

Data needs for Quaternary and Prehistoric Landscapes/Archaeology: Objectives and next steps

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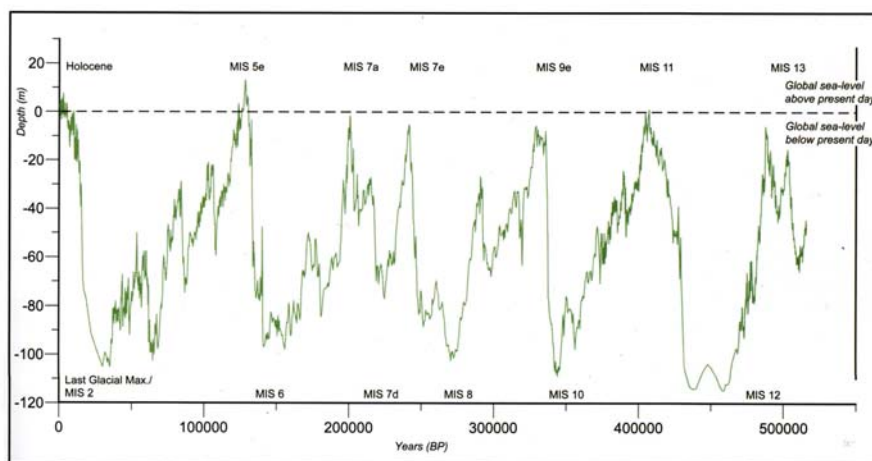


Figure 1.4 Global sea-level curve annotated to show the proportion of Palaeolithic time for which global sea levels were below present. Note that large oscillations occurred within individual glacial / interglacial stages (eg MIS 7) and that regional isostatic and tectonic factors meant British sea levels deviated from this global pattern (data from Rohling et al 2009)

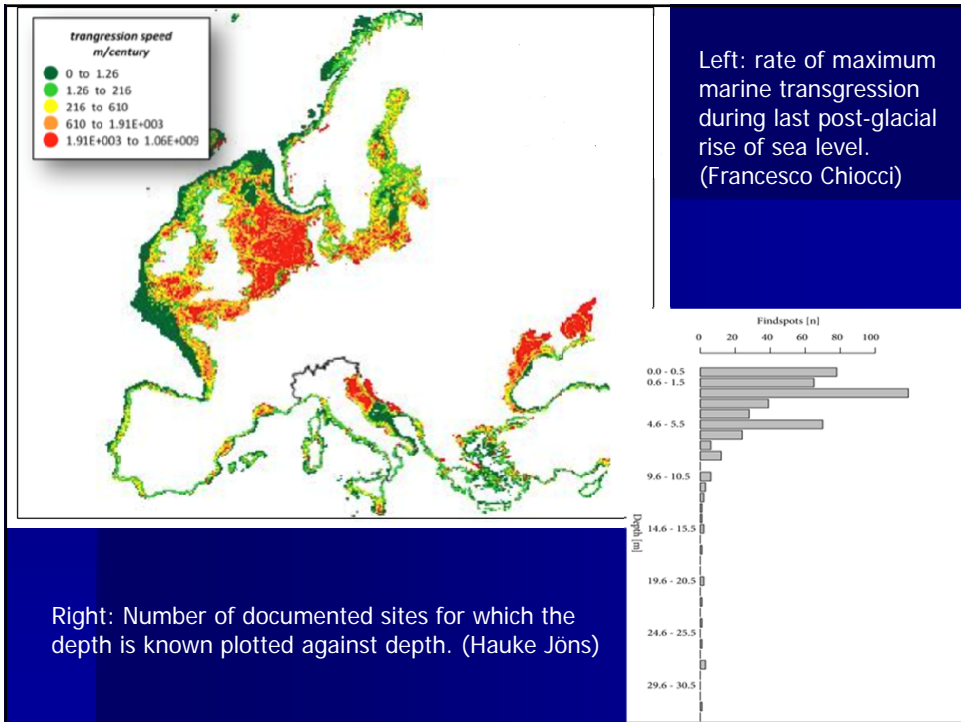
Sea level curve for last half million years: Europe was 20-40% bigger than now for most of the time.

