Oil Drift Modelling in the XXI century: *the data deluge and the uncertainty quantification challenge*

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Oil spill drift modelling : the frontier and the challenges

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- **Frontier:** Ocean current analyses and forecasts are now realistic and high frequency in space and time
- **Frontier:** Different estimates of 3-D oceanographic fields, surface waves and winds can be coupled with oil spill drift and transformation models
- **Challenge:** Uncertainty needs to be understood and managed by dedicated tools

The Marine Core Service: Marine Safety in the 2020

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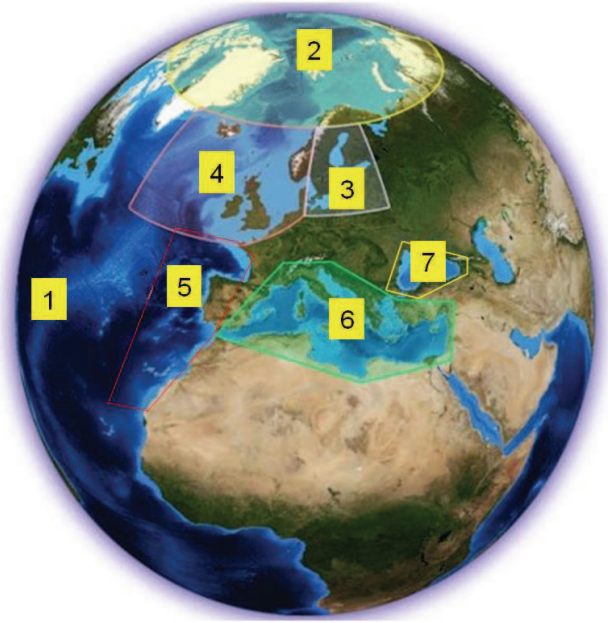
The regions

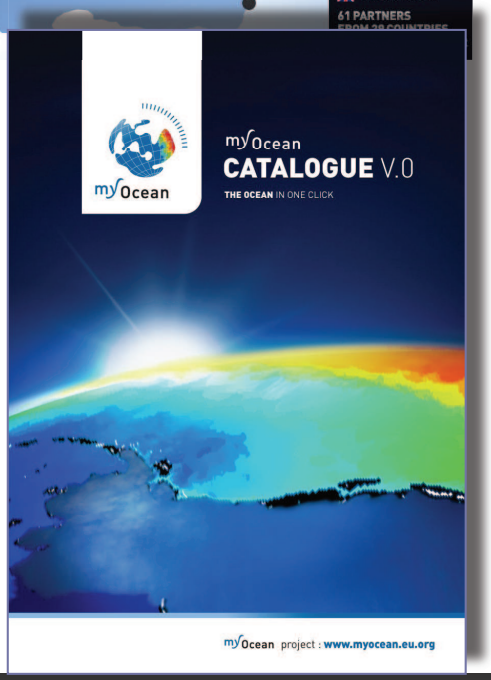


- 1. Global
- 2. Arctic
- 3. Baltic
- 4. NWS
- 5. IBI
- 6. Med Sea
- 7. Black Sea

