

ROCK COAST EROSION: AN OVERLOOKED SOURCE OF SEDIMENTS TO THE OCEAN. EUROPE AS AN EXAMPLE

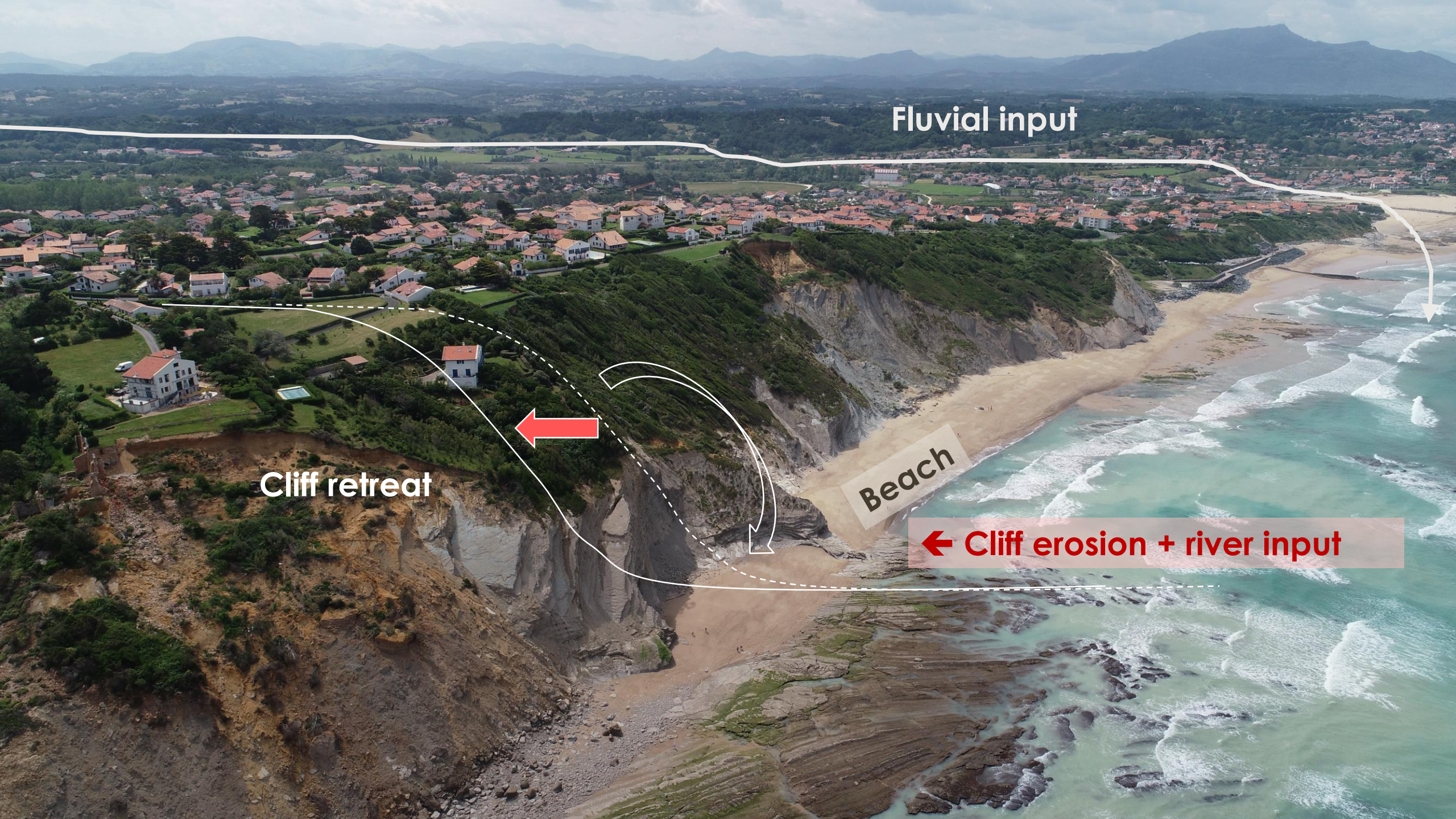
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M. Prémaillon, T. Dewez, S. Carretier,
C. Jeandel, Y. Godderis, S. Bonnet,
J. Schott, K. Pedoja, J. Martinod,
J. Viers, S. Fabre
Cf. Regard et al. EPSL, 2022