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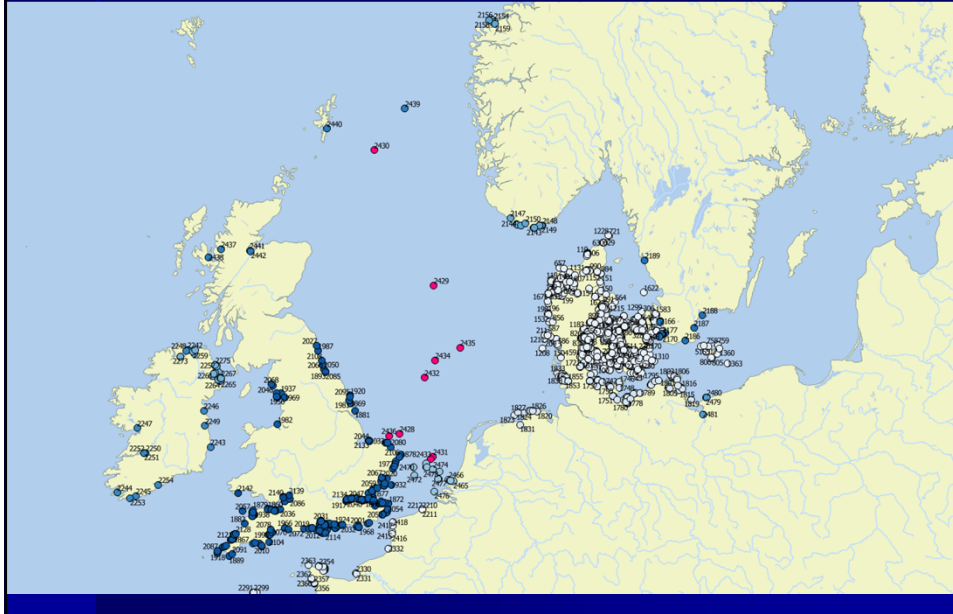
- 1.Objectives, context, connections
- 2.Existing relevant data types
- 3.Accuracy, resolution, coverage
- 4.Conversion to terrain characteristics
- 5.Data sources and new data
- 6.Establish a preparation group
- 7.Terms of reference and timescale

1.Objectives, context, connections

- 2500+ submerged prehistoric sites
- Legal/treaty/UNESCO obligations
- Links to industry, very constructive
- Research objectives; stake-holders
- Deukalion/SPLASHCOS/SUBLAND PP.
- Connection to EMODNet already
- Improvements in modelling, all kinds



