



Royal Netherlands Navy

LAT differences on the North Sea - update 2022

NSHC TWG24 (VTC) – 27 Sept 2022

Thijs Ligteringen
Ronald Kuilman

Hydrographic Service
Geodesy and Tides



Work plan items

WP18/01

Improve North Sea wide realisation of reference surfaces.

Explain and reduce differences in reference surfaces at the international boundaries.

WP 22/01

Ensure common European LAT surface adoption.

Follow the developments of European initiatives on new LAT surfaces.



Action items

AP18/01

Explain differences in realizations of LAT.

AP22/01

Each member state should supply information on how their LAT surface was built to NL who analyze this information and compare the surfaces.

AP22/02

Each member state should supply all LAT updates to NL who will update the LAT differences matrix accordingly.

AP23/02

Investigate all LAT differences at the borders and overlapping parts of surfaces using the redefined norm.



History

Background

October 2008: NSHC tasks Tidal Working Group (TWG) to study a seamless LAT for the North Sea.

TWG22 (October 2017 – Ostend)

The TWG has continued to work to combine existing national models in order to develop a common reference surface for tidal reduction to Chart Datum in the North Sea.

Several countries have their own reference surface related to the ellipsoid. There are discontinuities at adjacent boundaries. The updates of the member country's reference surfaces (LAT) were discussed together with their impact on the difference calculated as *LAT difference / depth*.

TWG23 (Februari 2020 - Reykjavik)

During TWG23 there was a discussion about how to redefine the 1% norm. NL proposed to define a new proposal for the norm connected to S-44 (AP 23/01).

LAT North Sea – result 2022

Almost full coverage, based on received data of TWG members.

Updated since previous analysis:

DK – DTU21LAT

DE – ChartDatum-Ellipsoid-Germany2021

NL – NLLAT2018

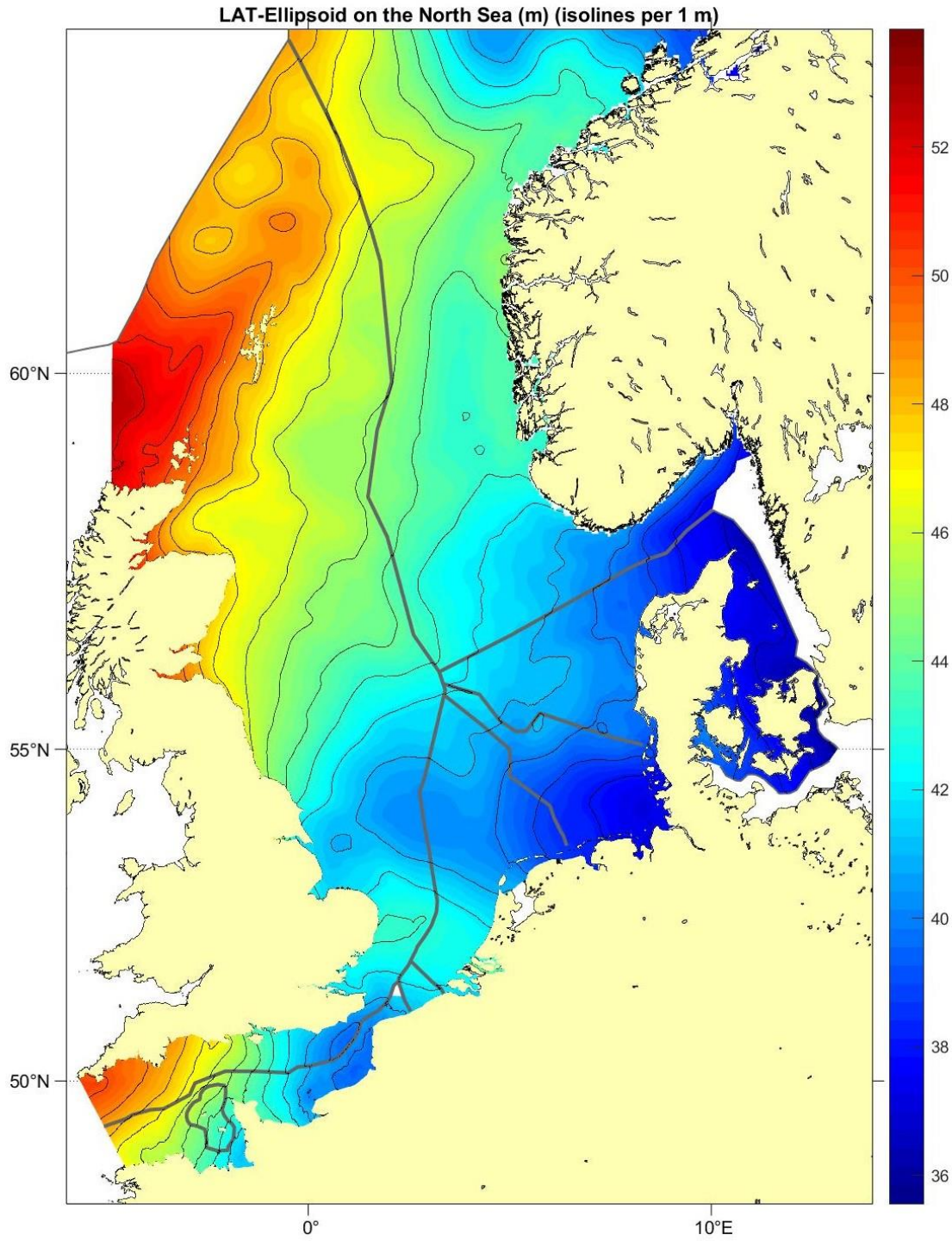
Unchanged:

UK – VORF

NO – MSS DTU & Z0 ROMS

BE – GEONZ97 and EGM96

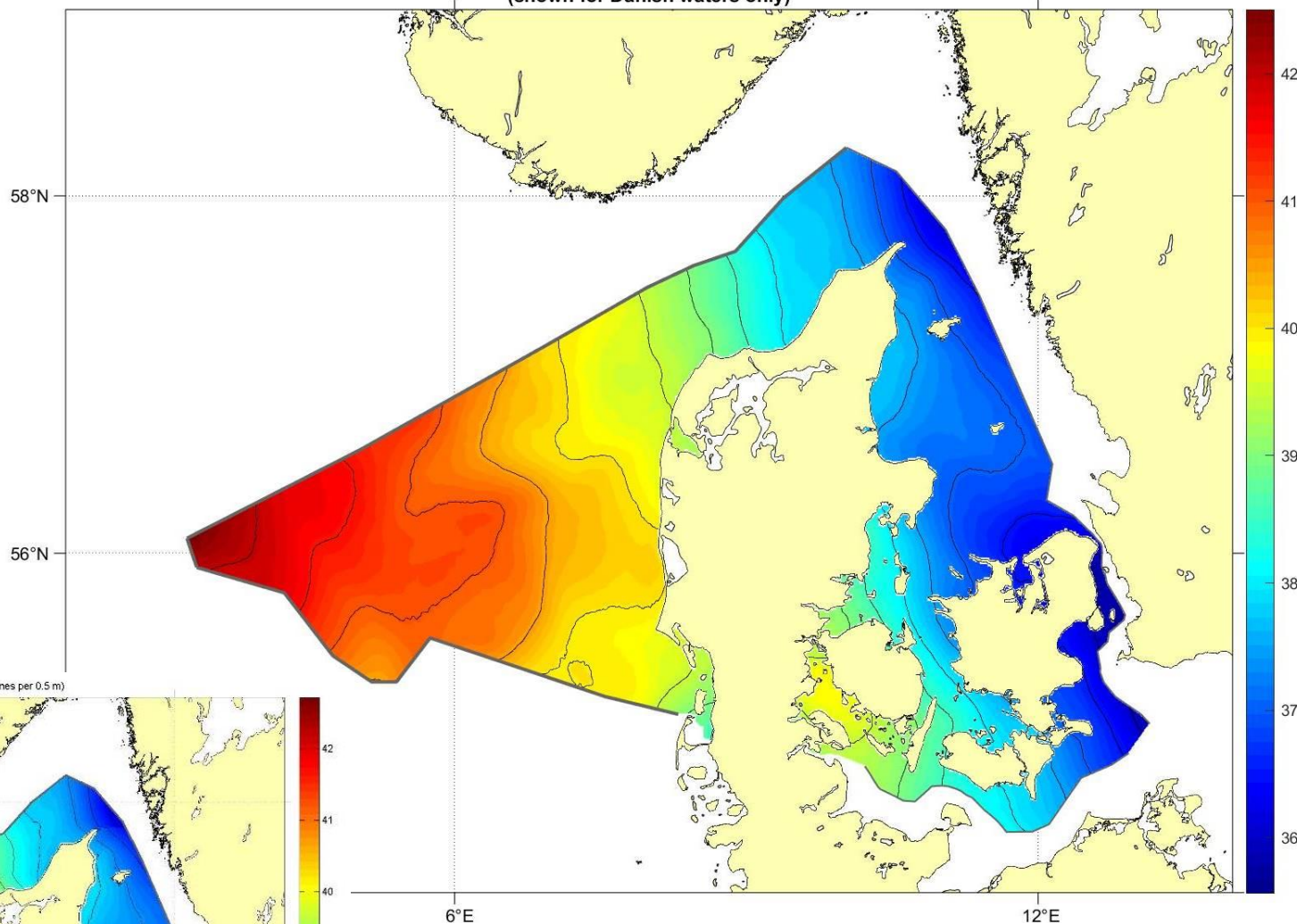
FR – BathyElli v2.0



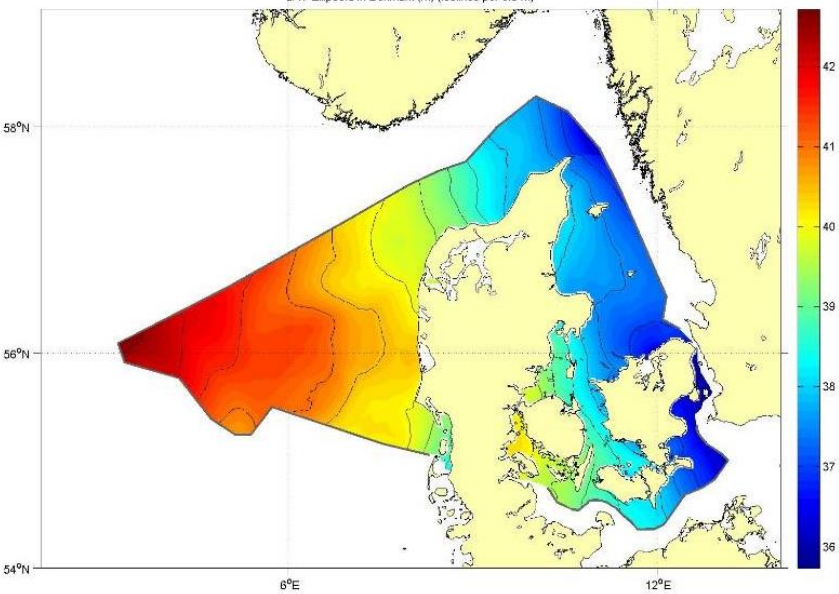
LAT-Ellipsoid on the North Sea (m), Danish solution (isolines per 0.5 m)
(shown for Danish waters only)

New data
Denmark

2015



LAT-Ellipsoid in Denmark (m) (isolines per 0.5 m)



2021

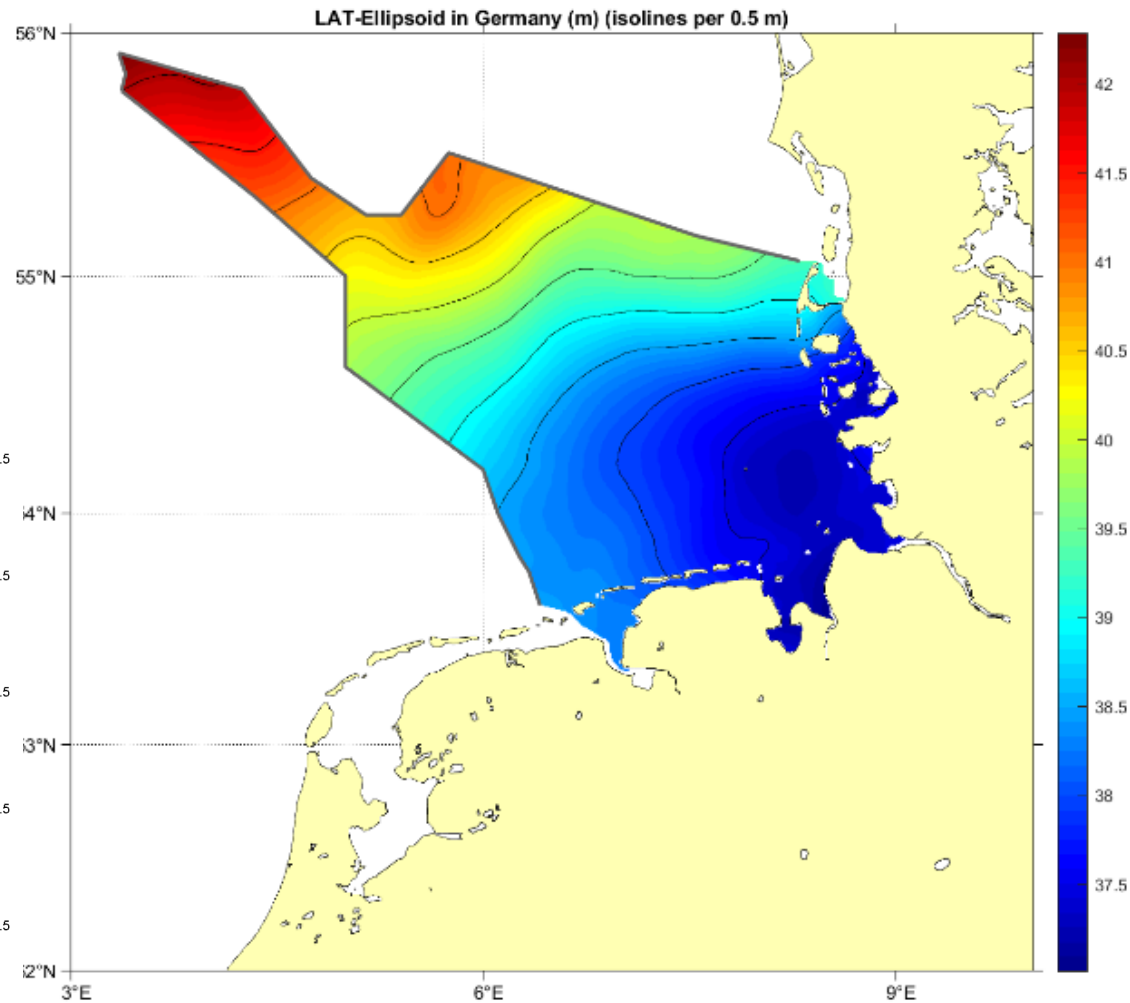
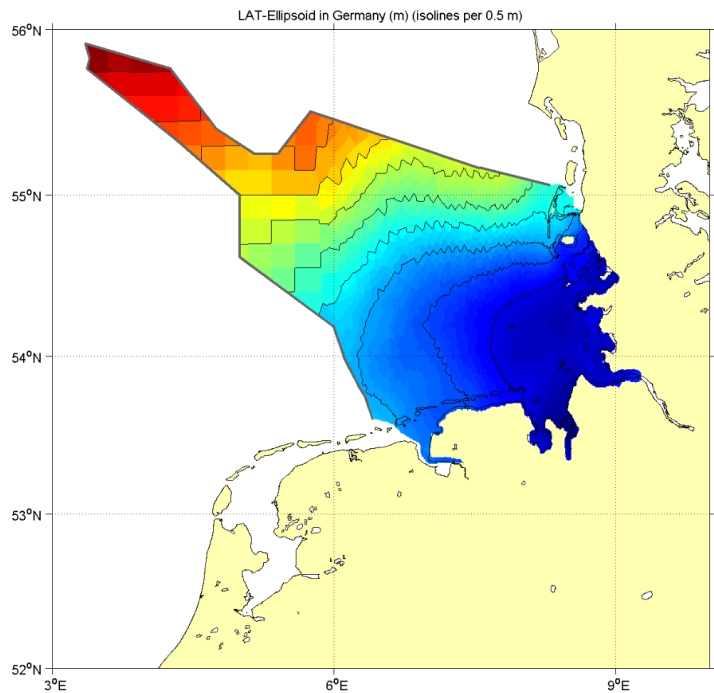
Royal Netherlands Navy
Seamless LAT on the North Sea