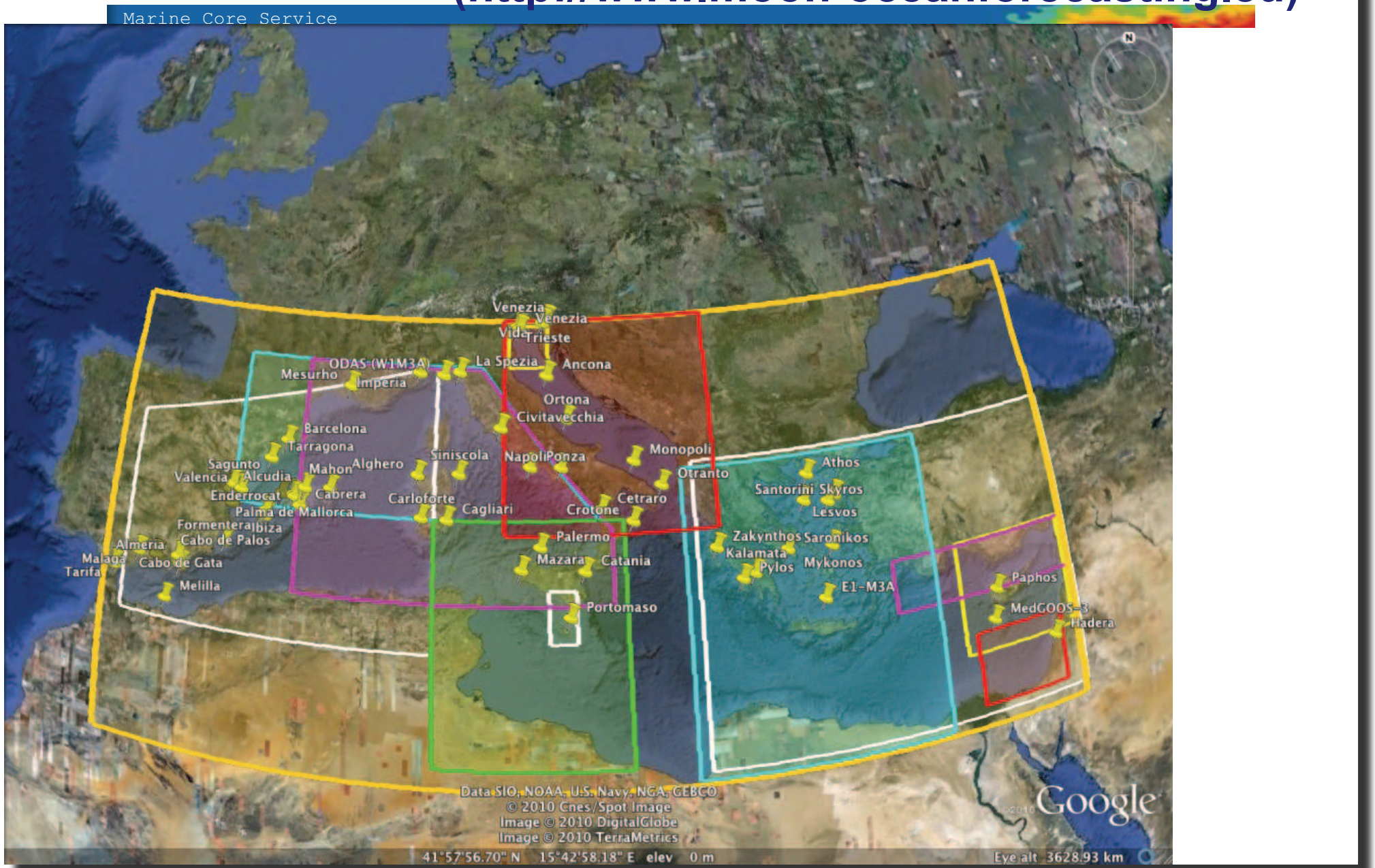
The partners

The service

- *A European service plus regional expertise*
- *Global coverage plus Regional zooming*
- *A unique catalogue plus downloading service*
- *Operational plus scientific assessment*
- *Public production for public and private use*



The data deluge: the Marine Service and oceanographic national centers (http://www.moon-oceanforecasting.eu)