Site catalogue details for N. Sea area and west Baltic. Jöns, SPLASHCOS 2014

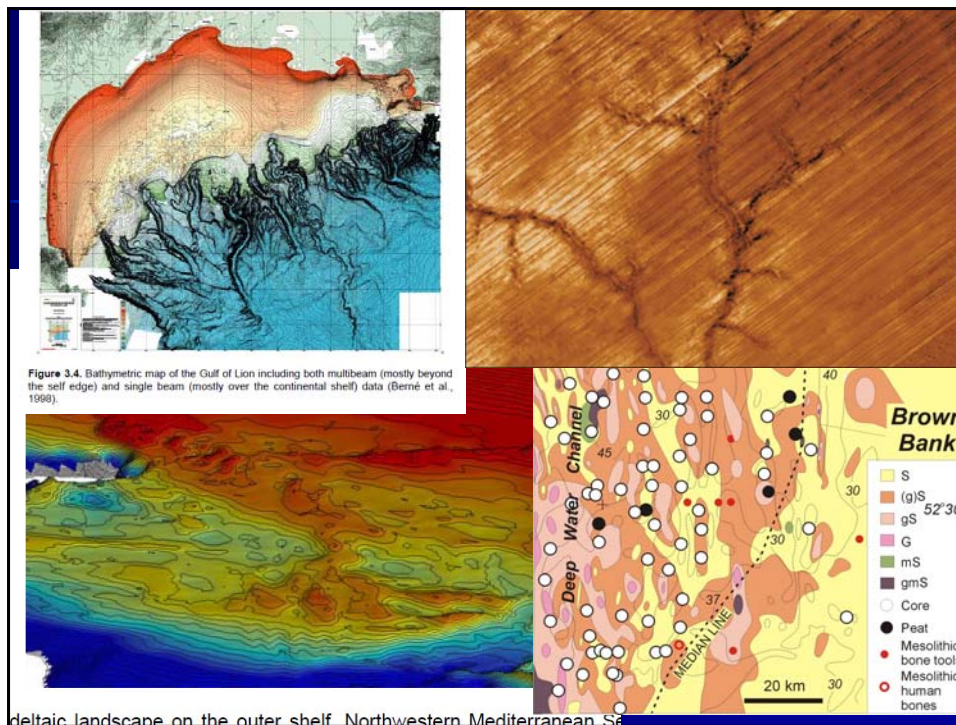


Research objectives, SPLASHCOS, Deukalion, SUBLAND, treaties.

- To reconstruct or map the European Quaternary (offshore) landscape, climate, coastline, ice edge, and vegetation in agreed time-steps.
- Obtain and integrate existing data to achieve the reconstructions listed above.
- This will enable better compliance with UNCLOS, UNESCO, and European treaties and EU Directives regarding protection of the historic cultural heritage.
- Provide data and products to the archaeological community for academic research goals in European prehistory.
- EMODNET would not “do the archaeology”.

2. Data types needed: The continental shelf is a drowned terrestrial landscape with a drape of modern marine sediments

- Digitised coastline (+/- 10m), correlated with tidal limits and mean sea level/terrestrial benchmarks, wetlands, marshes, lagoons, shallow rocks, etc.
- Bathymetry: small scale, coarse resolution to identify the broad landscape, hills and valleys.
- Bathymetry: very large scale & very high resolution to detect changes of gradient, geomorphological features etc.
- Sediment thickness: thickness of modern marine deposits; depth to base of Pleistocene (1-2 million years ago).
- Solid geology: rock outcrops, cliffs, valleys and scour in bedrock, basement under sediments to define regions.
- Sub-bottom acoustics, stratigraphy, reconstruction of buried surfaces and landscapes.
- Samples, core data, dated samples, peat, organics, pollen etc.



3. Accuracy, resolution and coverage (faux-naïf)

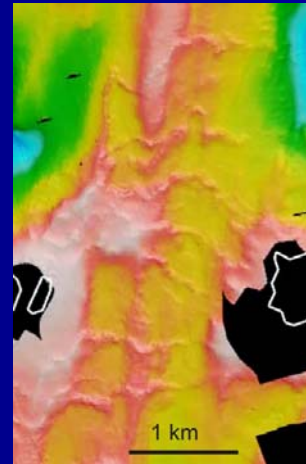
- Geographical coverage: High-tide line to 150m isobath.
- Harmonise stratigraphy and terminology. Dating accuracy and methods.
- Bathymetry to HO standards and geo-referenced to GPS, or other global/European standard.
- HR Multibeam where possible direct access.
- Sediments standard BGS-type classifications. Tens of thousands of cores and samples.
- Sub-bottom profiling data, many thousands of track km.
- Time step of maps to be decided. Not just LGM & post-LGM (if possible).

