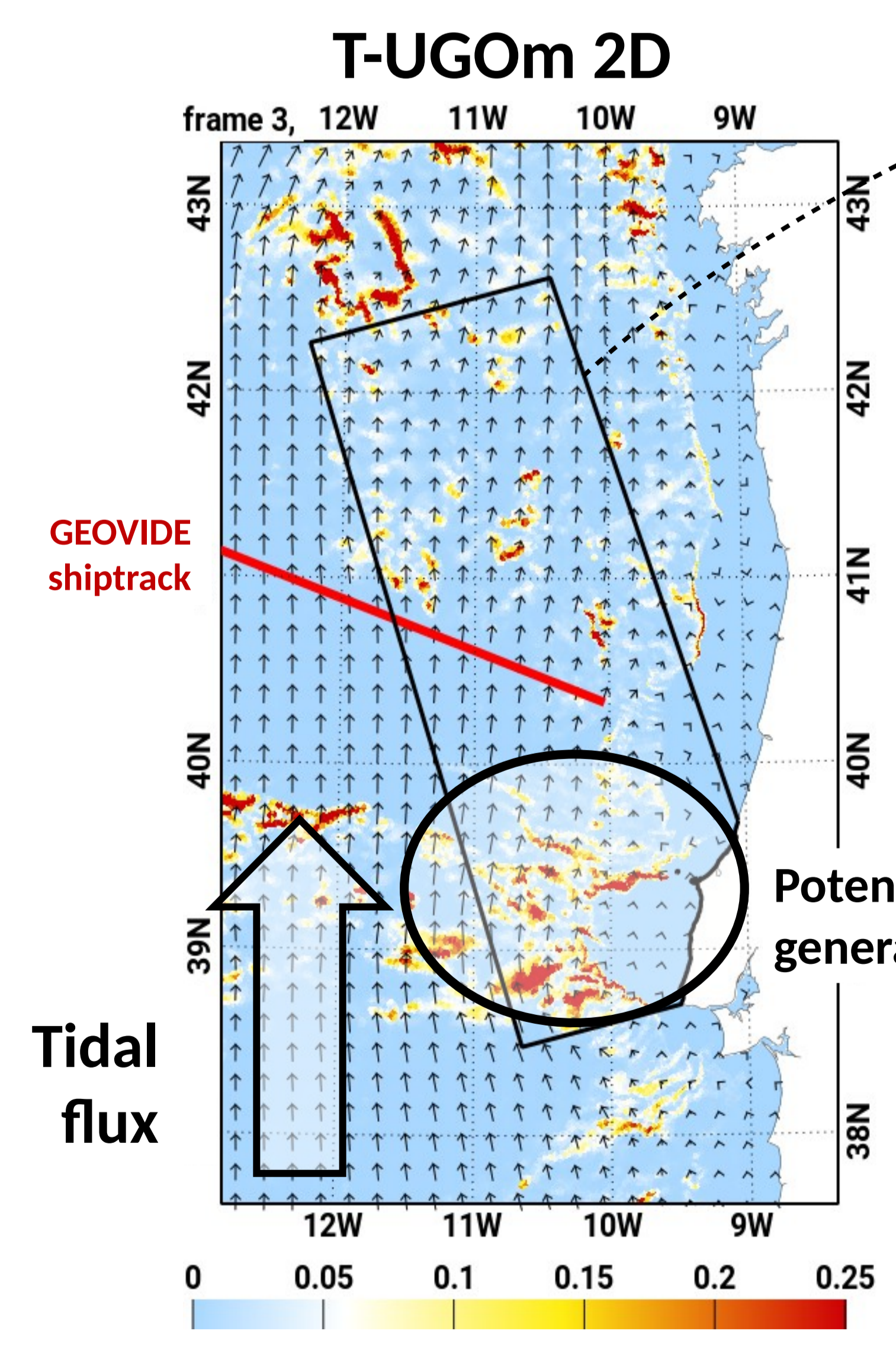


Fig.3 - Wave drag (energy consumed by the ITWs, in $W.m^{-2}$) estimated using a 2D simulation.

Fig.4 - Baroclinic flux at the bottom (energy deployed by the ITWs, in $W.m^{-2}$) resolved using a 3D simulation. Most of this energy is located between 400m and 1000m isobaths.