New data Germany

2021/22

2017

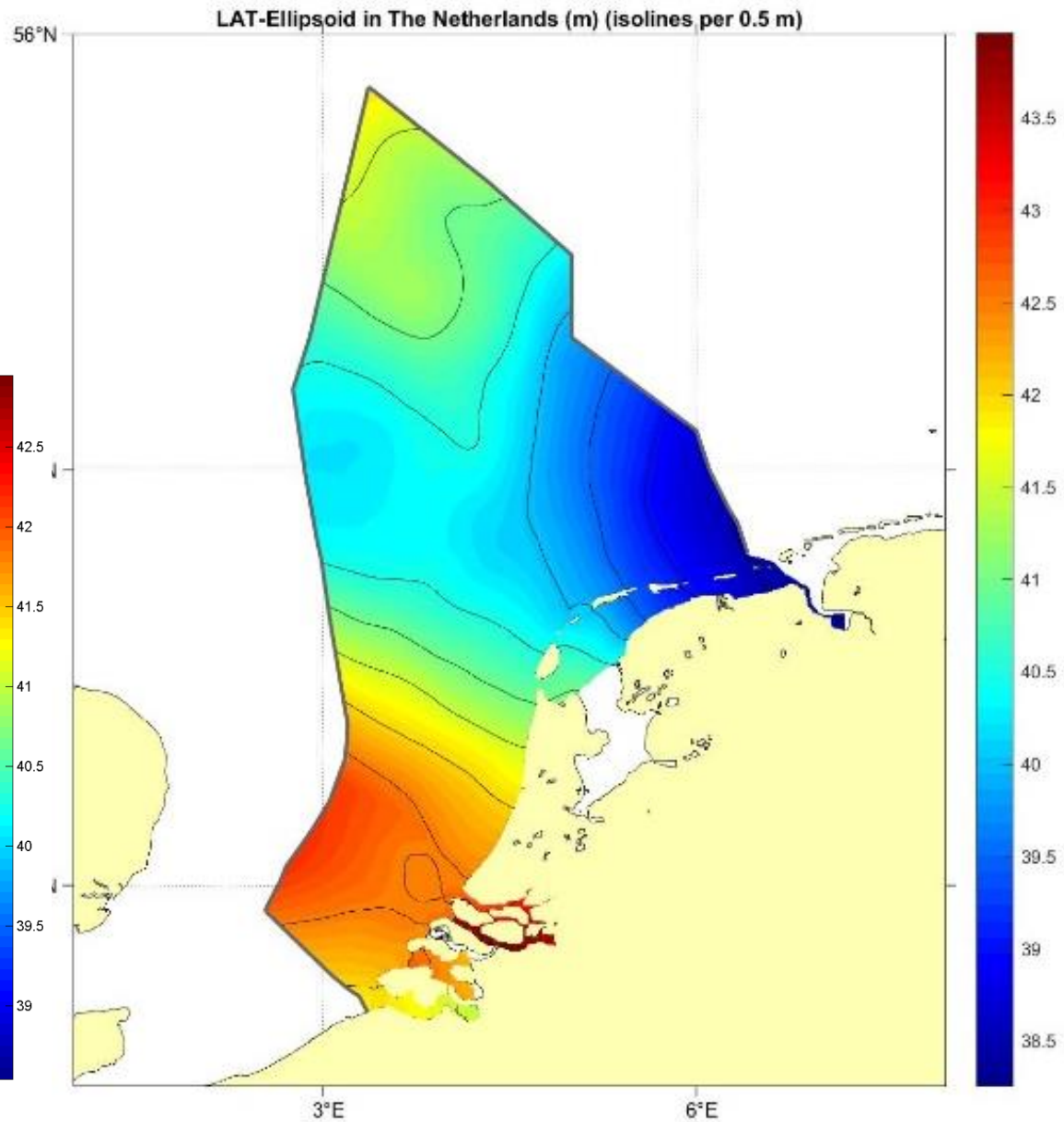
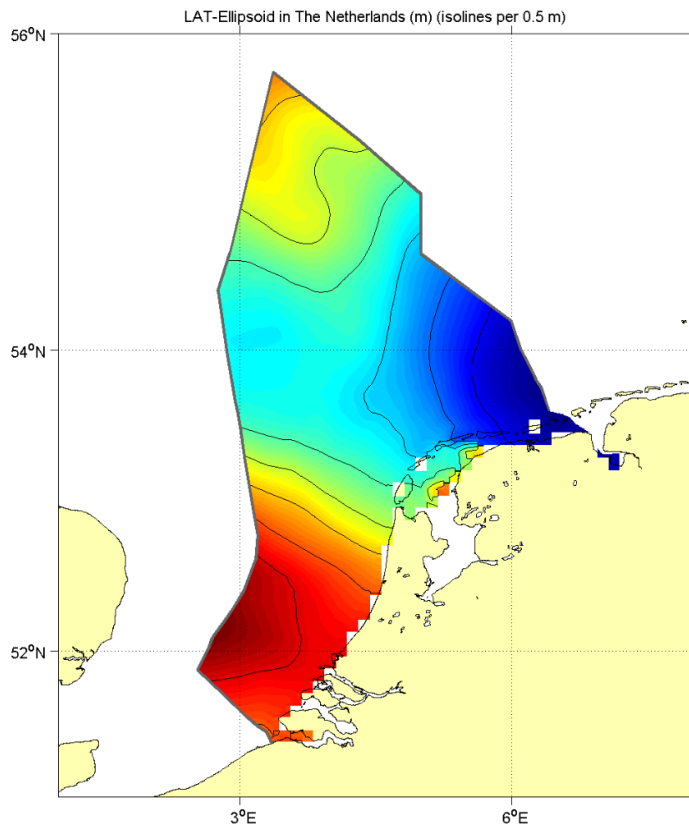




NLLAT2018

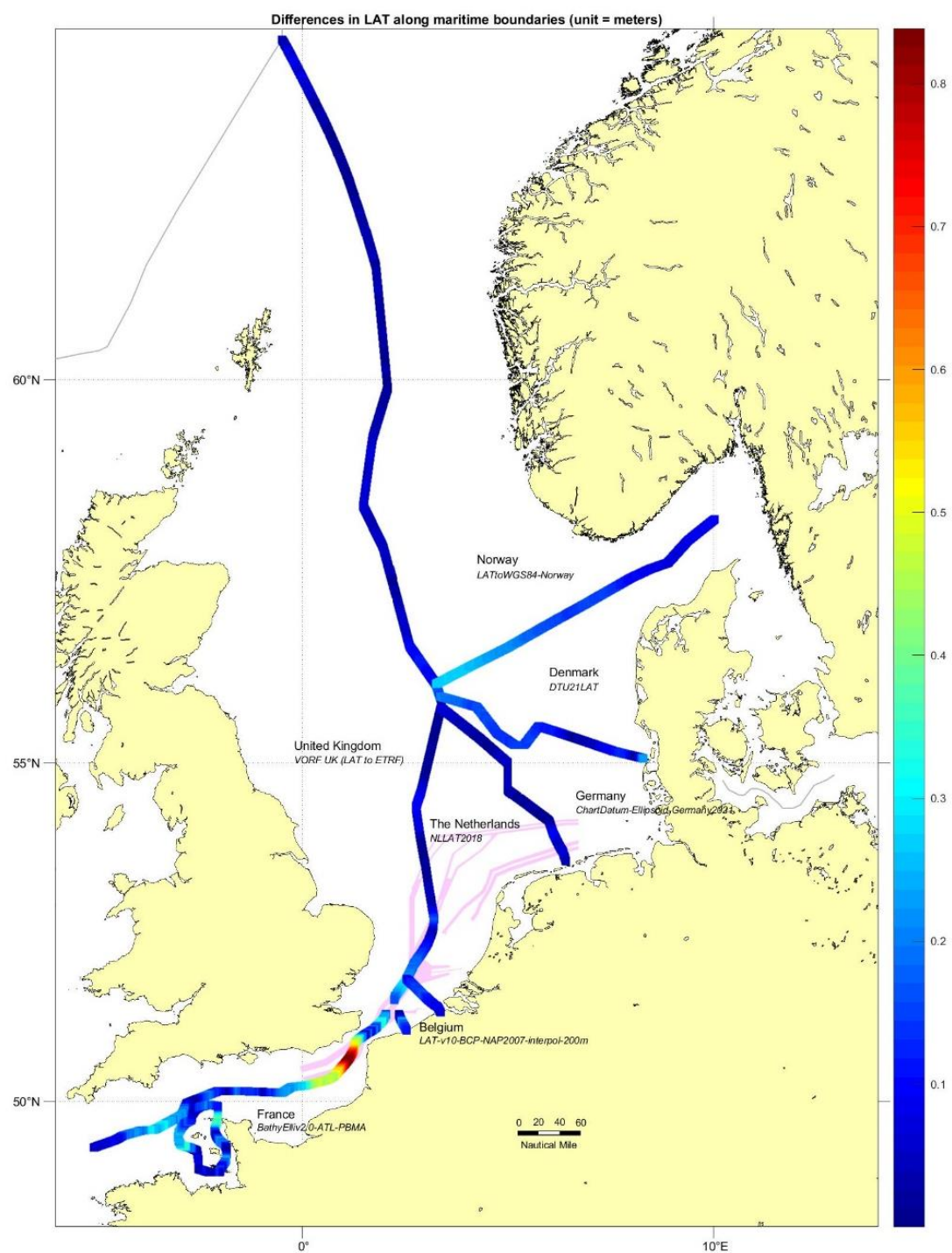
New data The Netherlands

LAT2006



North Sea

LAT differences at maritime boundaries



LAT differences at (Northern part)



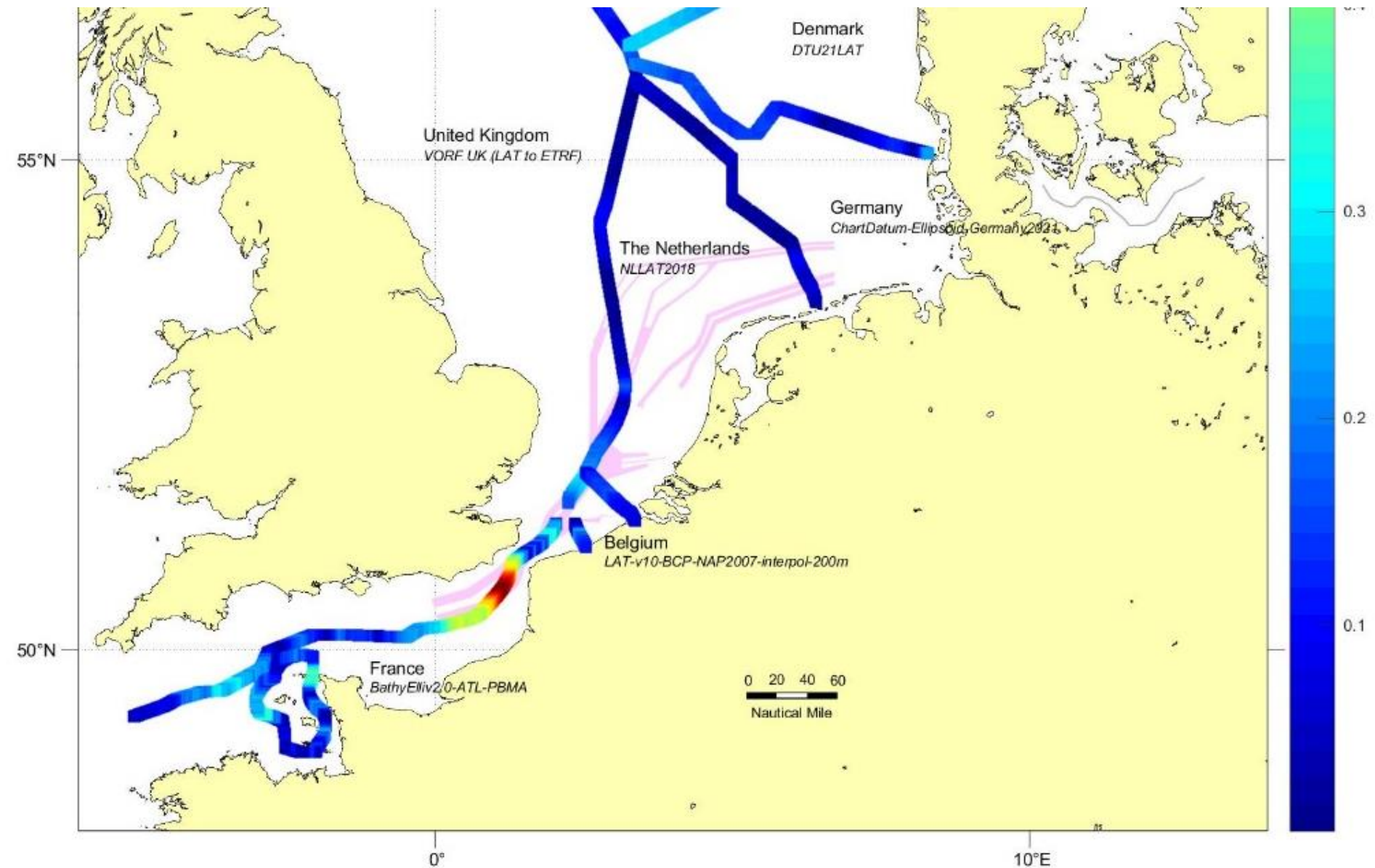
maritime boundaries

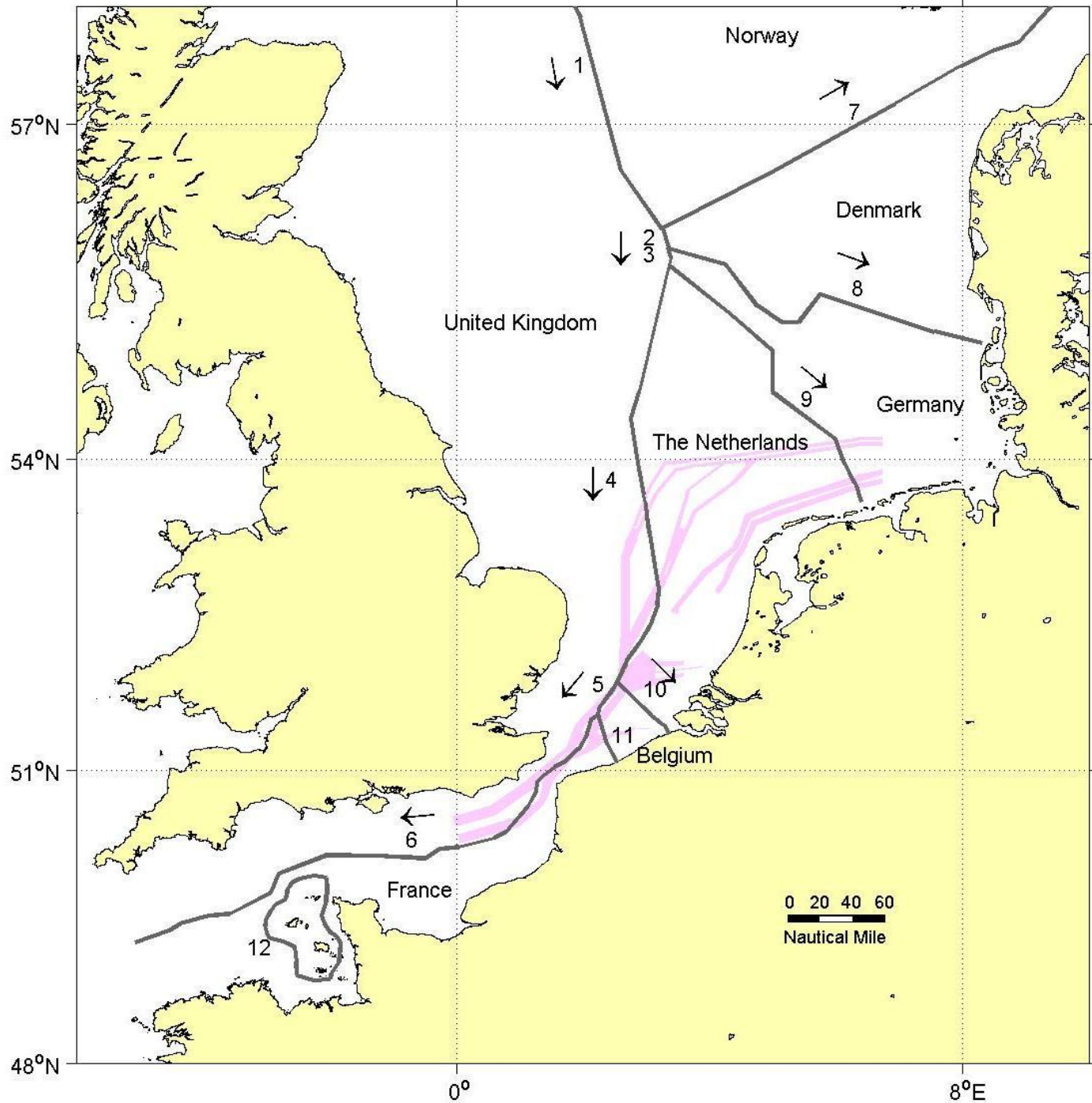


LAT differences at (Southern part)