EROSION FLUXES

Bidart (Côte Basque). © EZPONDA





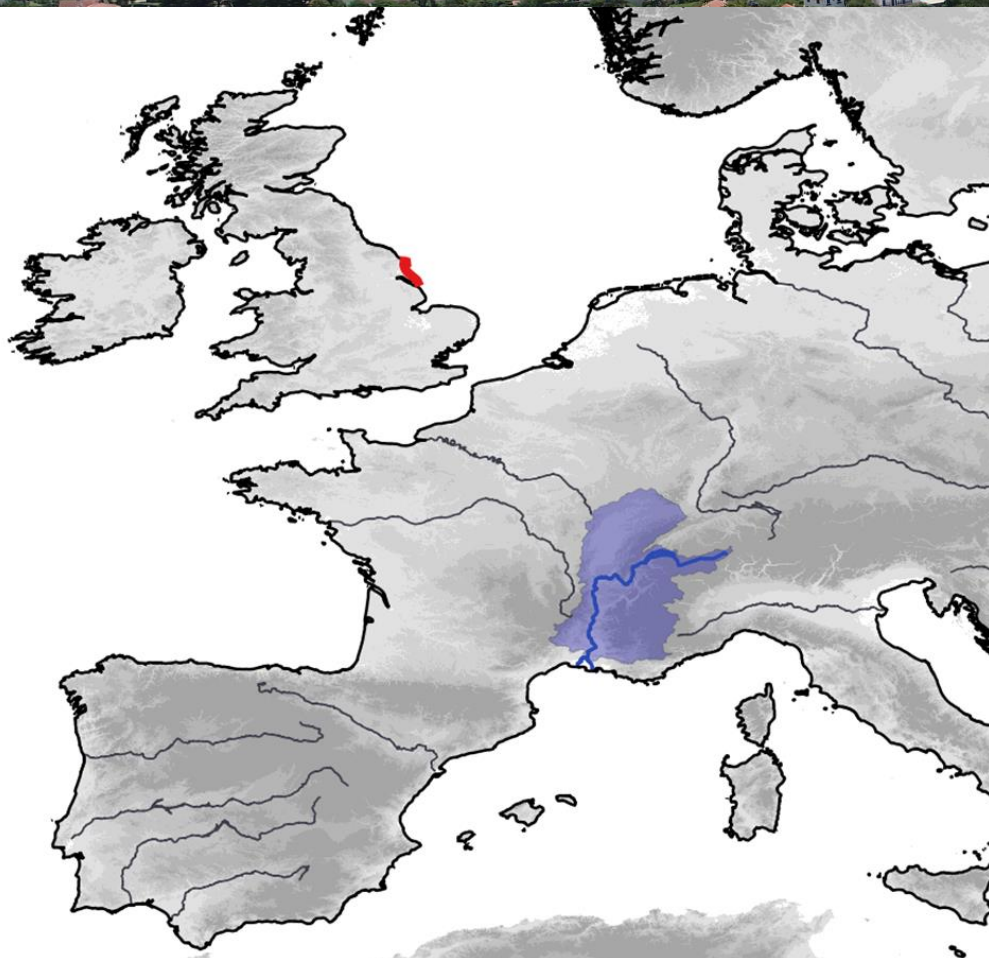
Fluvial input

Cliff retreat

Beach

← Cliff erosion + river input

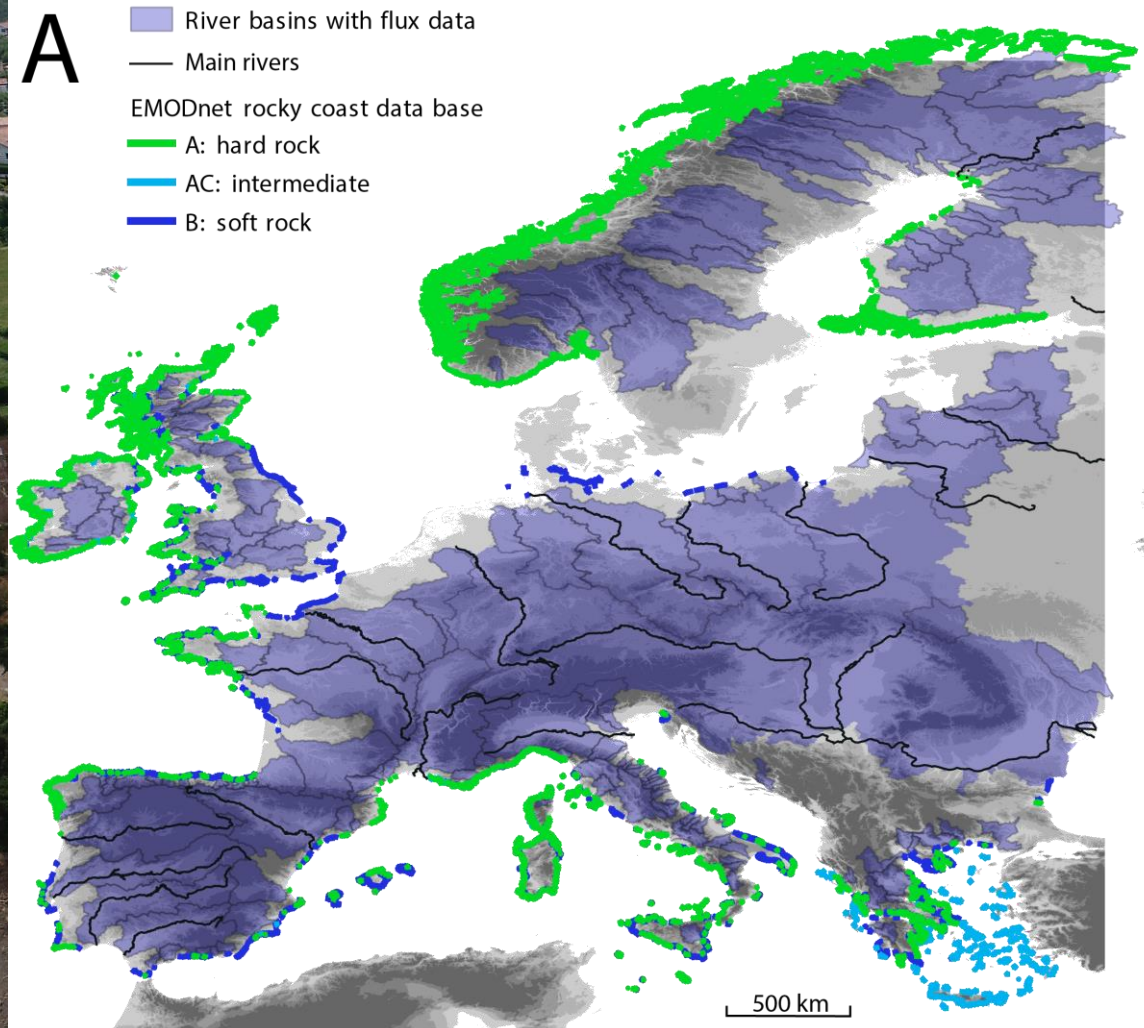
ROCK COAST EROSION: AN OVERLOOKED SOURCE OF SEDIMENTS TO THE OCEAN. EUROPE AS AN EXAMPLE