4. Conversion to features

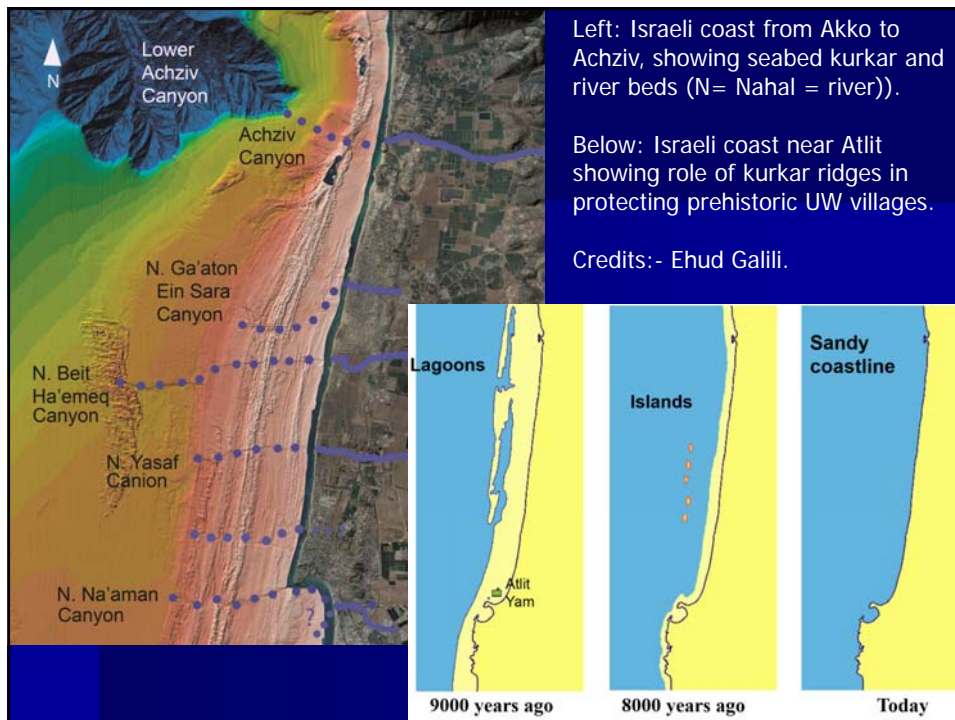
- Terrestrial geomorphological features occur both exposed on the surface of the seabed and buried in the sediment column.
- Cliffs never occur on charts.
- There are more steep gradients and sharp changes of gradient than gridded DTMs would suggest. DTMs tend to remove abrupt discontinuities. Even DTA algorithms use polynomial splines. (Is this true?)
- Gradients, changes of gradient, junctions, continuity of features, etc., need developing as algorithms (has this been done? Habitats?)
- Papers on digitised feature recognition: Tarolli et al.; Finkl; Grohmann et al., Seijmonsbergen (etc...).
- Feature recognition required: next slide...

Automatic recognition of:...

- River valleys, banks, braids, meanders, deltas
- Shorelines and terraces
- Moraines, ice tunnels
- Lake-beds, cliffs, faults
- Dune ridges, kurkar
- Sand waves, sand banks
- Fossil coral terraces
- Etc. etc. etc...

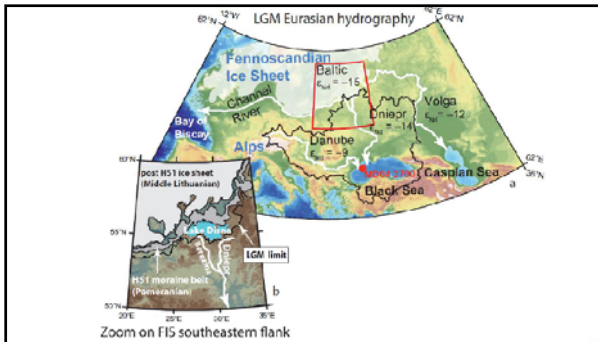
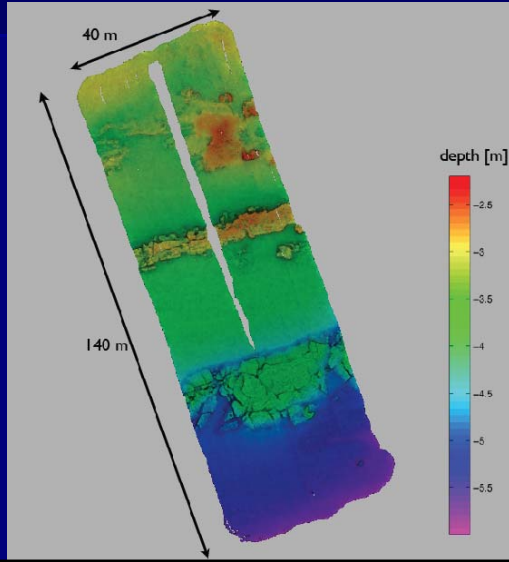