maritime boundaries

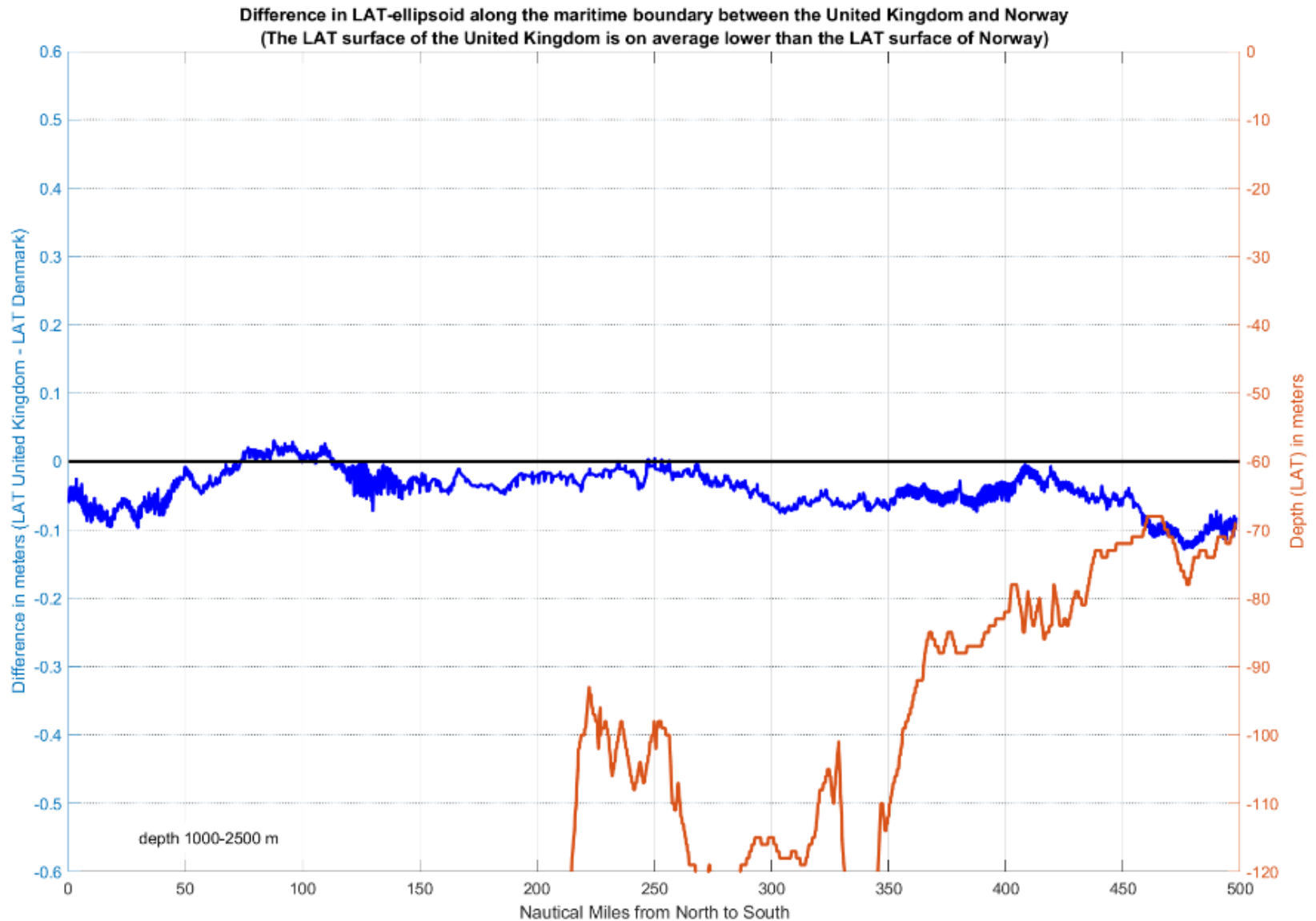




1.UK-Norway



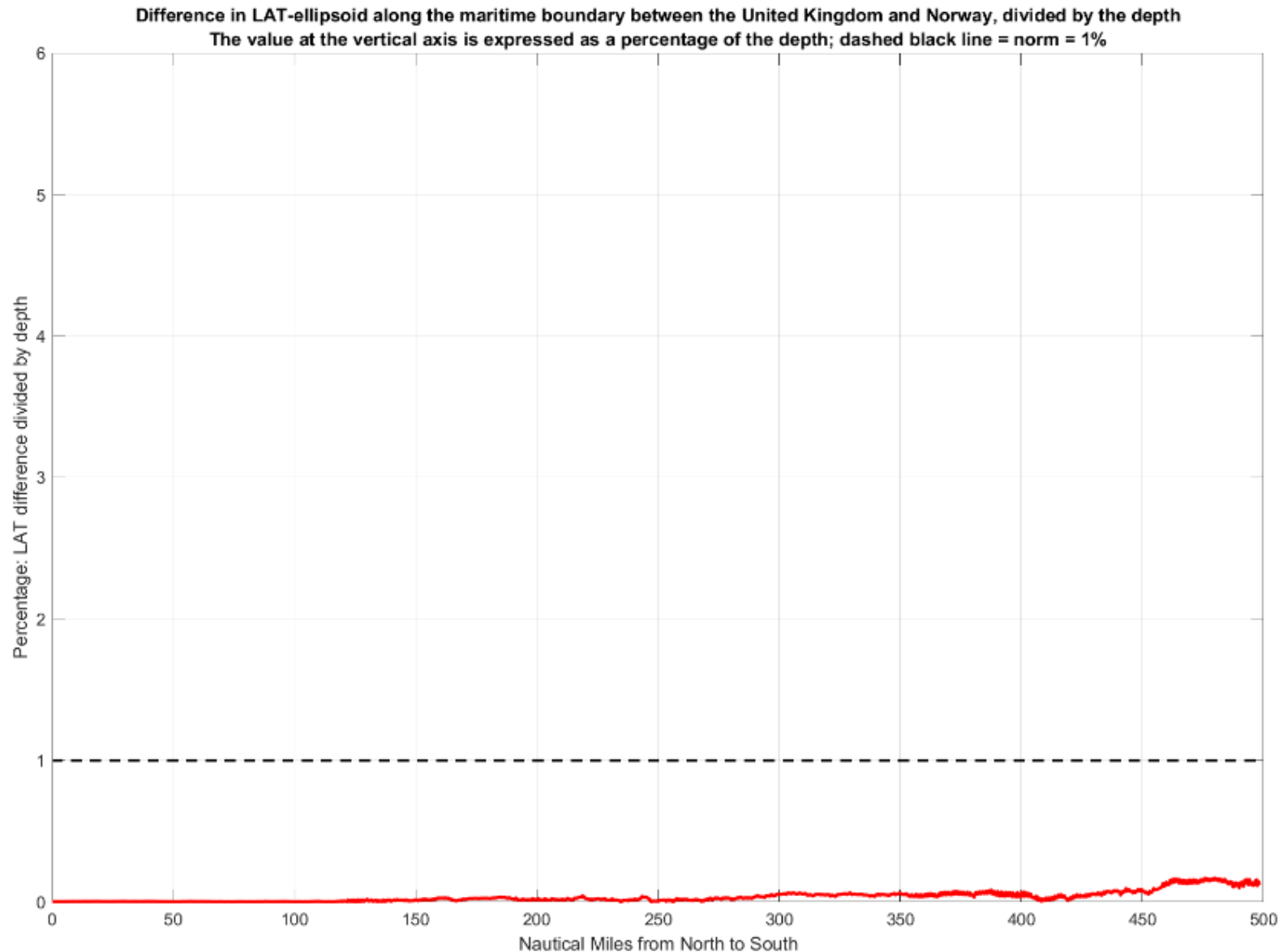
(unchanged)

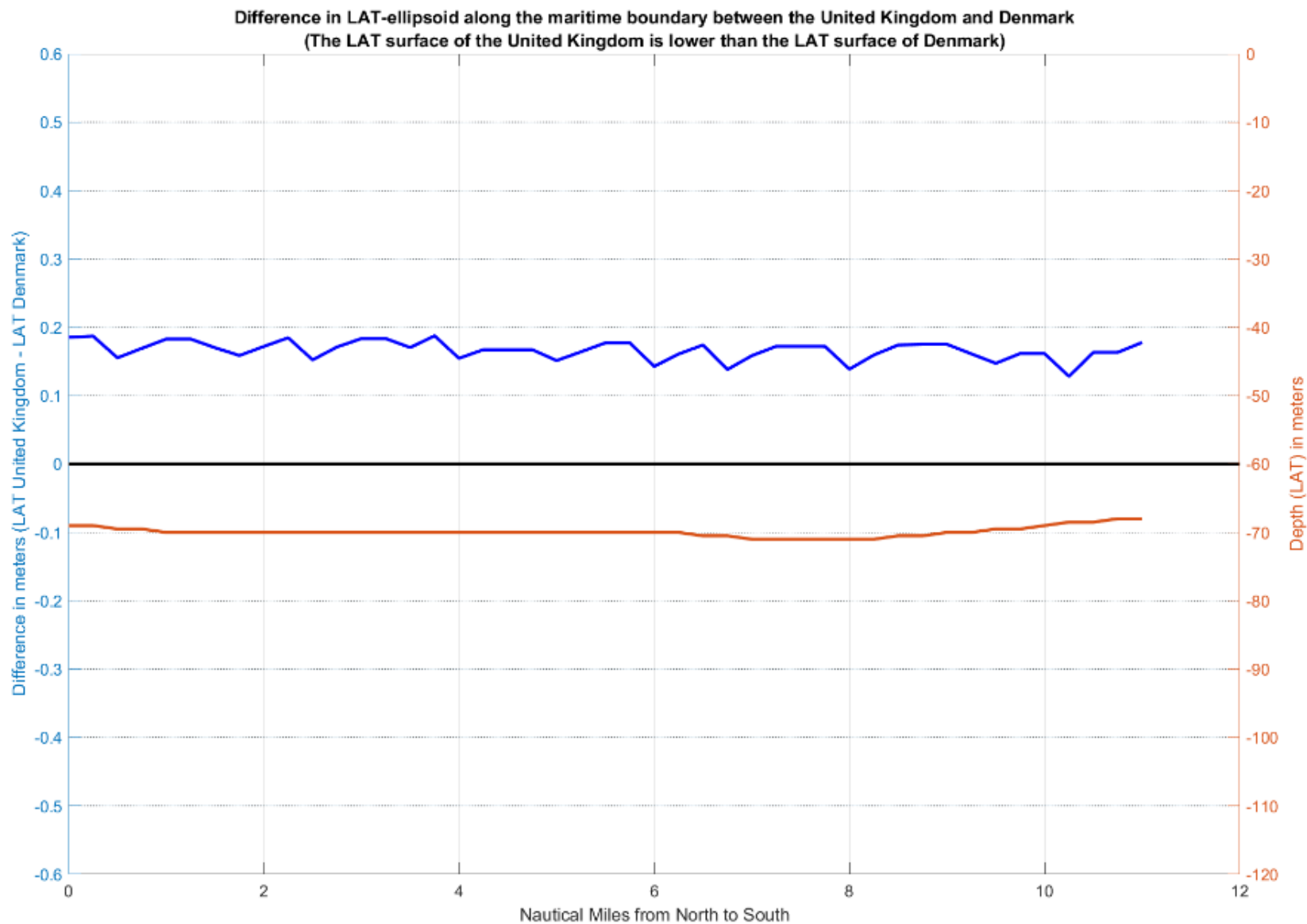


1.UK-Norway



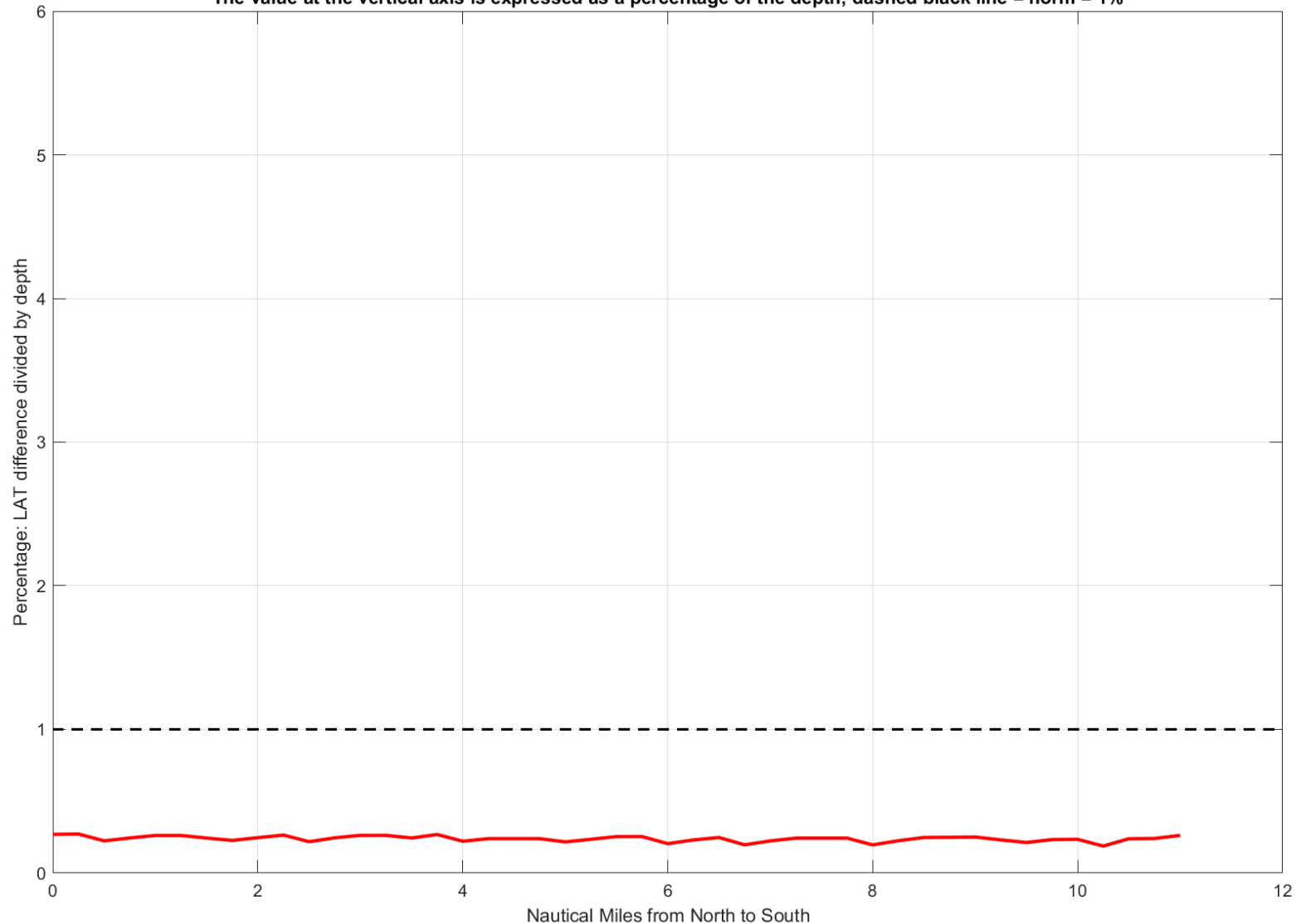
(unchanged)