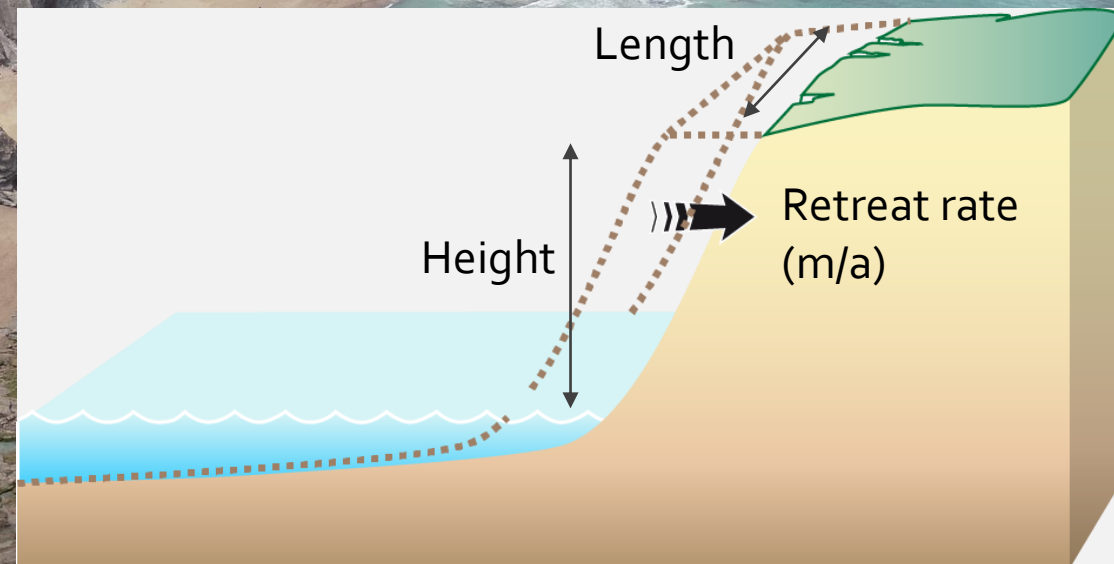
Main question:
How much sediment comes
from rock coast erosion?

Holderness	Rhône
7-9 Mt/a	7-35 Mt/a
64 km-long	96000 km ²
<i>Pye and Blott, 2015</i>	<i>Milliman and Syvitski, Pont et al. 2002, Delmas et al. 2012, Molliex et al. 2016</i>

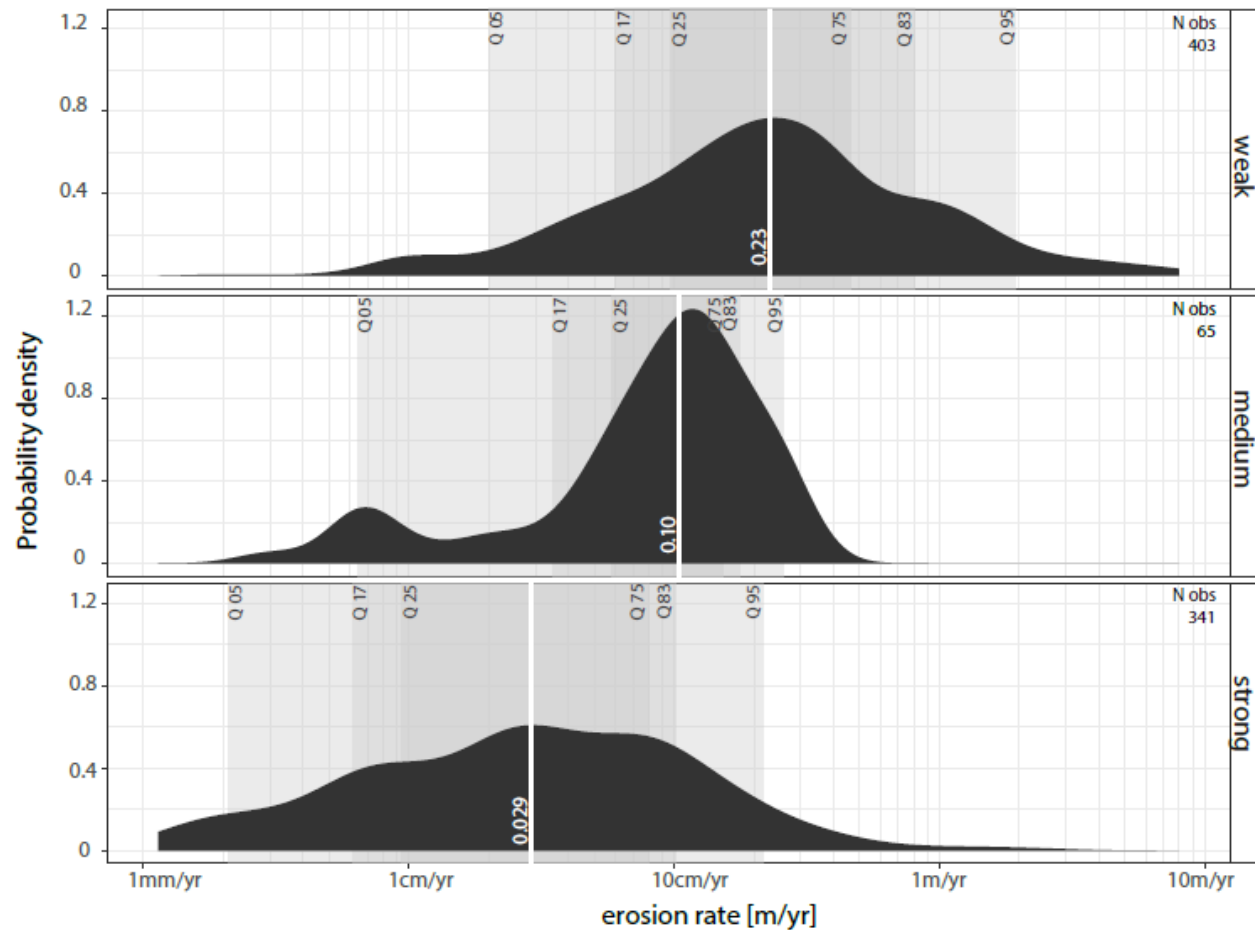
CALCULATION

$$\text{Volume} = l \times H \times v$$


Coast classification
(EmodNET)
(and length)