Right: Summer Isles, Stoker *et al.* 2009.





Left: Diver raising ancient artefacts from an abandoned freshwater well, Atlit Yam. Credit: - Ehud Galili
Below: 3 parallel beach rock ridges, Pavlopetri. Credit: Oscar Pizarro.



Left: Influence of Fennoscandian ice lake on river inputs to the Black Sea: Soulet *et al.* 2013.

Fig. 1. (A) The LGM hydrographic network of the Euraz diverted westward by the FIS, creating the "English Char" the Bay of Biscay. In northeastern Europe, the FIS rea

Right: Synthesis of the proposed landscape in southern North Sea and the Weald-Artois Ridge. Hijma *et al.* 2011.

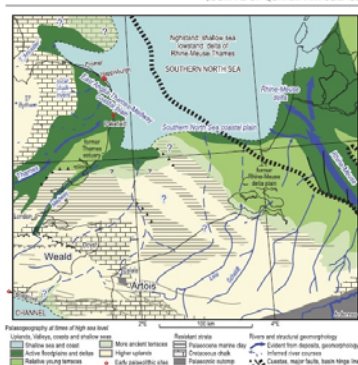
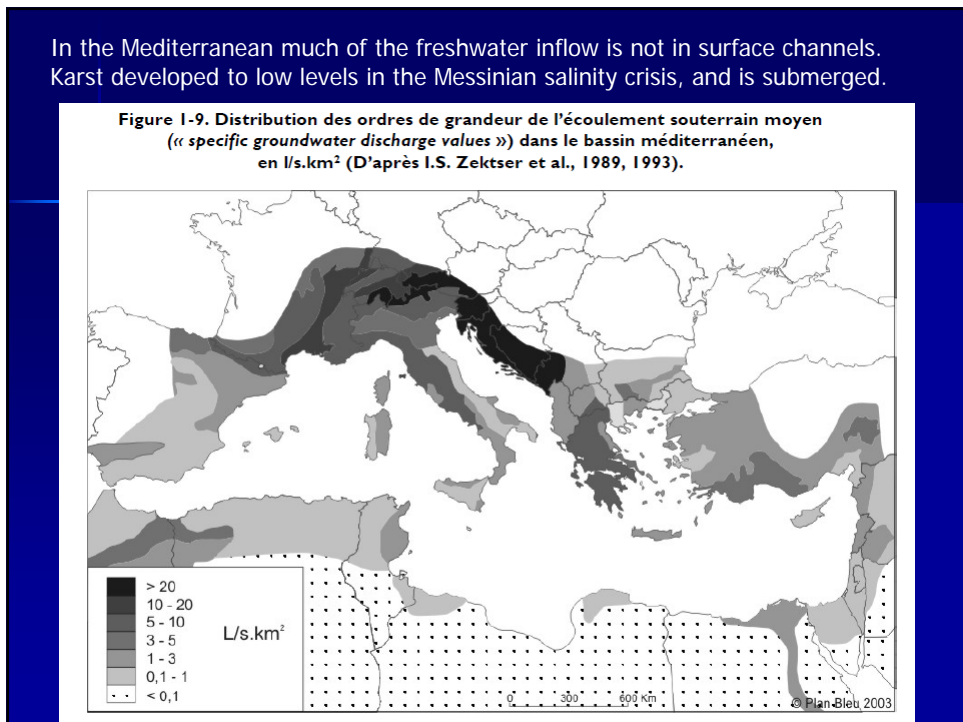
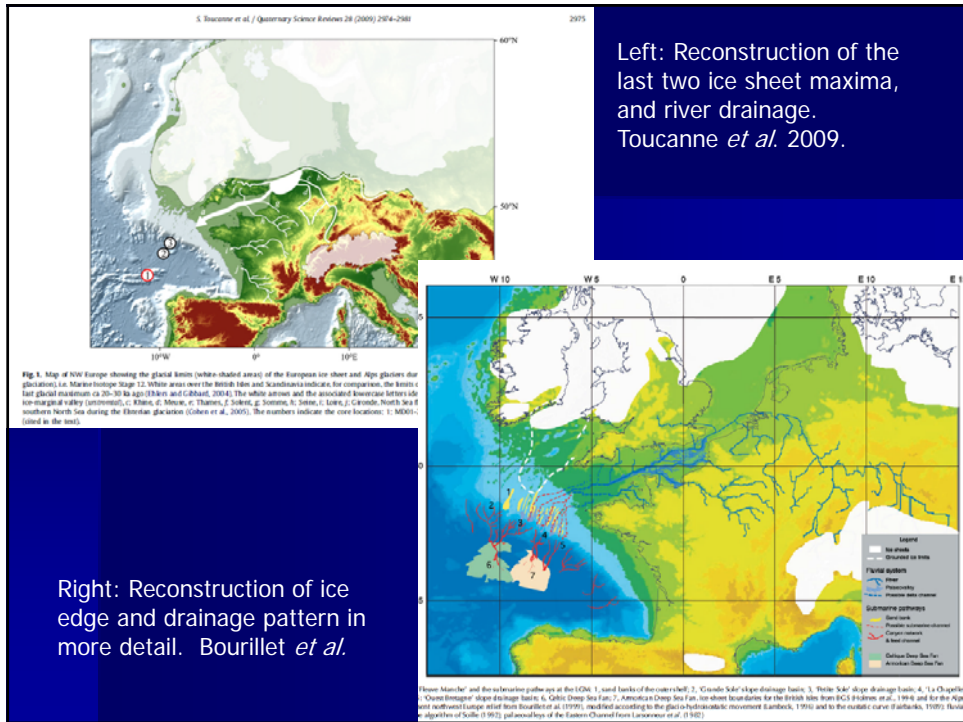