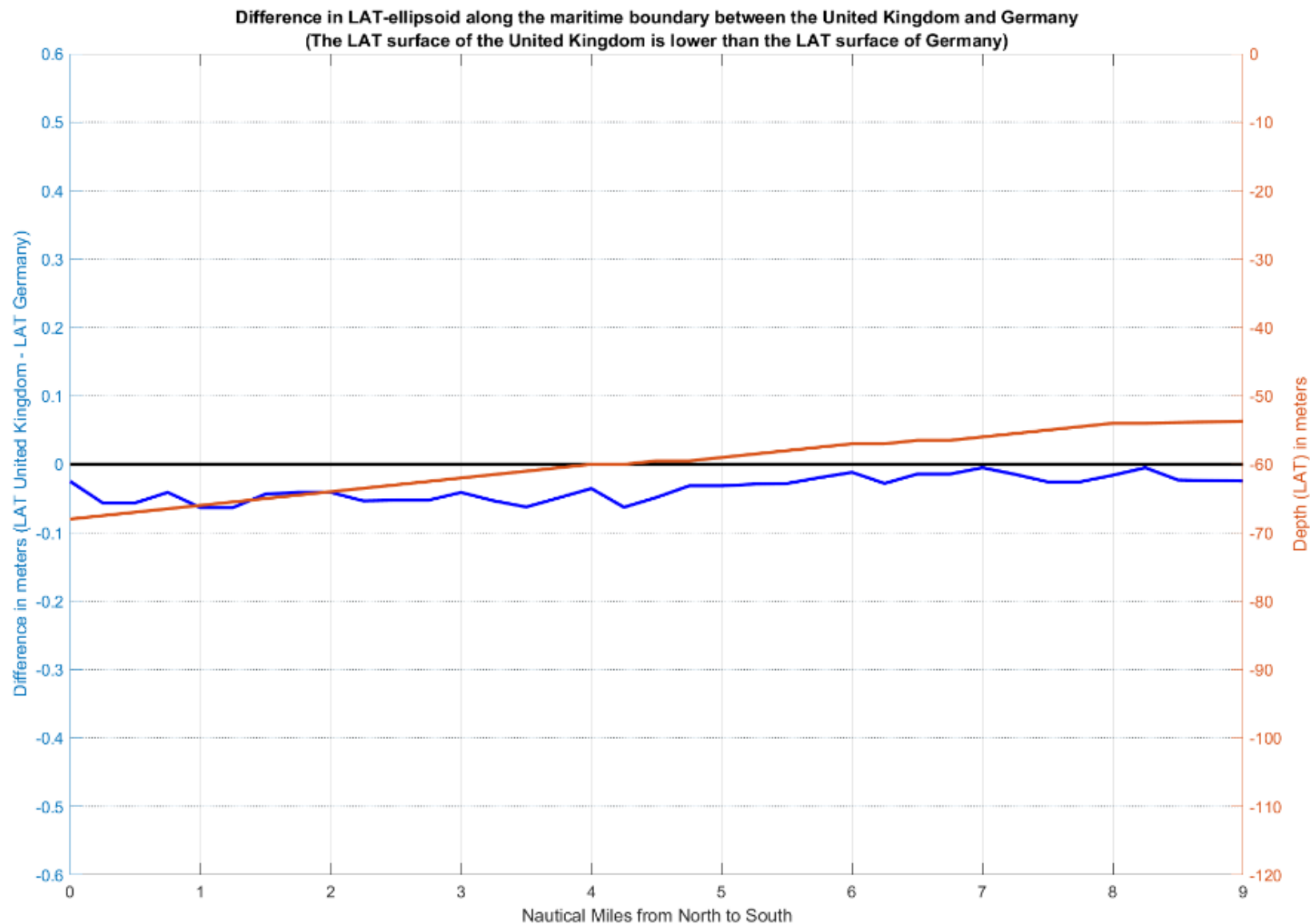






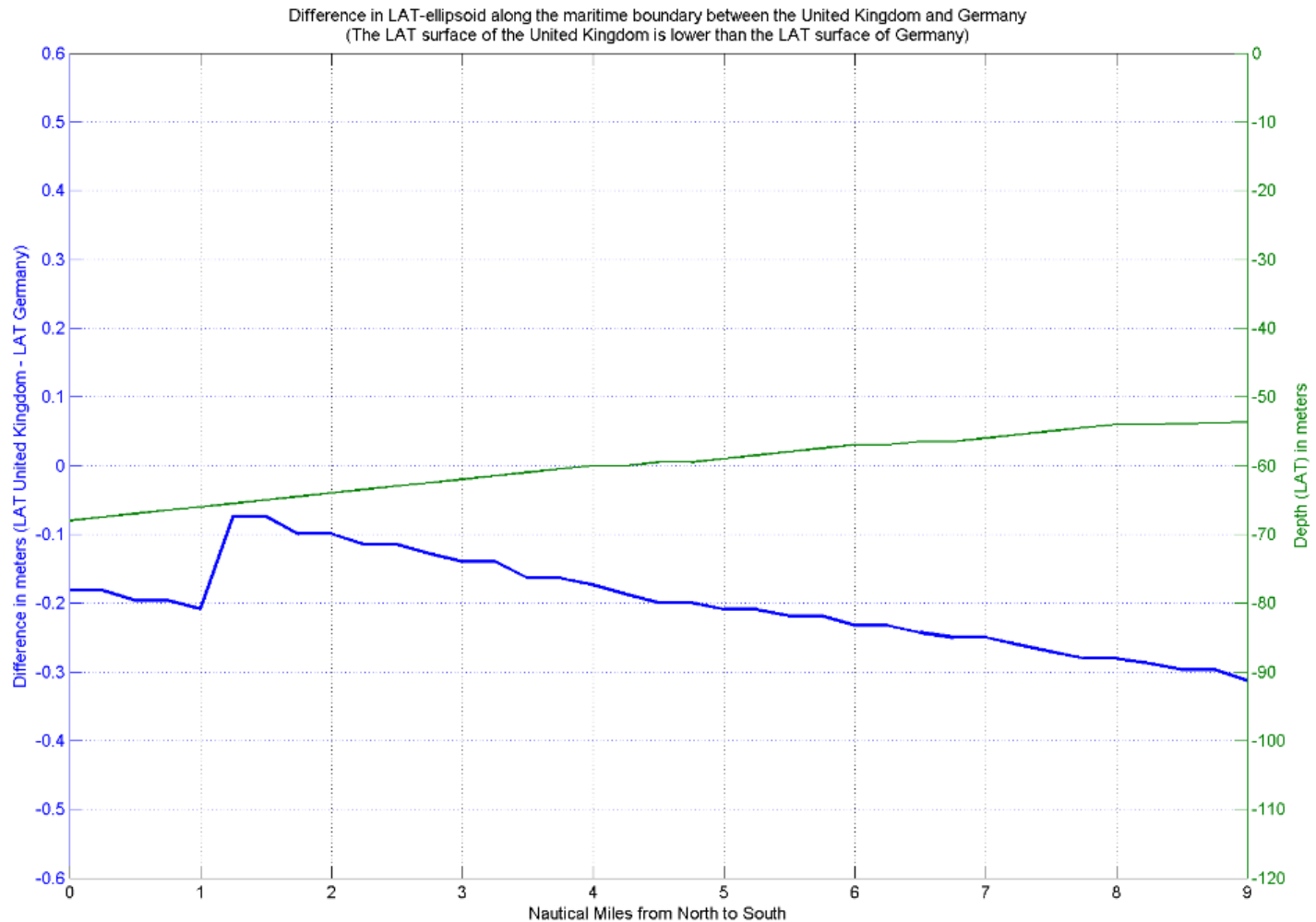
Difference in LAT-ellipsoid along the maritime boundary between the United Kingdom and Denmark, divided by the depth
The value at the vertical axis is expressed as a percentage of the depth; dashed black line = norm = 1%

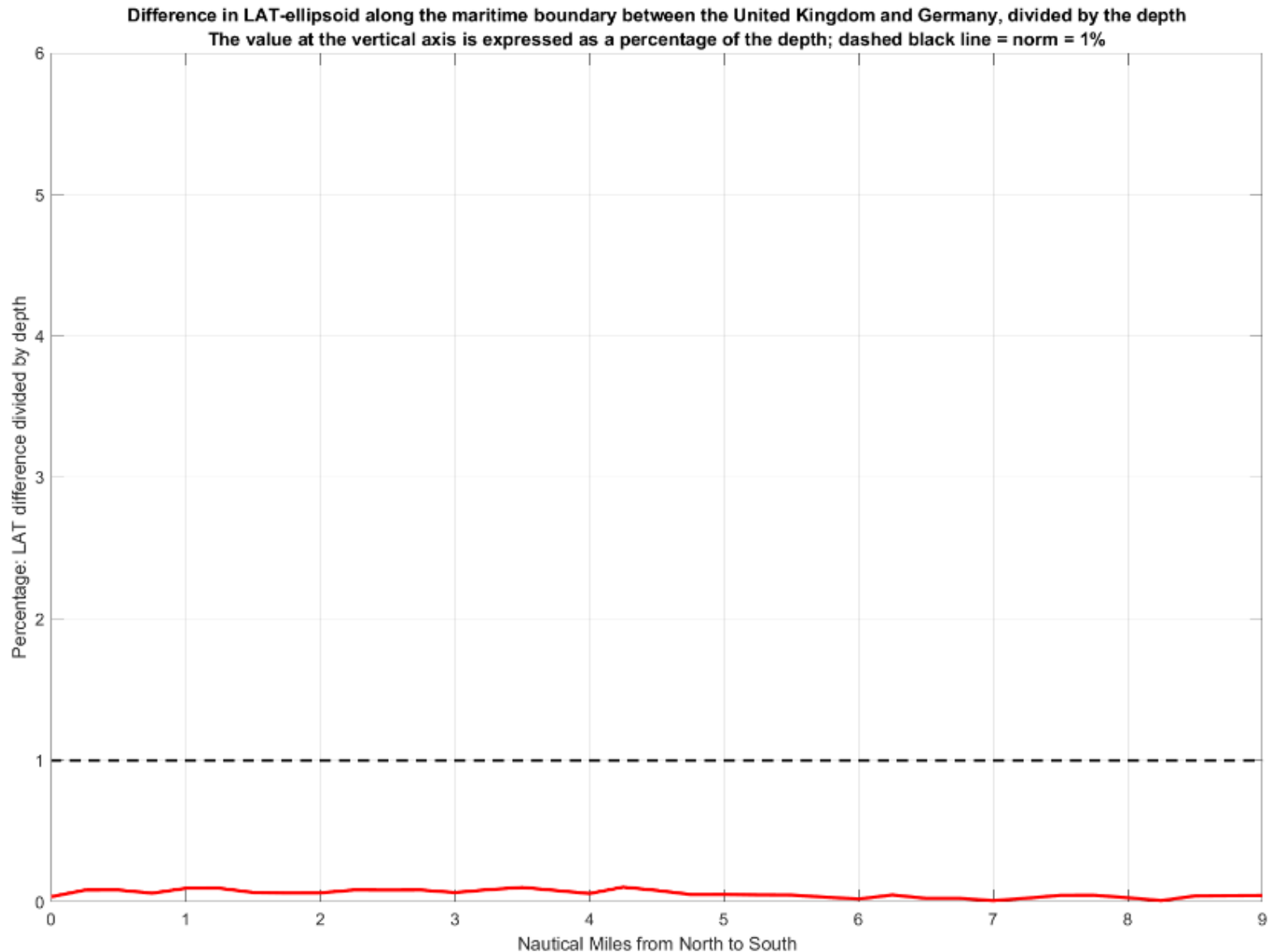


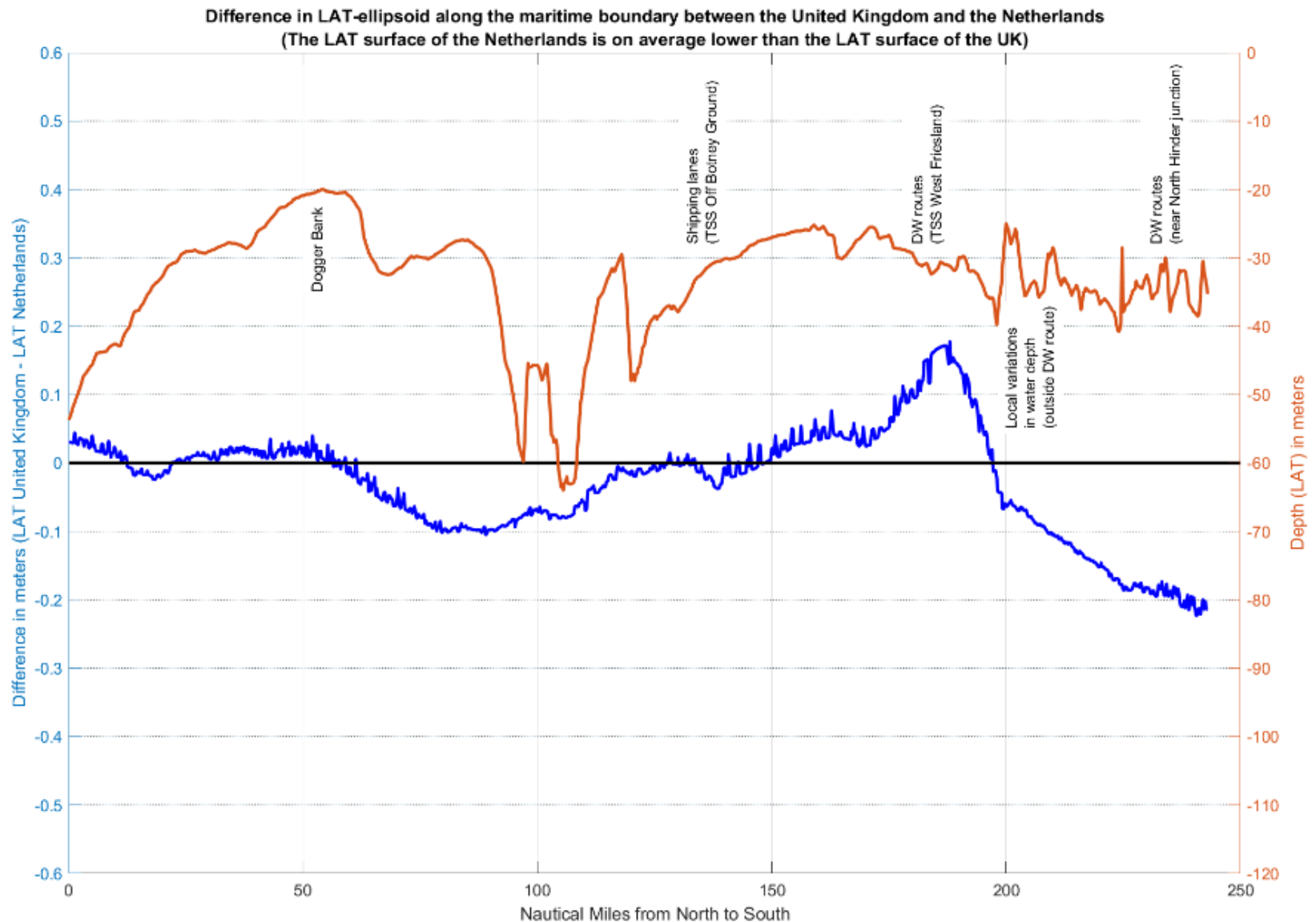


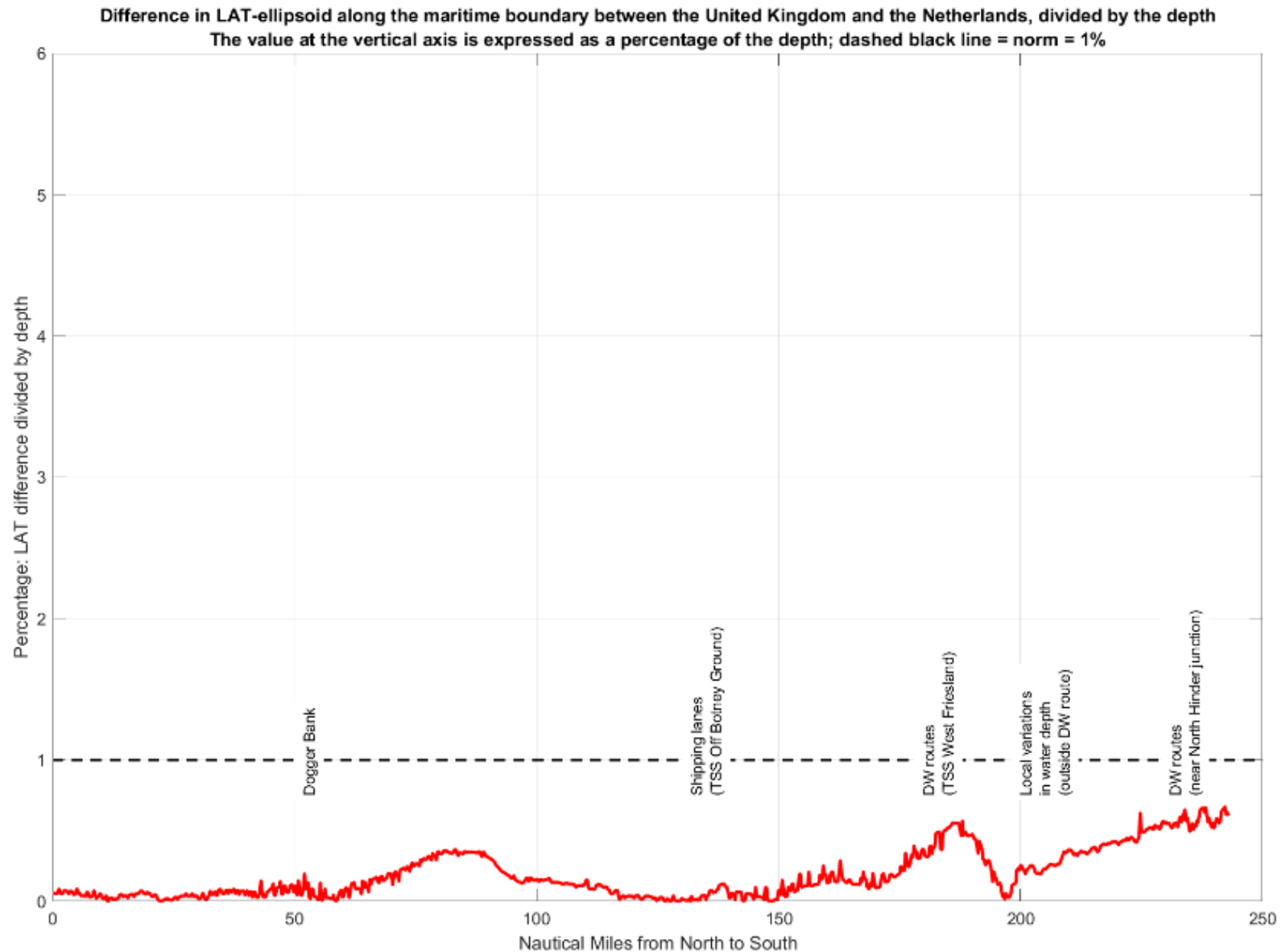


2017 (for comparison)