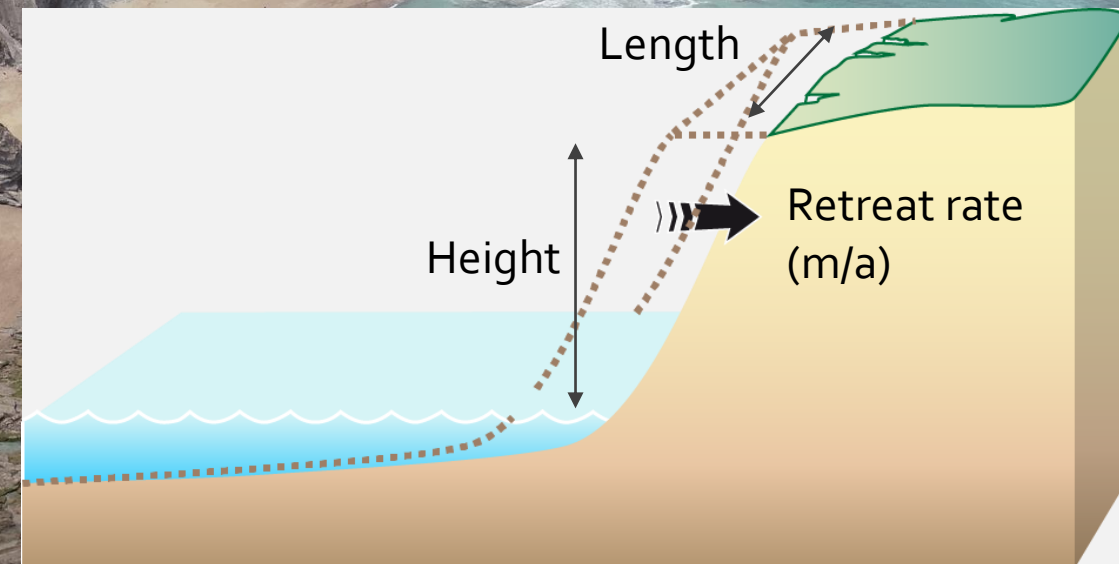


CALCULATION

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Coast classification
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Rock coast erosion
database (GlobR2C2,
Prémaillon et al. 2018)



CALCULATION

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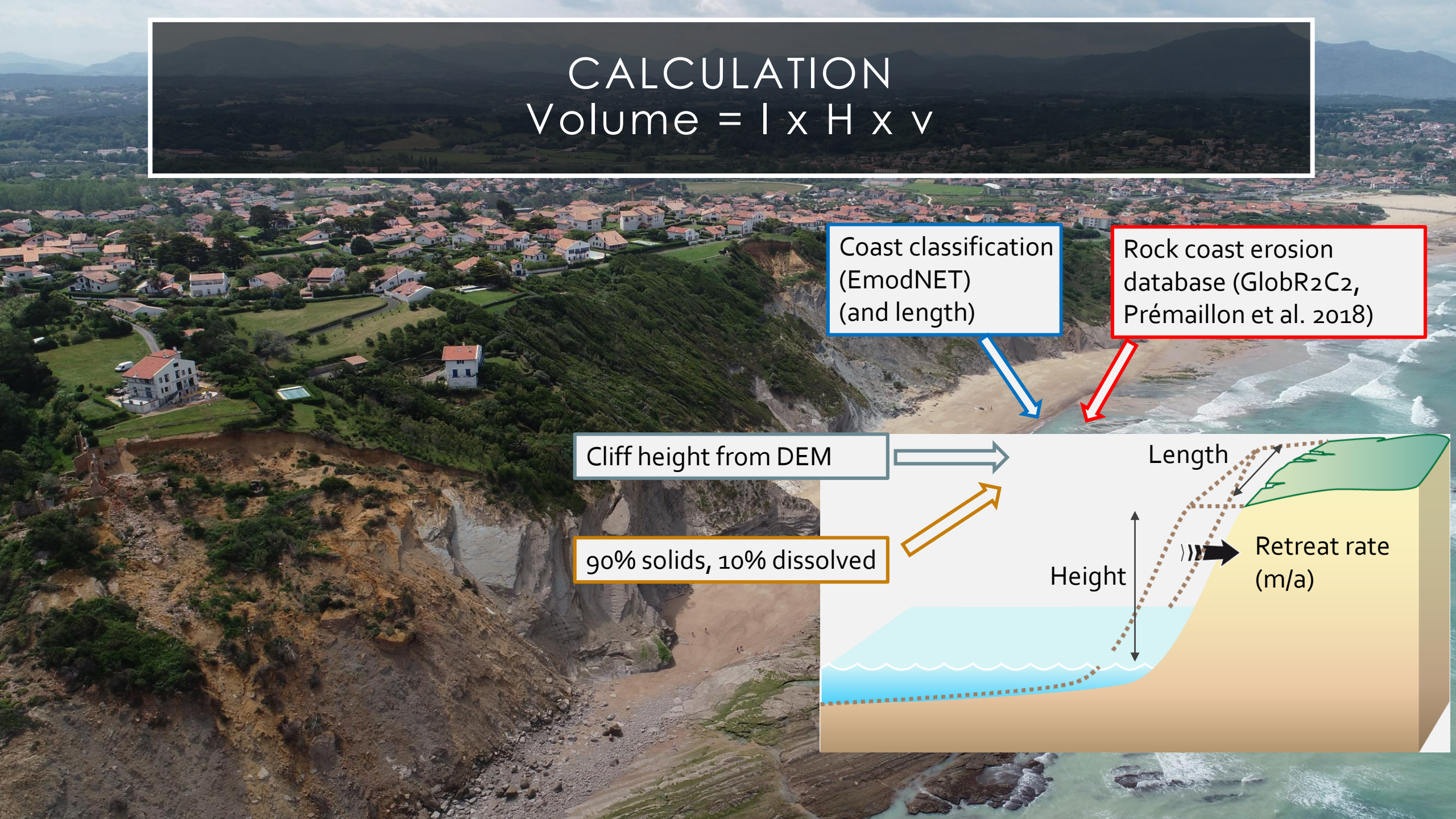
Cliff height from DEM