The current resolution effects on drifter trajectories

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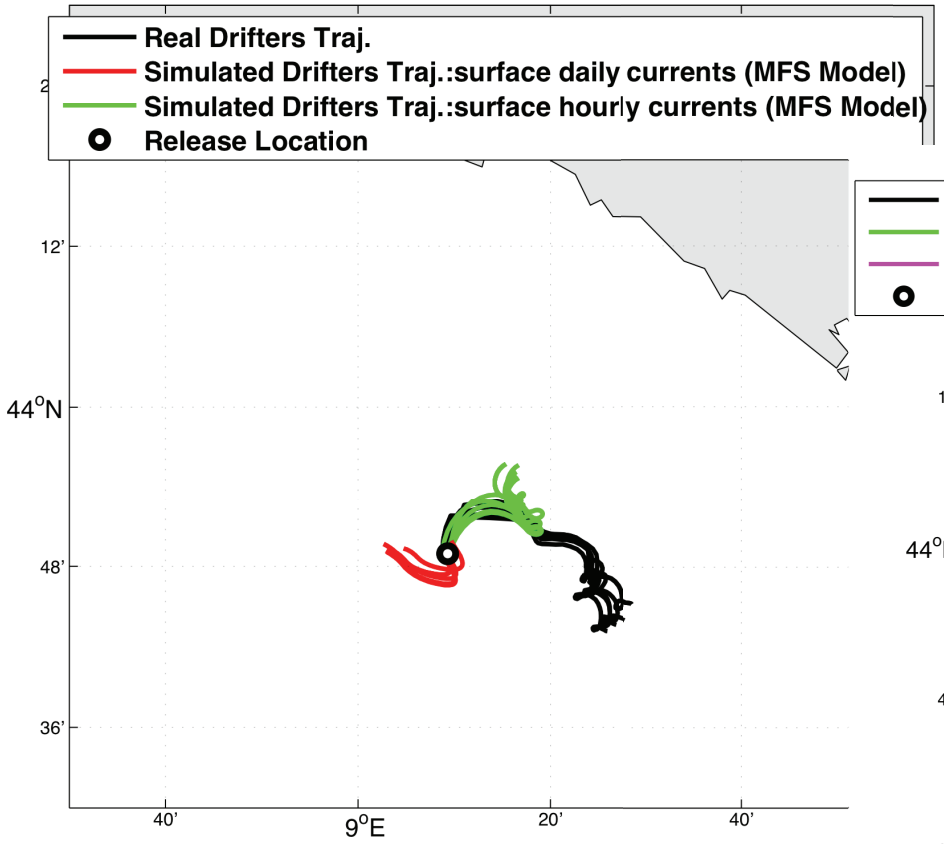
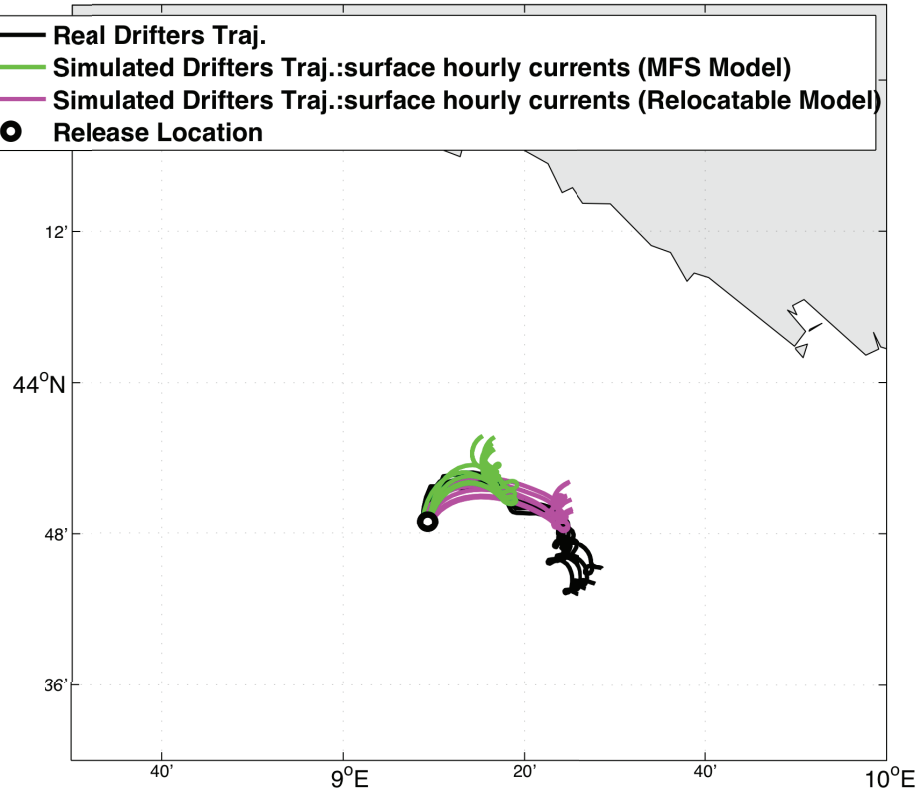
First the time frequency



Second the space resolution



The challenge: uncertainty quantification

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Some of the uncertain parameters in oil slick modelling

Model parameter	comment
X(to),Y(to), Z(to)	Parcels Initial condition
U(t),V(t),W(t)	Three dimensional velocity field
dx,dy,dz	Tracer grid cell resolution for concentration
A^{TK}, T^{TK}	Area and Thickness of Thick part of slick
A^{TN}, T^{TN}	Area and Thickness of Thin part of slick
F	Ratio between Thick and Thin slick Areas
T_S	Half life of absorption on coasts
K_H,K_V	Turbulent diffusivity parameters
u_m	Droplet cloud diameter

In conclusion

- Oils pill modelling in the past five years has undergone a rapid development due to the availability of realistic ocean currents from the GMES Marine Service and national centers
- More R&D is needed to recast model uncertanties in terms of probabilistic forecasts and scenarios

Ensemble Operational Costa-Concordia accident oil spill scenarios