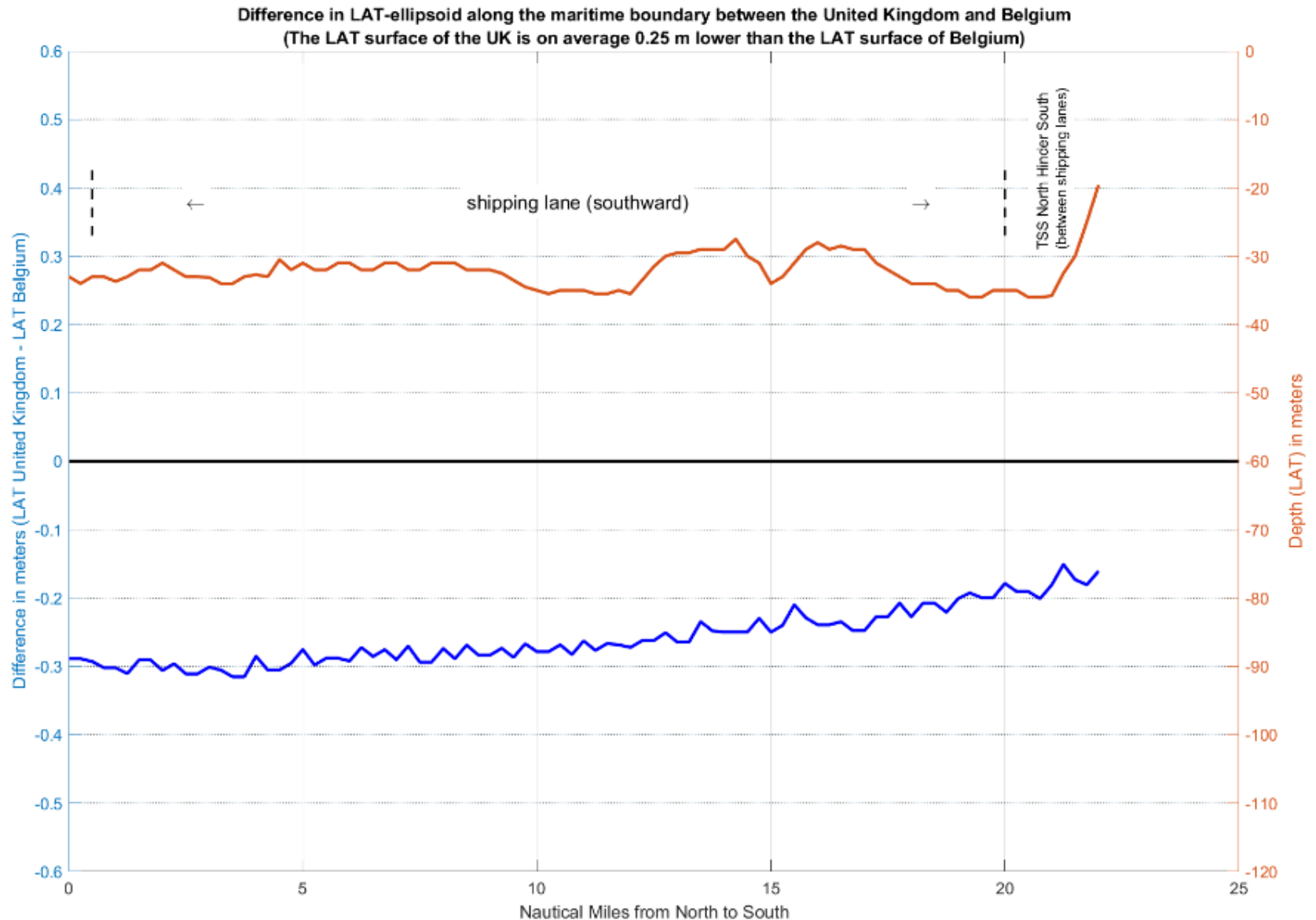


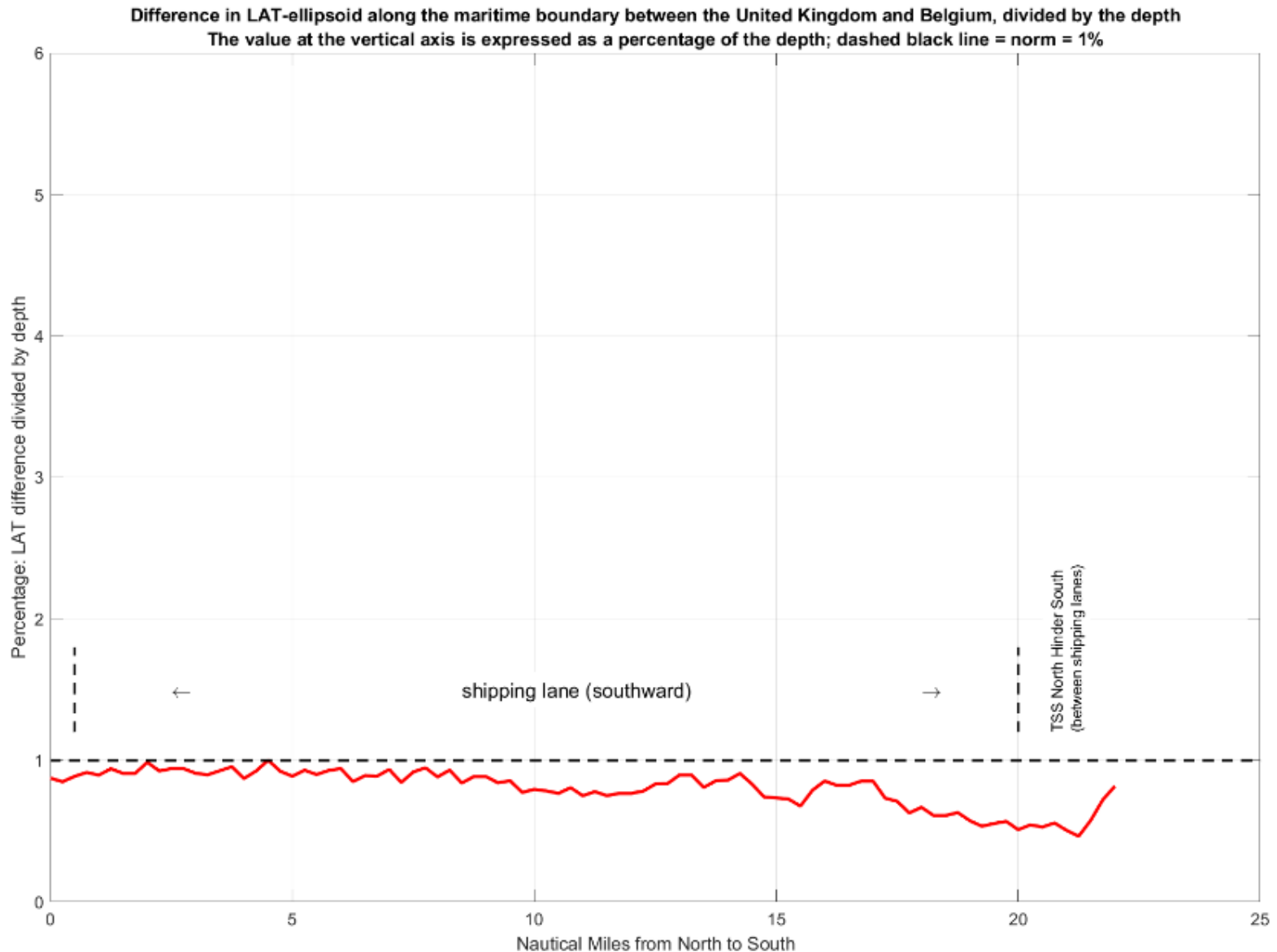


5.UK-Belgium



(unchanged)

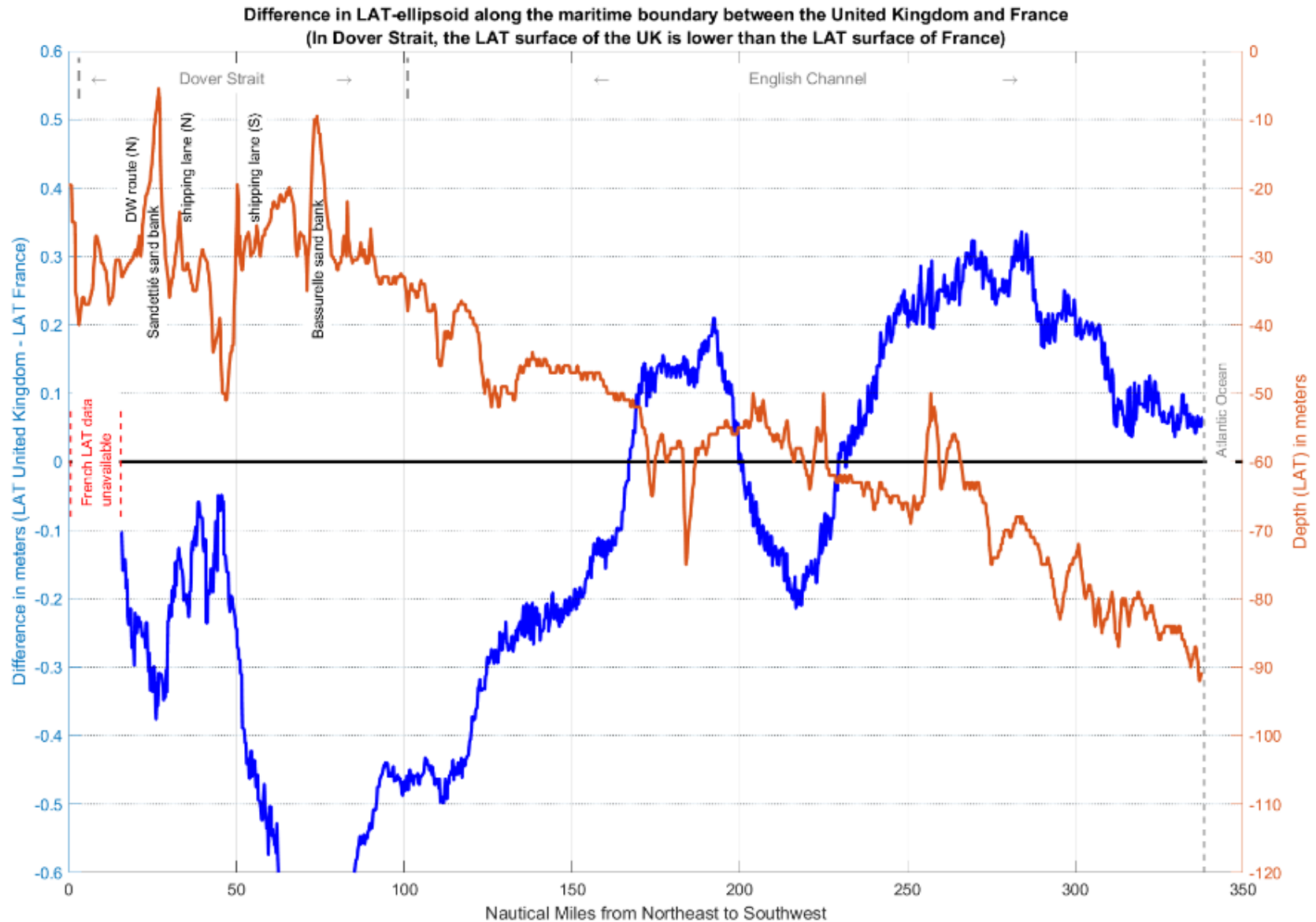




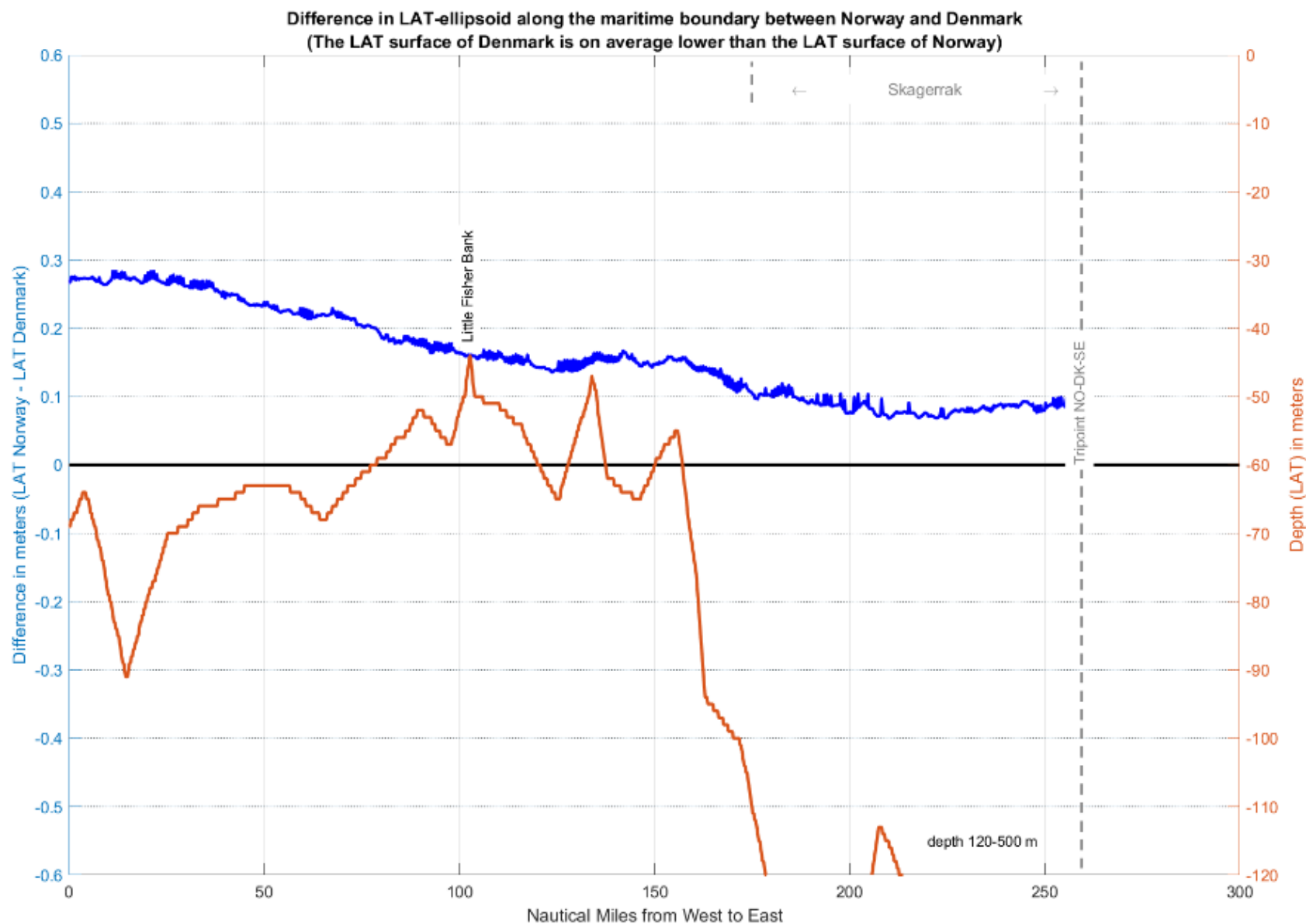
6.UK-France



(unchanged)