90% solids, 10% dissolved

Length

Height

Retreat rate
(m/a)



CALCULATION

Minimum evaluation

B

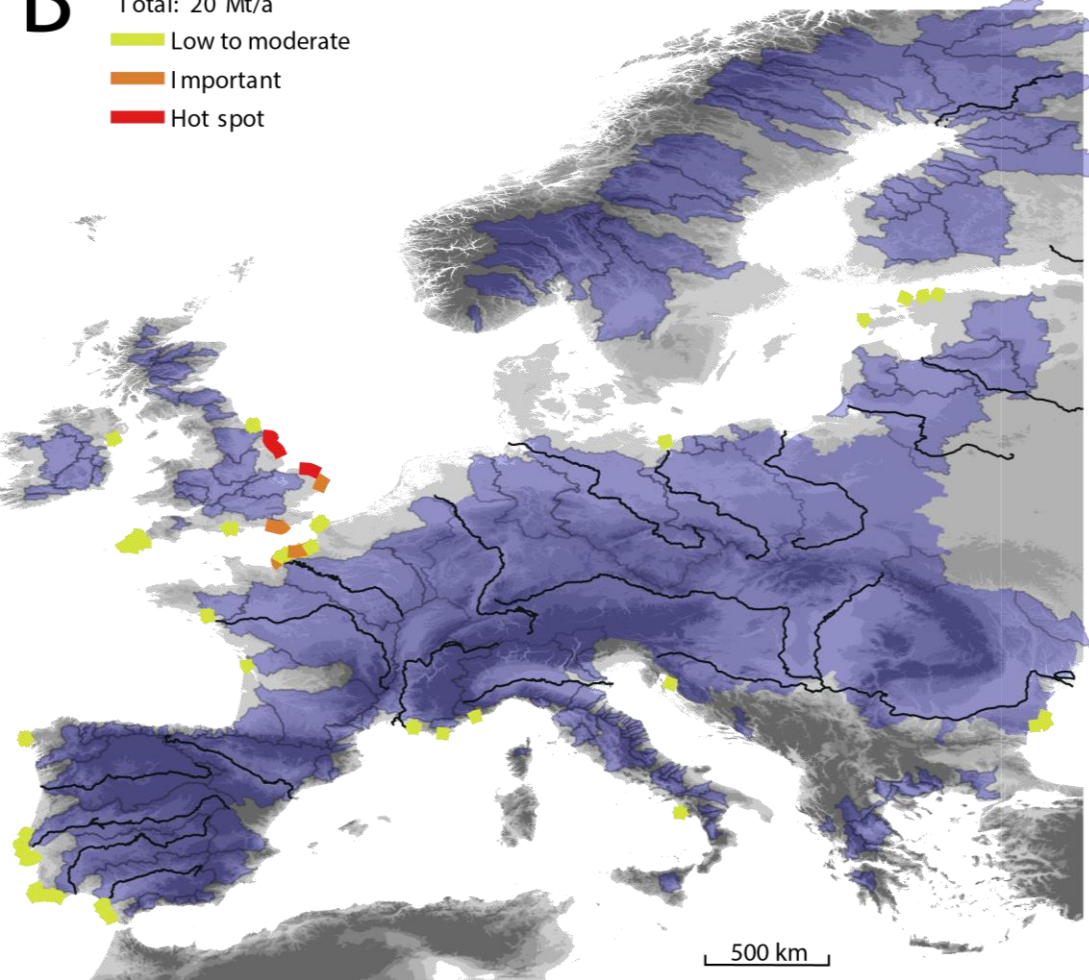
GlobR2C2 observed erosion

Total: 20 Mt/a

Low to moderate

Important

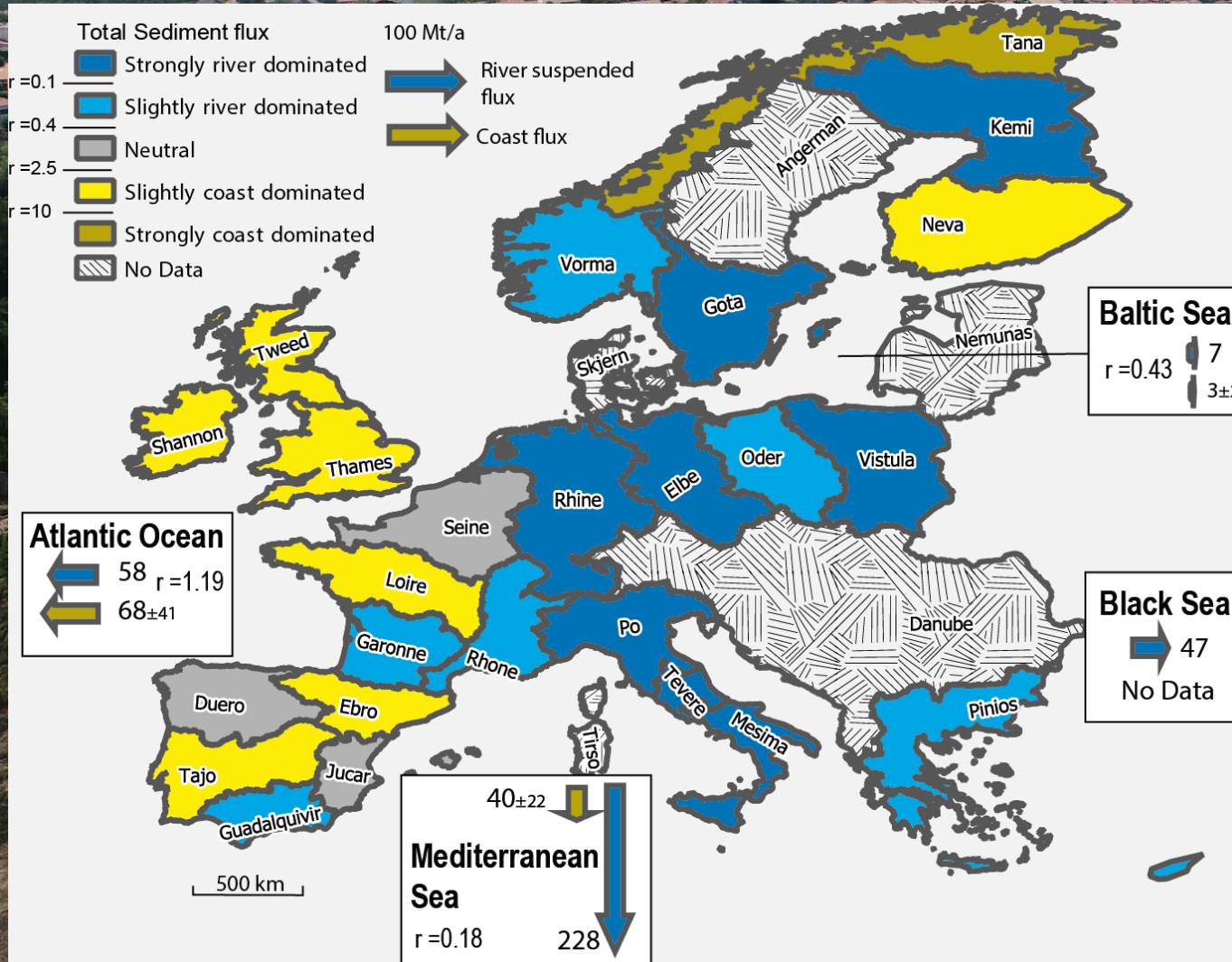