Figure 13. An interglacial highstand situation during the early Middle Pleistocene as repeatedly occurring between 1 and 0.5 Ma (i.e. 'Bavelan, Cromerian Complex', MIS 21, 19, 17, 15, 13) showing repeatedly glaciated headlands. Note position of Thames-Meuse, Rhine-Meuse, and NW German river confluences. Thames and Meuse valley gravels; BECS mapping; Rhine-Meuse gravelly sands; TNO-GSN mapping; Ombore ~1 Ma drainage network; Britain: Gibbard (1988) and Rose (2009); Belgium: De Moor and Picaut (1992); Netherlands: Westerhoff (2009).



5: Data sources & new data

- Solid geology: EMODnet geology Lot.
- Bathymetry: EMODnet Hydrography.
- Coastline: EMODnet, new project
- Sediment thickness
- Sub-Bottom acoustics, national agencies and commercial sources.
- Samples, cores, grabs, ...
- Texture/roughness, terrain, relief, etc..

6. Establish a MODEG preparation group

- Instructions for preparation/drafting group. Minutes of this meeting.
- Members of the drafting group, volunteers requested.
- Chairmanship.
- Deadline for draft contract.
- Meetings, if any.

7. Terms of reference and timescale

- Task within a geology/Quaternary layer
- Contract date 2016; contract duration?
- All European seas and shelf area
- Metadata, browser maps, links to data sources.
- Samples of high resolution data.
- Feature recognition software if possible.