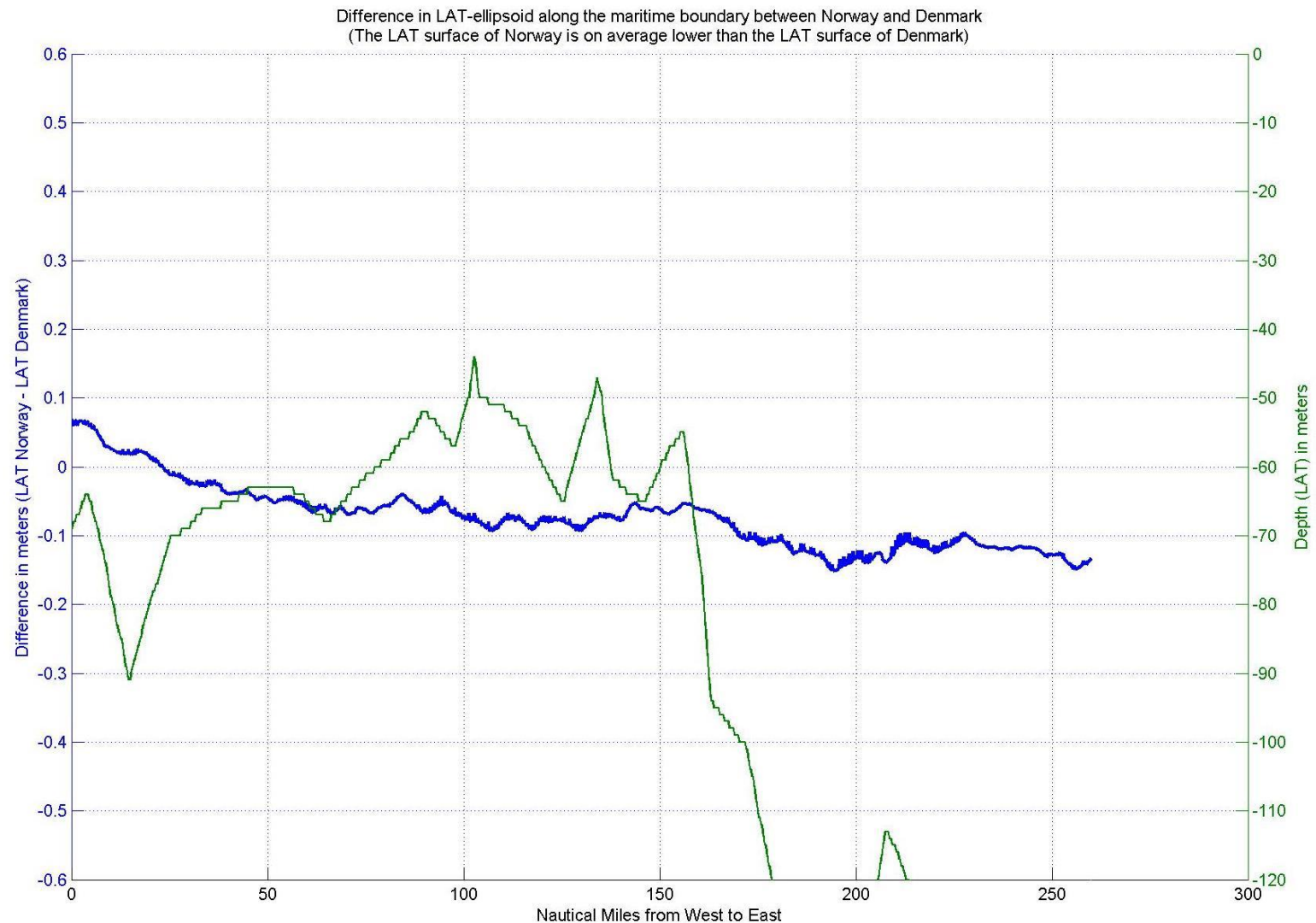


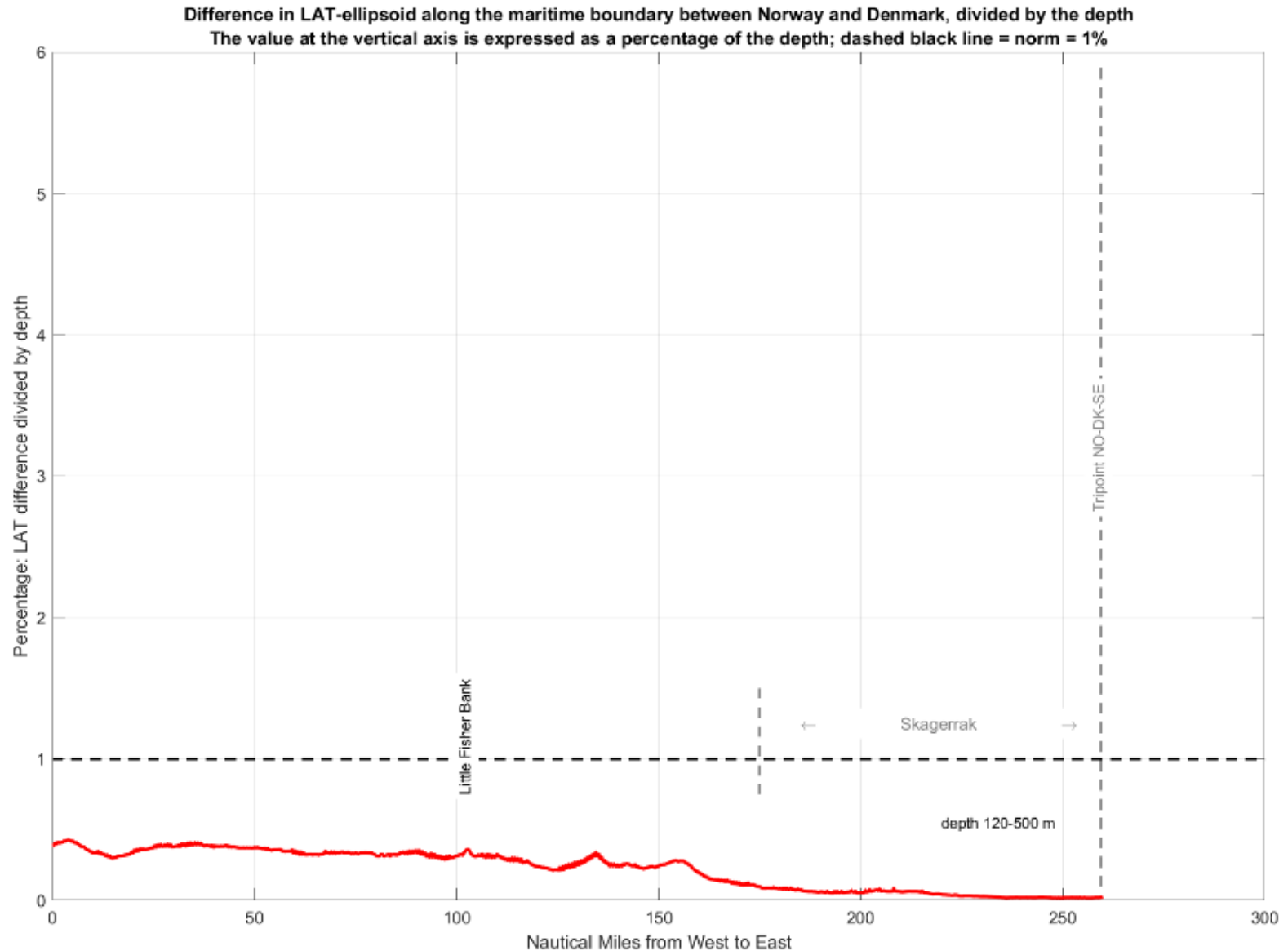


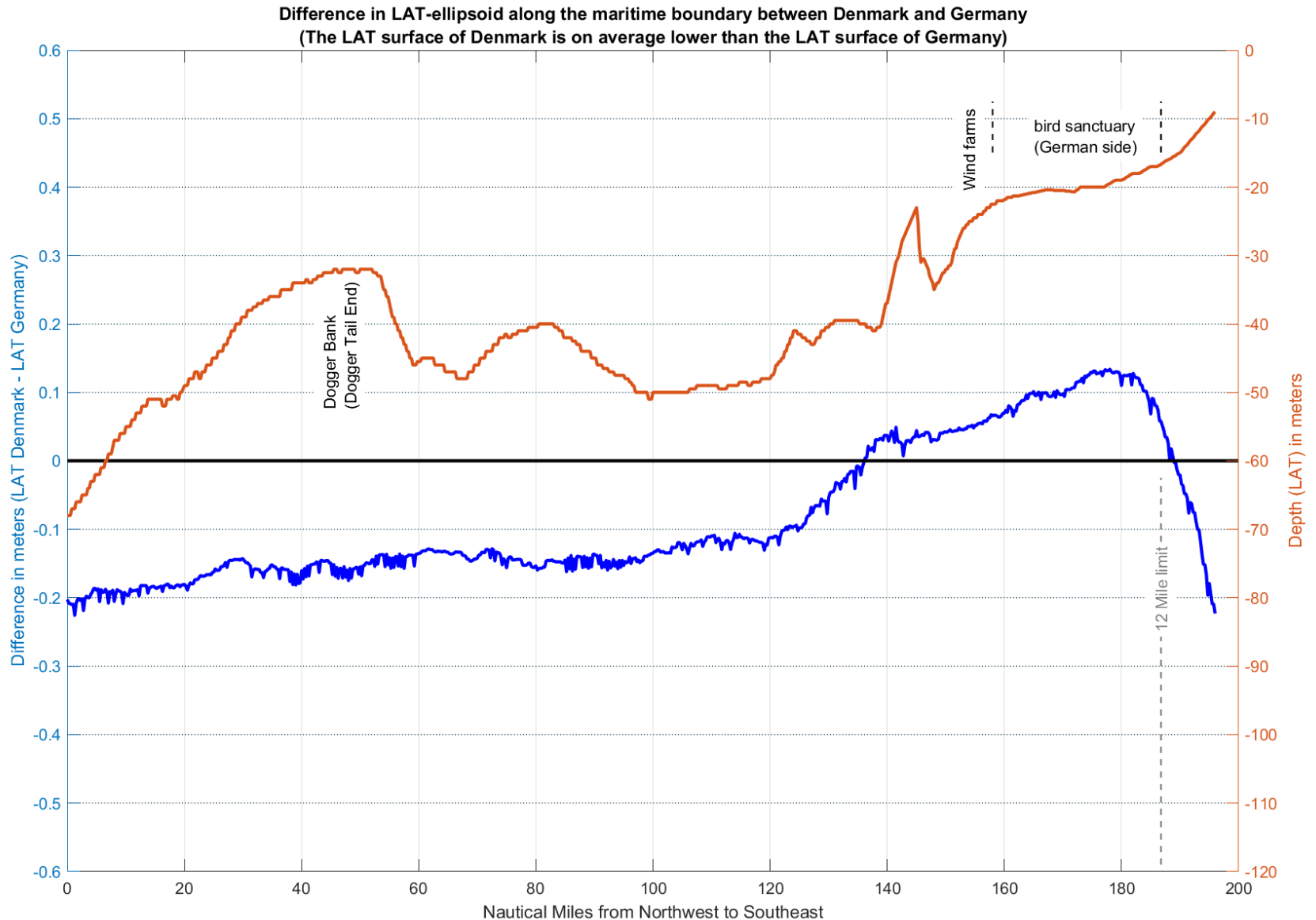




2015 (for comparison)