Hot spot



Only monitored sites
GlobR2C2 (Prémaillon et
al. 2018)
20 Mt/a

CALCULATION

70 % Europe / comparison to fluvial input



Rock coast erosion
111 ± 65 Mt/a

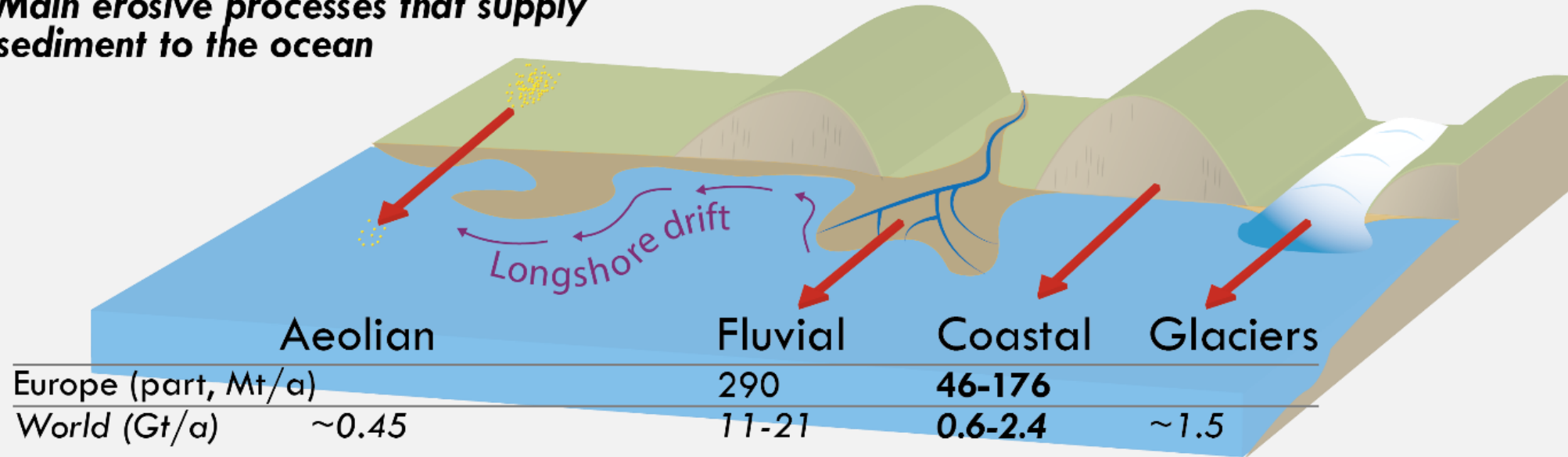
Fluvial input
290 Mt/a

Ratio $r=0,38$

DISCUSSION