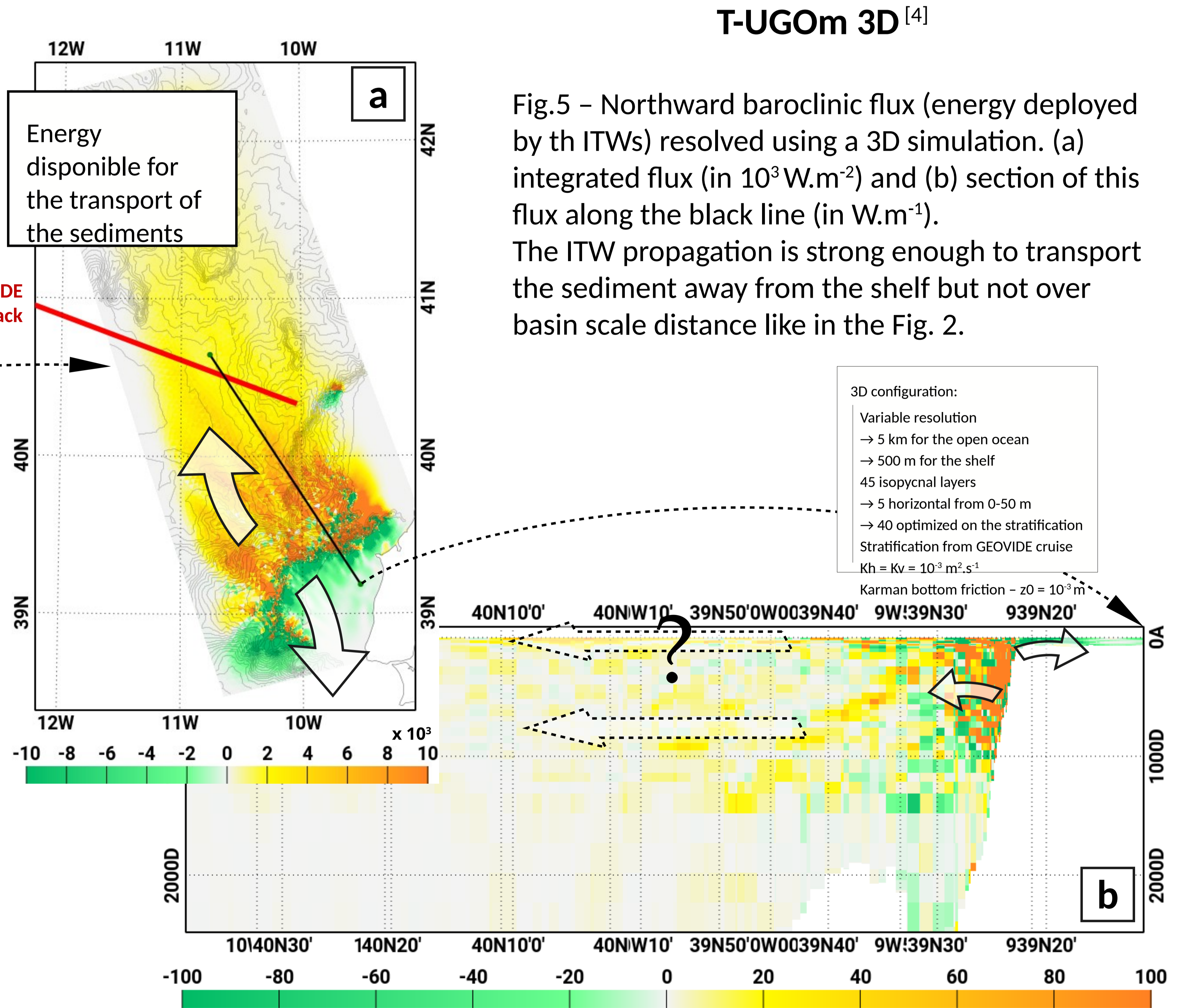


Fig.5 - Northward baroclinic flux (energy deployed by the ITWs) resolved using a 3D simulation. (a) integrated flux (in $10^3 W.m^{-2}$) and (b) section of this flux along the black line (in $W.m^{-1}$). The ITW propagation is strong enough to transport the sediment away from the shelf but not over basin scale distance like in the Fig. 2.

References :

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[2] Rudnick, R. L. and Gao, S.: Composition of the Continental Crust, in *Treatise on Geochemistry*, pp. 1-51, Elsevier., 2014.

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