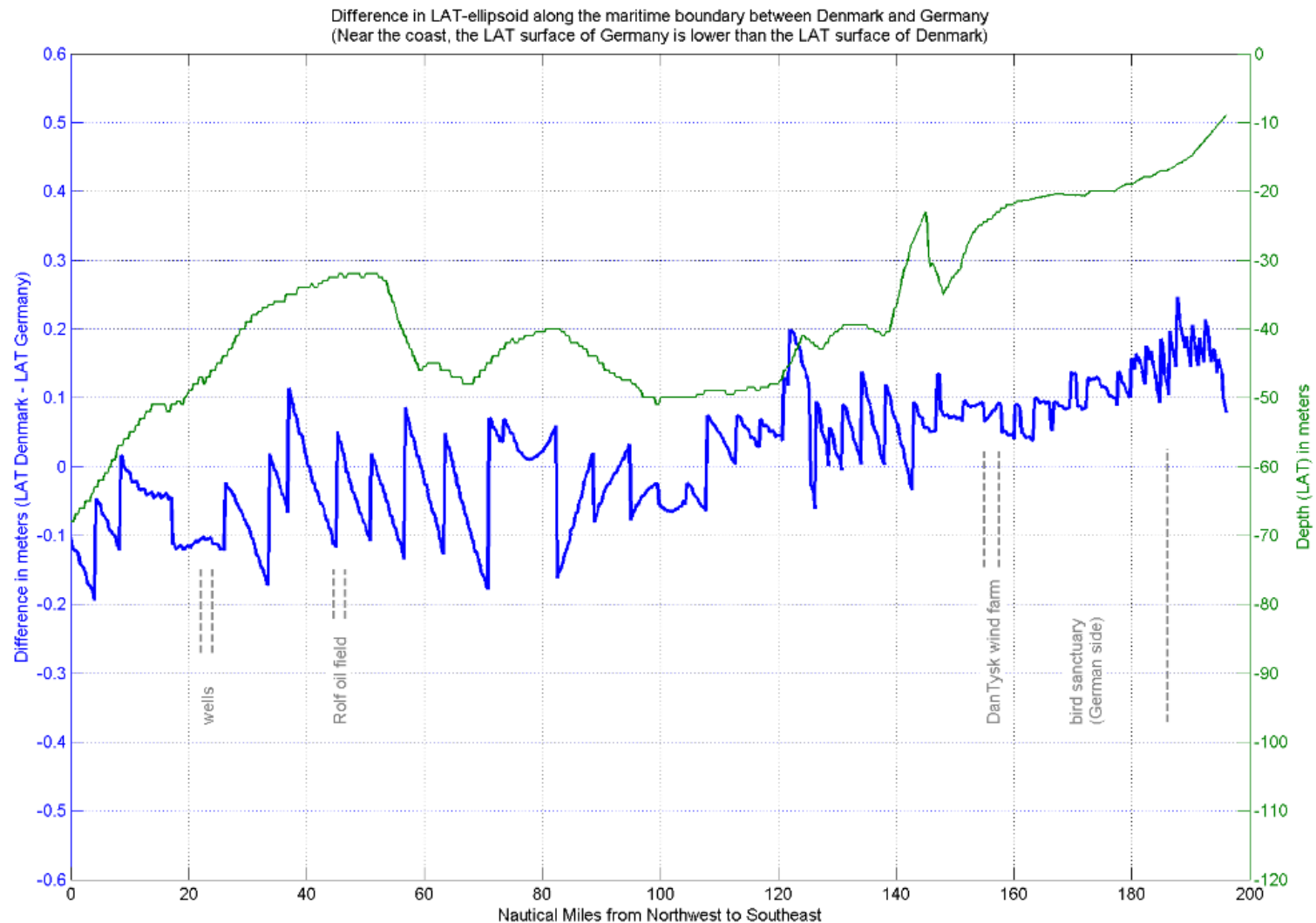


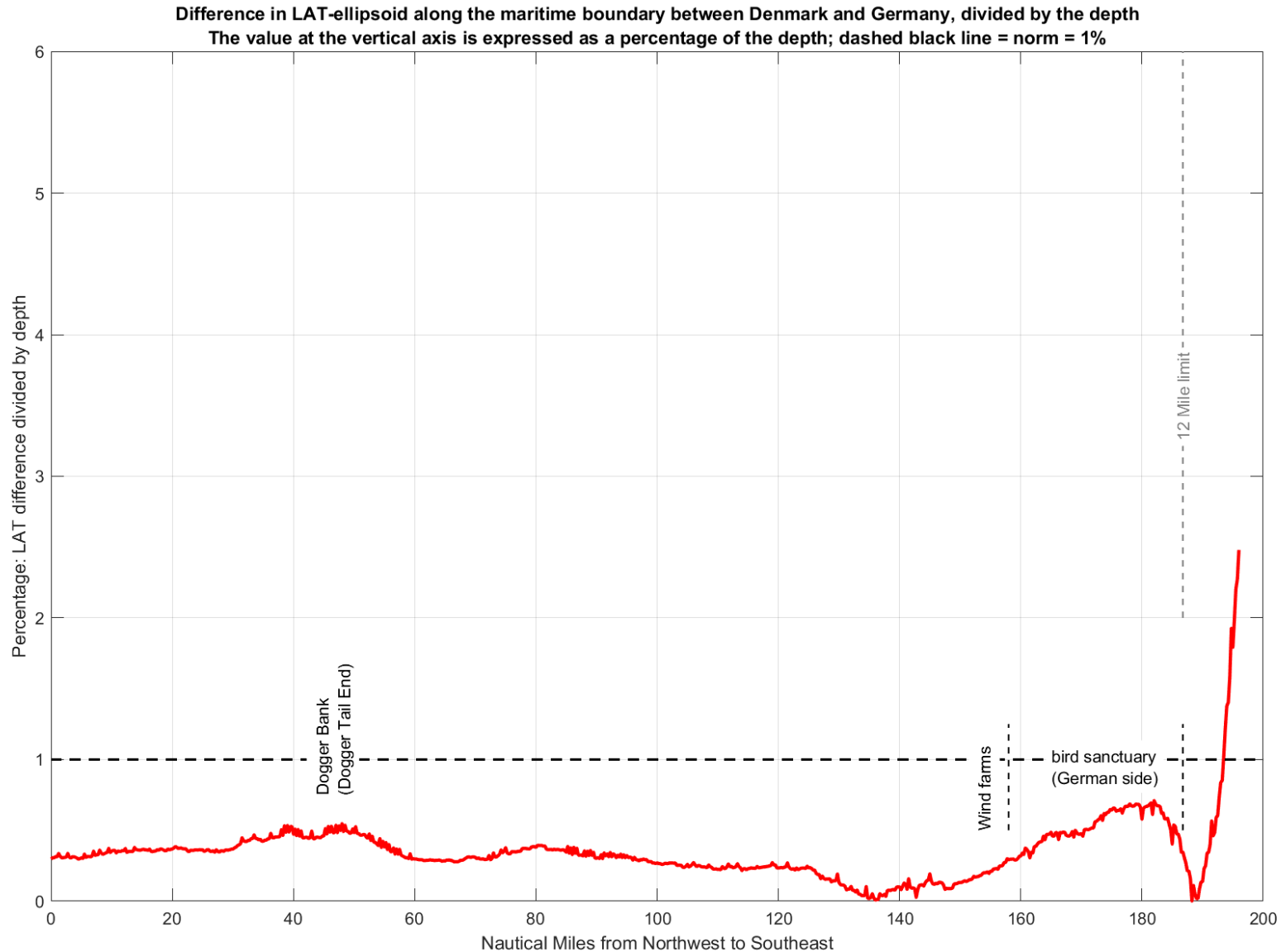


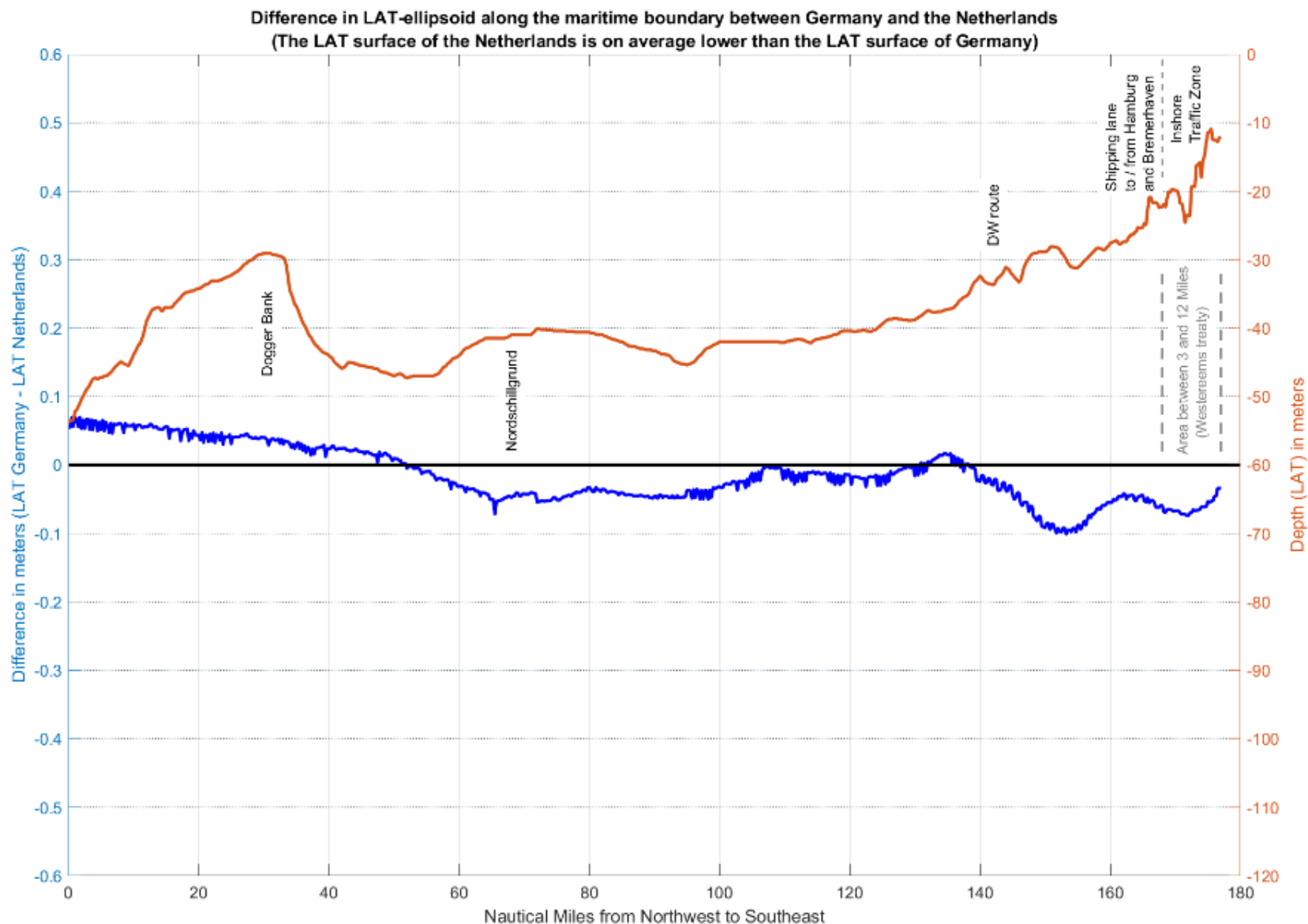




2017 (for comparison)

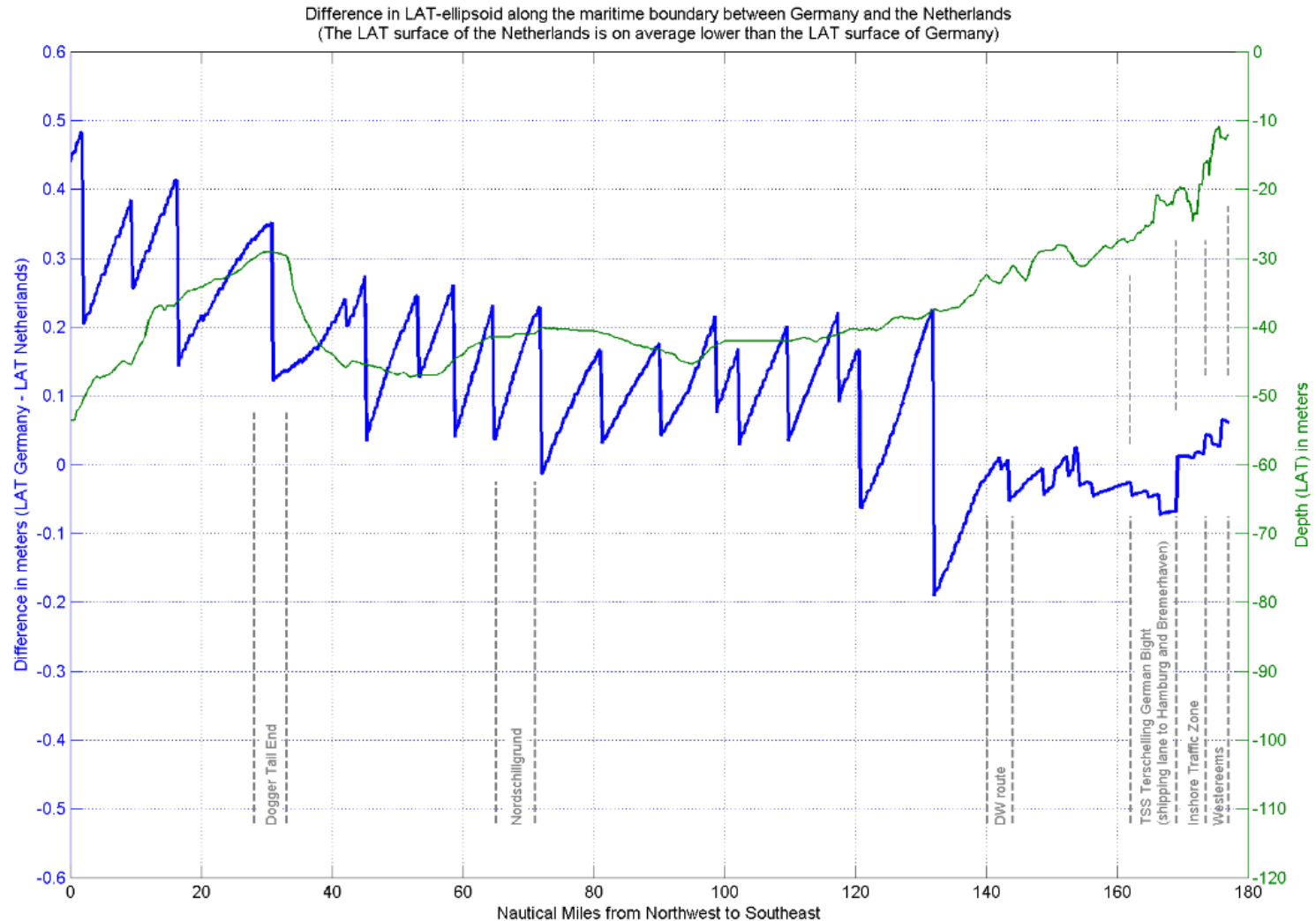








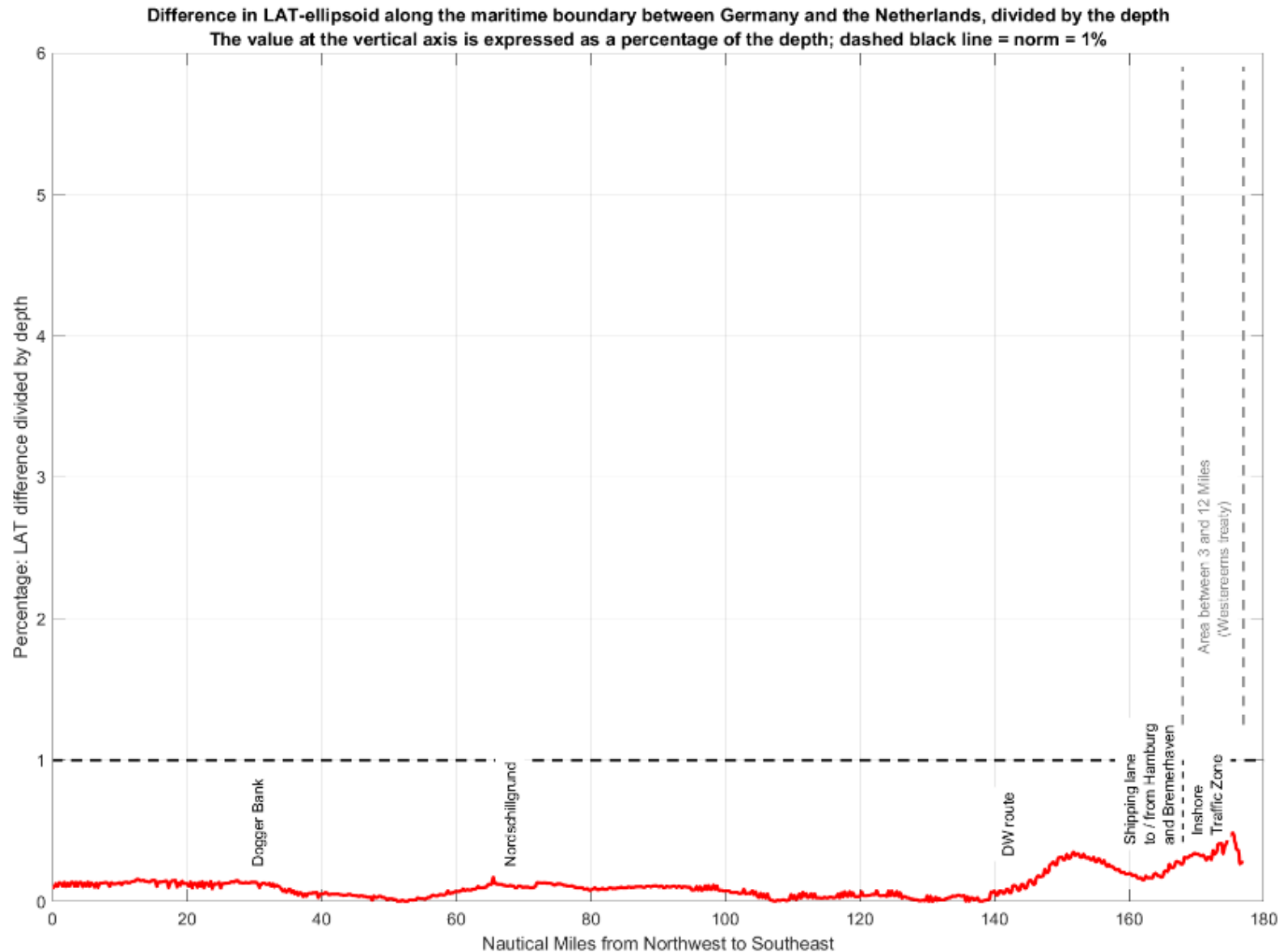
2017 (for comparison)



9. Germany-Netherlands



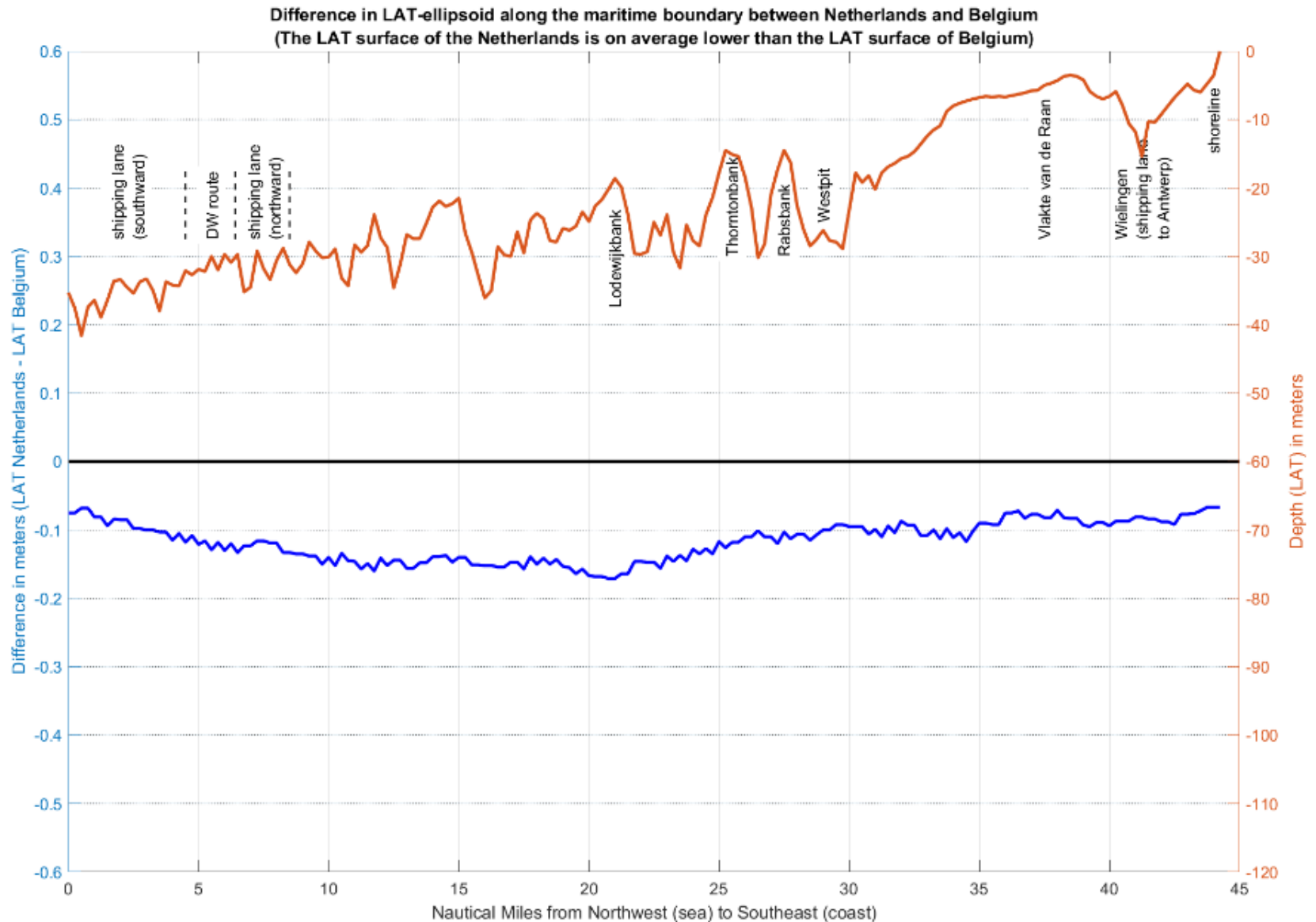
(updated)

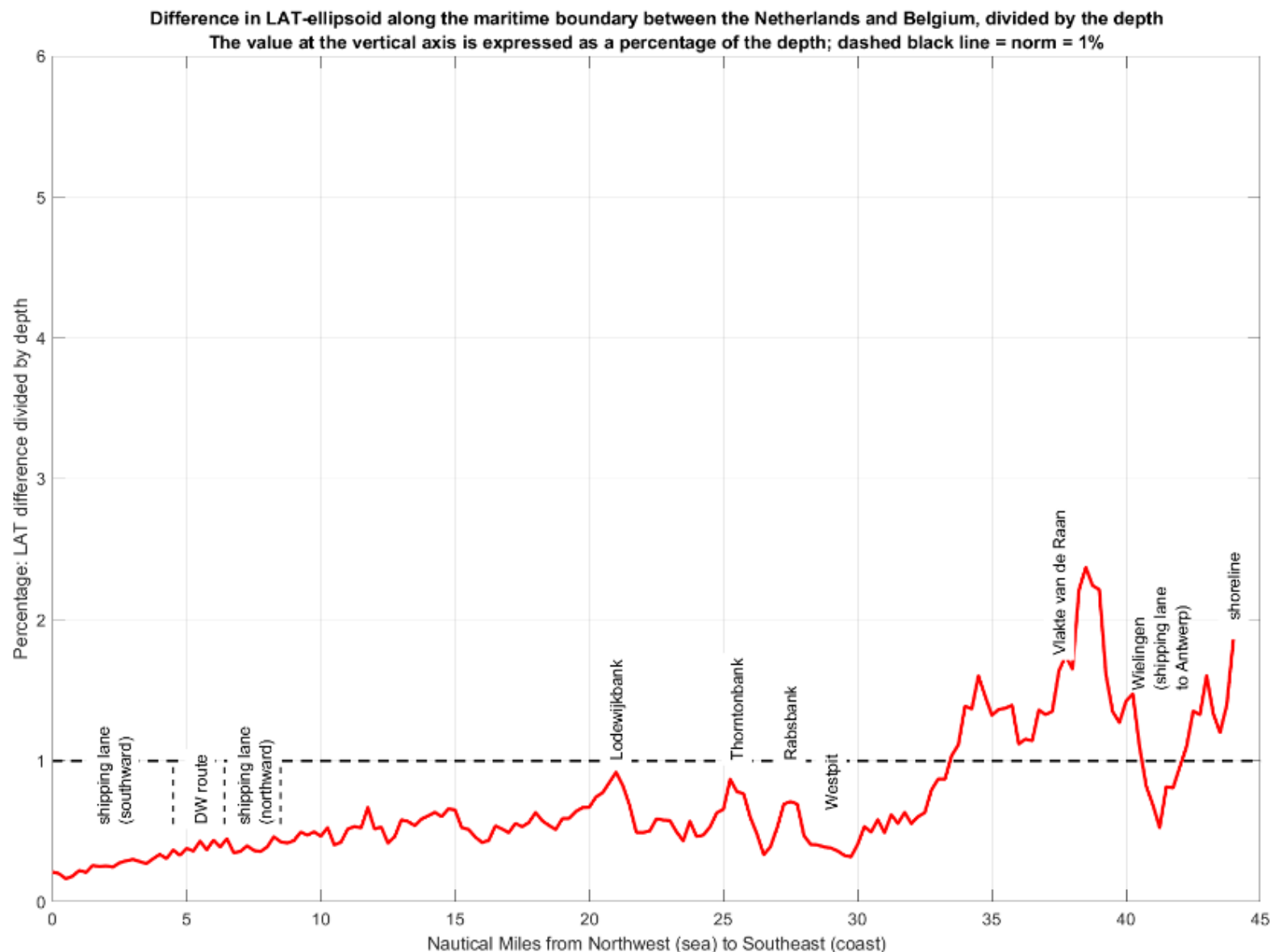


10. Netherlands-Belgium



(updated)