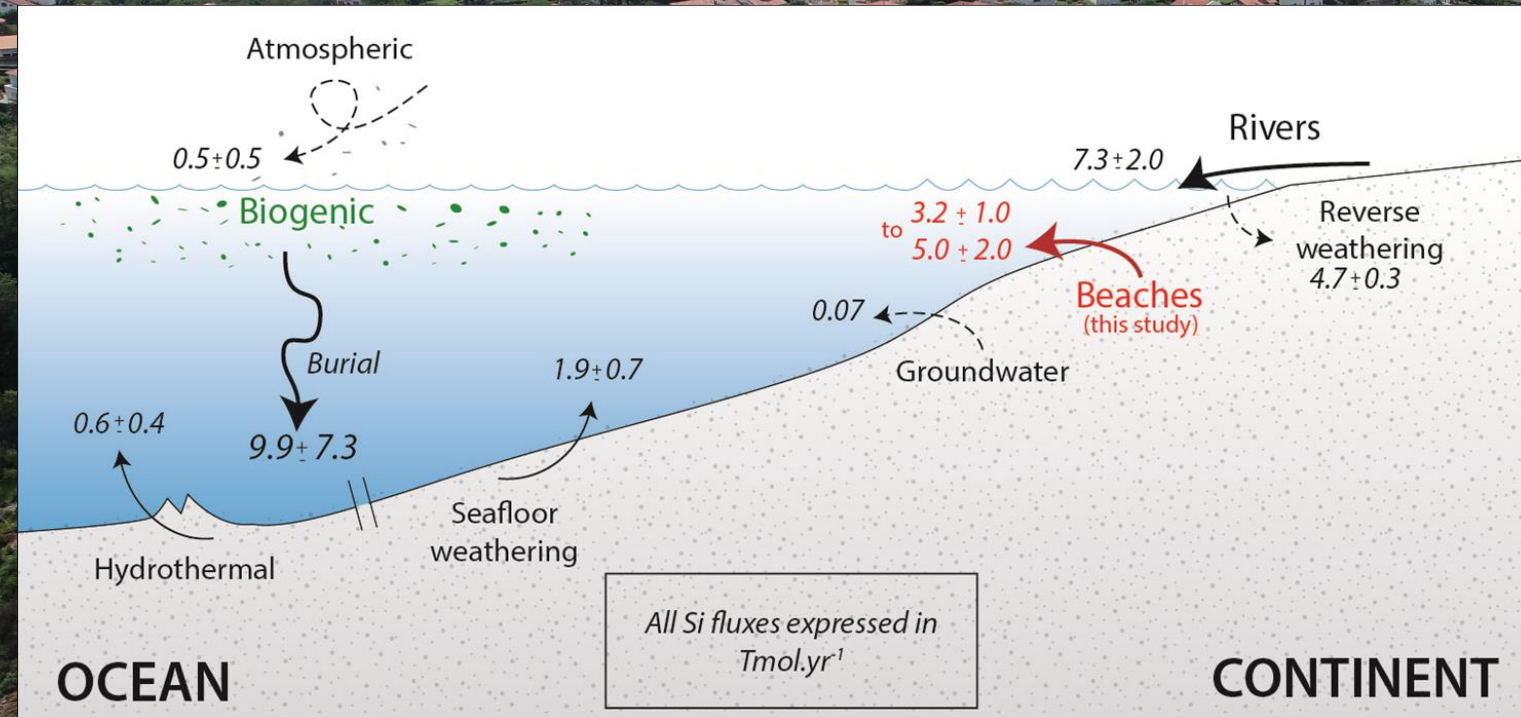
extrapolation

Main erosive processes that supply sediment to the ocean



DISCUSSION

Implication for global cycles



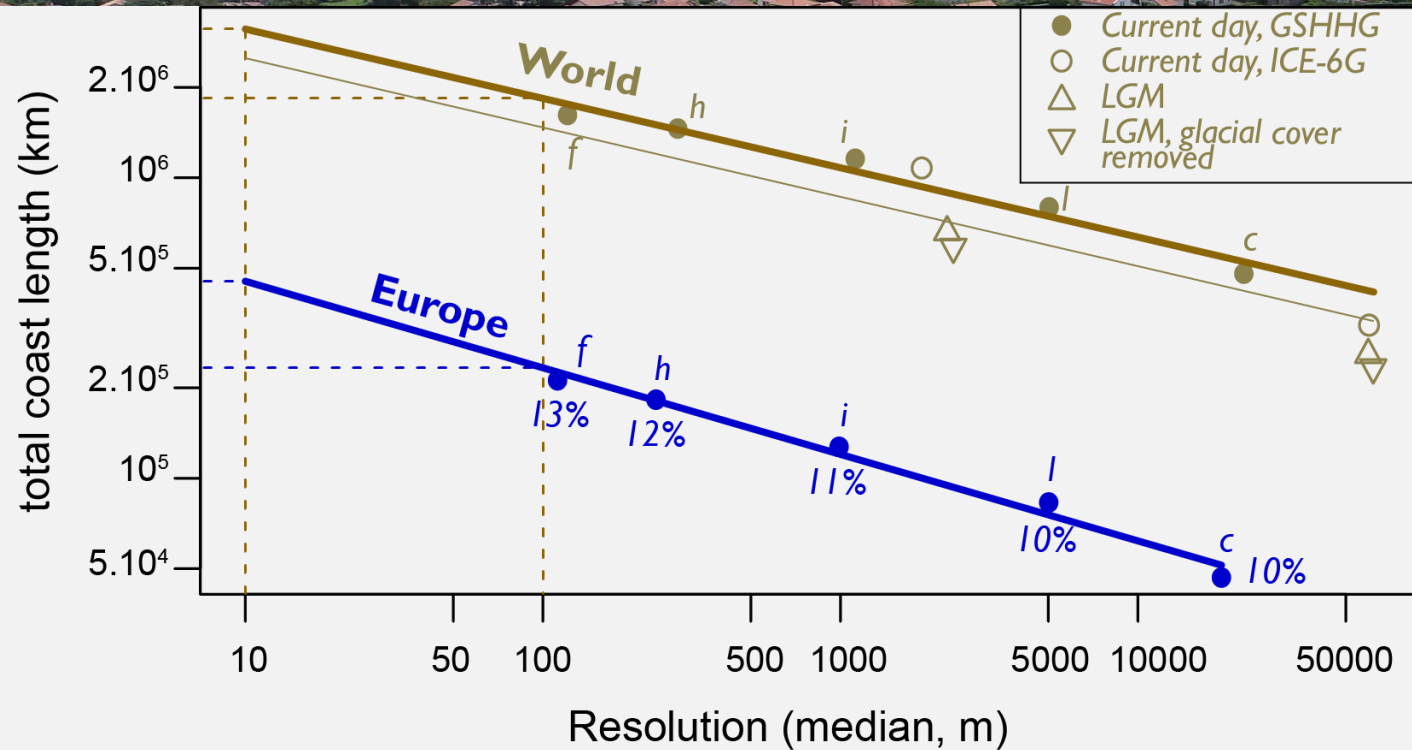
Unbalanced cycles
(ex Si)
(Fabre et al. 2019)

For details, see Regard et al. EPSL 2022



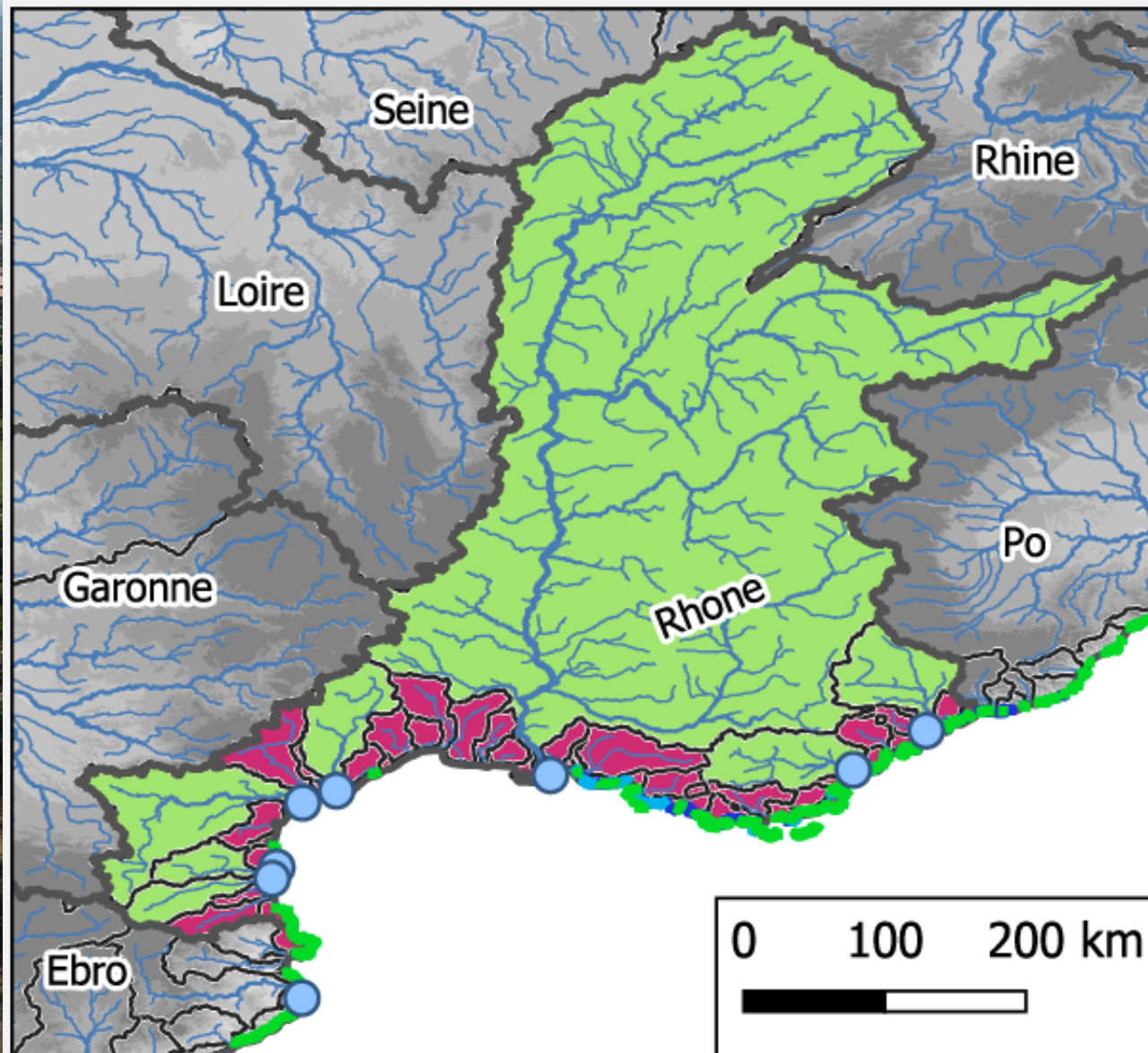
DISCUSSION

Coast length



Fractal:
 Europe ~10% global
 Global, ~100 m: 1,8 Mkm

LGM : 20 à 27% less



-  Gauging station
 -  Catchment boundaries (HydroSHED data base)
 -  Measured basin
 -  Extrapolated basin
 -  Basin district limit
 -  A
 -  AC
 -  B
- EMODnet rocky coast data base