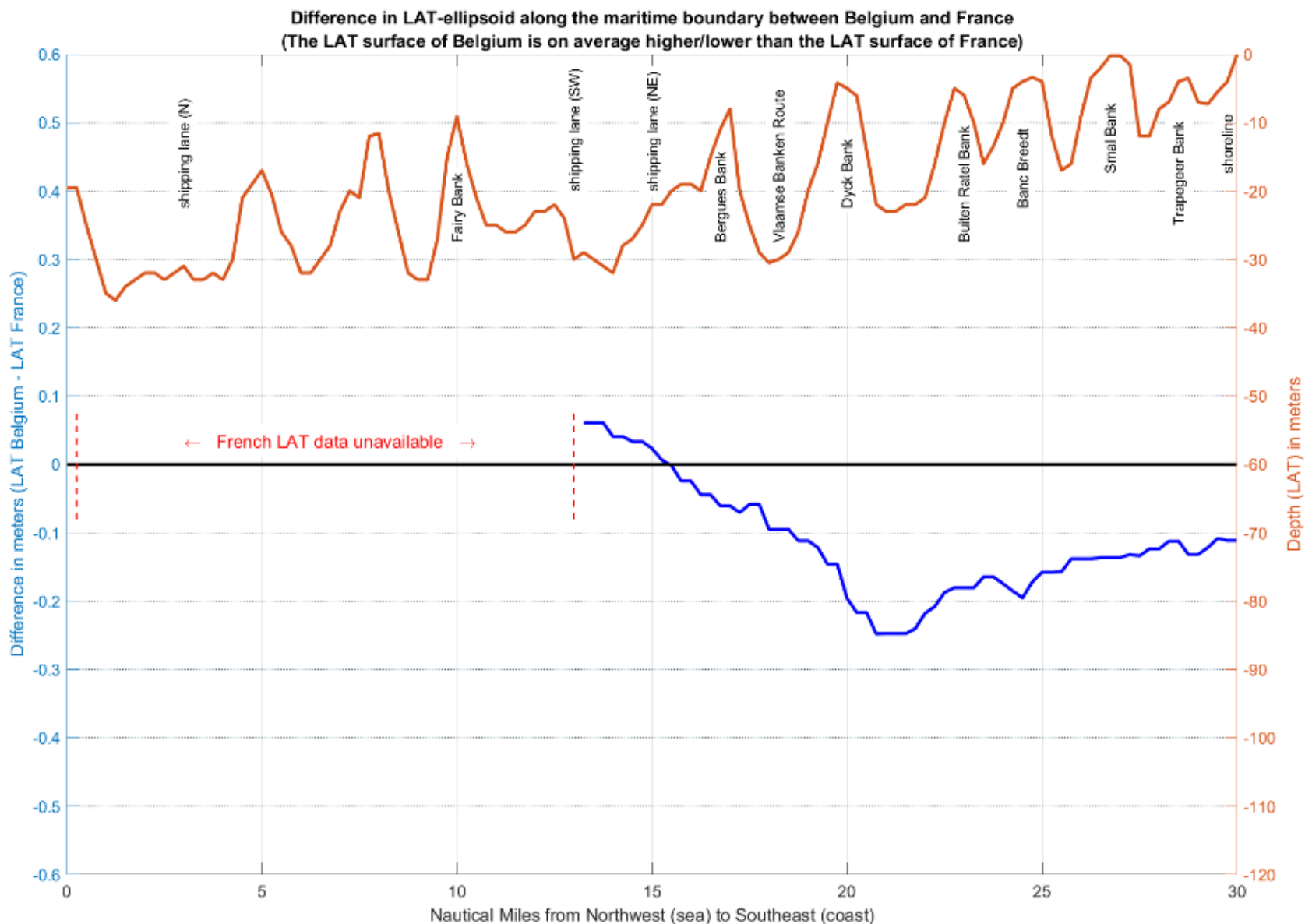




11. Belgium-France



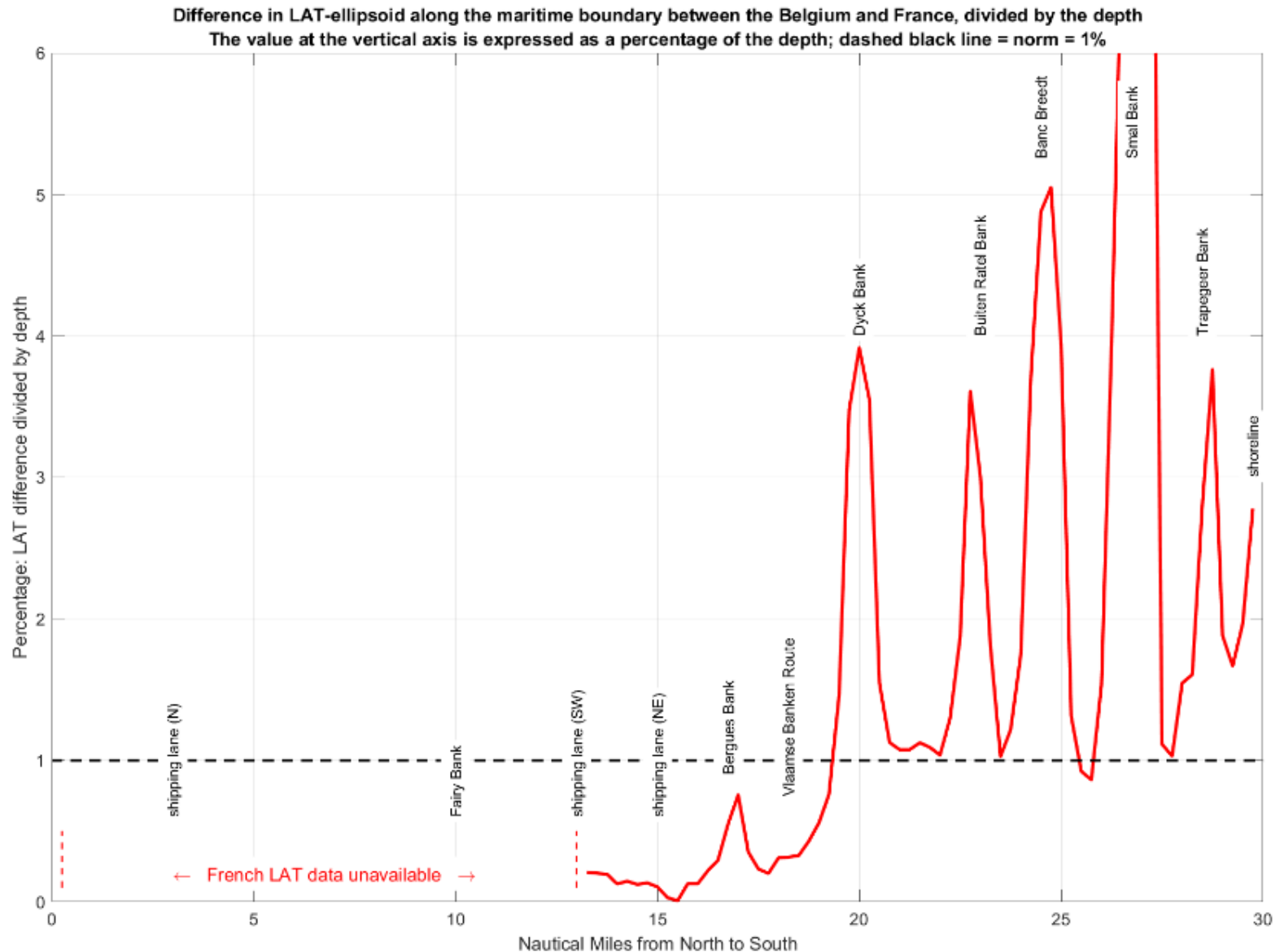
(unchanged)



11. Belgium-France



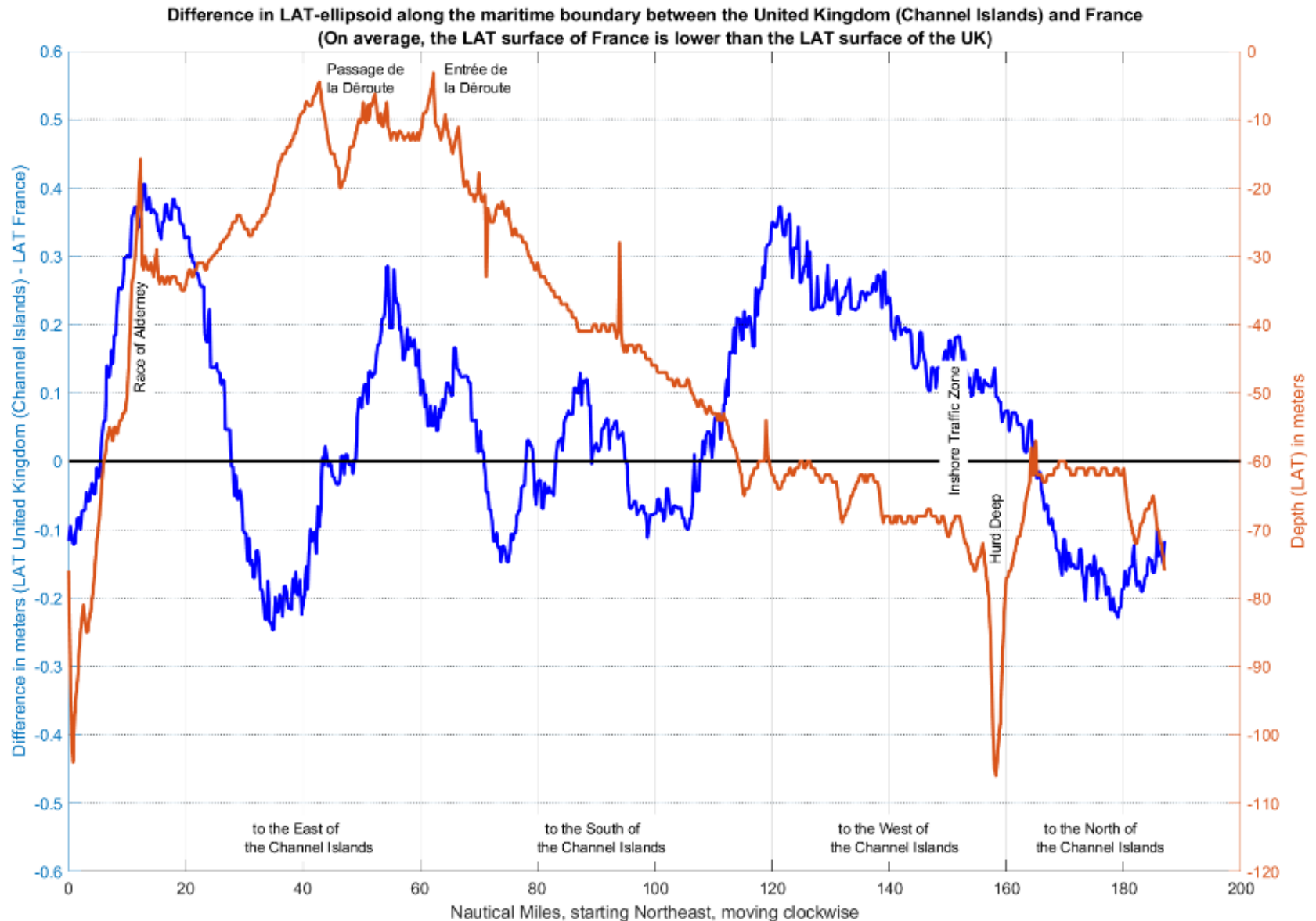
(unchanged)



12.UK-France (Channel Islands)



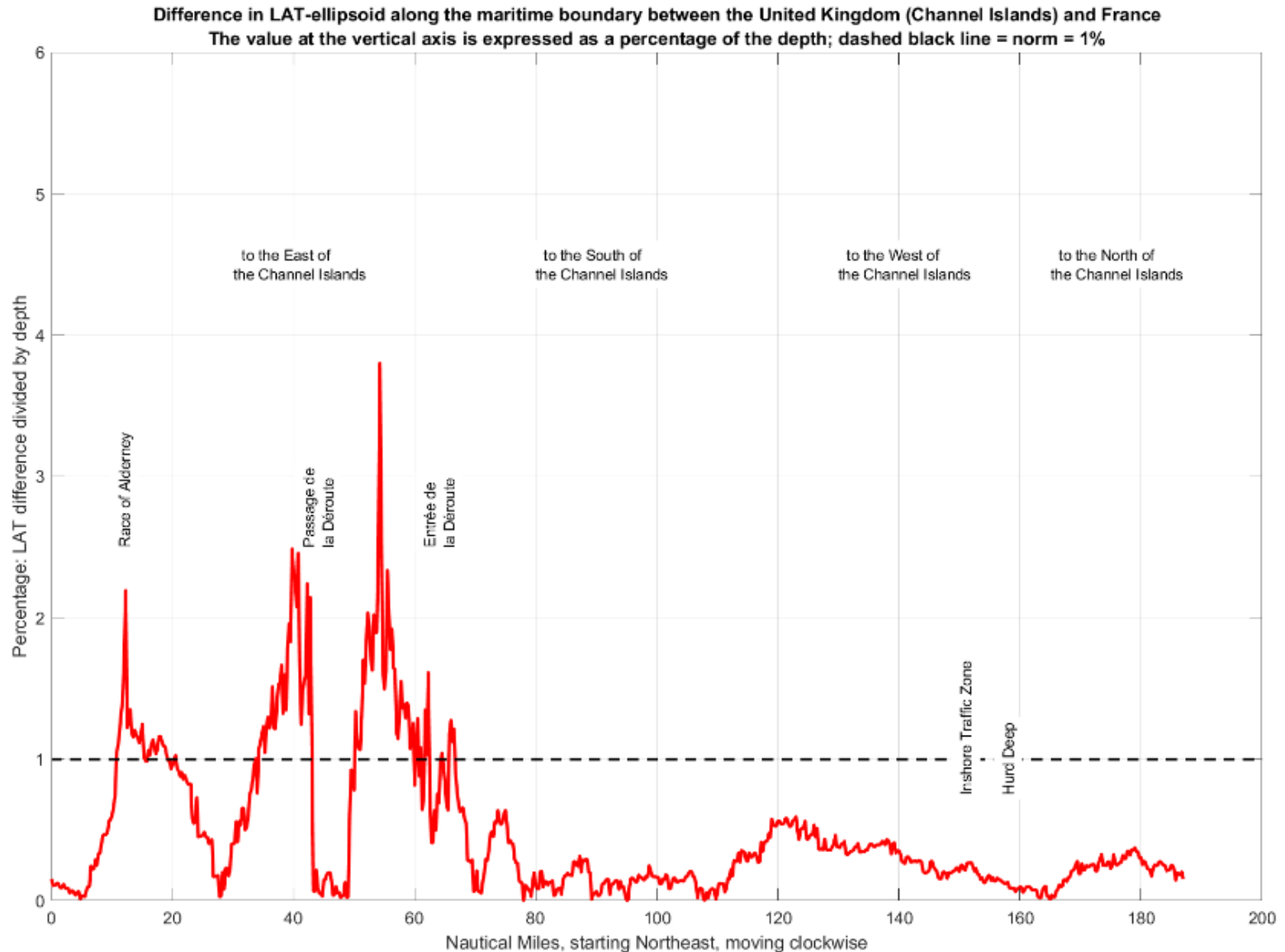
(unchanged)



12.UK-France (Channel Islands)



(unchanged)



Summary

Differences in reference surfaces at the international boundaries:

- Differences were reduced for several boundaries (due to new datasets).
- Larger differences still exist (particularly in the English Channel)
- LAT coverage at the North Sea under 100%.

Next steps:

- Investigate overlapping parts of surfaces (AP23/02)

