British archaeology verifies 5th-Century rapid multi-metre sea-level rise and portends another before 2100

Roger Higgs, Geoclastica Ltd, United Kingdom
rogerhiggs@hotmail.com
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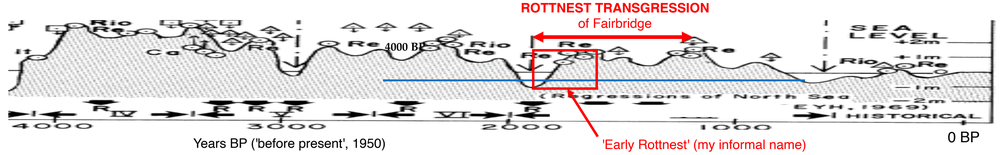
My publications (ORCID)

Abstract

SUMMARY (email me for references). The famous Fairbridge (1961, updated 1976) global-compilation sea-level (SL) curve for our current Holocene interglacial (last 11,700yr), based on *geological* benchmarks of former SL, shows several multi-metre (m) SL oscillations. The most recent oscillation began with the 'ROTTNEST TRANSGRESSION' (Panel 1 below), in which an initial rapid ~3m SL rise spanned ~50-300AD (loose C14-dating, typically +/- 100-200yr). In support, later workers in various countries (Panel 2) identified a transgression of 1.5-3m (or more), its highstand somewhere between 200 and 800AD (variability reflects loose C14 and sparse samples). Copious published British coastal *archaeology* (e.g. Panel 3), *much* better-dated (coins, pottery, tree rings) and hitherto underappreciated for SL research (but see Cunliffe 1966* & Cracknell 2005**), confirm the Rottnest and show it was *very fast*, ~3m in only ~70yr (~430-500AD, Panel 4). (A comparable 2-3m SL rise in <100yr is proven for the *previous* interglacial MIS5e [Blanchon 2011].) This rapidity may explain enigmatic 5th-Century Anglo-Saxon mass-migration to England (Panel 5). Such a rapid rise (average 4cm/yr; cf. 3mm/yr at present) can only be due to Antarctic ice collapse (google 'MICI'; Panel 6). What drove it? The Rottnest began (~430AD) just 25yr after an Arctic (sic) temperature super-spike (405AD), which followed 95yr after a 310AD solar-magnetic super-peak (Panel 7, graphs A, B). Therefore, I propose north Atlantic (Arctic periphery) surface water, 'overwarmed' by the solar surge (95yr time-lag, above, due to ocean thermal inertia), was downwelled in the AMOC ocean circulation, and upwelled at Antarctica 25yr later (travel-time lag), inducing ice collapse. Due to man-made warming, the Arctic is now (since 2005) warmer than the Rottnest-triggering 405AD warm peak (Panel 7, Graphs B, C). This portends another metre-scale SL rise, lasting at least 70yr (like the Rottnest), starting ~2030 (2005 plus 25yr lag). Consistent with this assessment, Antarctic scientists predict that final disintegration of Thwaites Glacier's remaining ice shelf (pre-requisite for MICI) could begin by 2026 (Pettit et al. 2021).

1) Fairbridge 1976 sea-level (SL) curve, global compilation from stable regions (modified after Fairbridge 1961, based on geological benchmarks [data-points] of former sea level, e.g. raised beaches, drowned wave-cut benches)

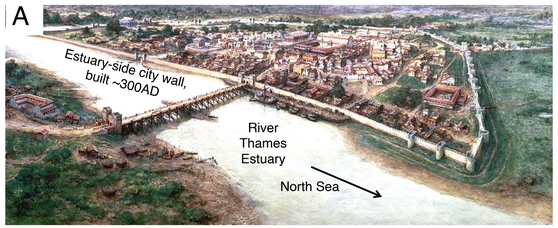


2) Other (mostly later) publications recognising a Rottnest-equivalent transgression (based on geo- and/or archaeological data-points; several authors applied *local* names for this transgression)

Author	*Study area*	*Time span (rounded to nearest 50yr)*	*Magnitude (nearest 0.5m)*
Bloch **1963**	Europe & M. East	250BC-550AD	2.5
Cunliffe 1966 *	SW England	3rd & 4th Century AD	3-6
Greensmith & Tucker 1973	SE England	200-750AD	4
Schofield 1977	C. Pacific atolls	~50-450AD	>1.5
Tooley 1978	NW England	350BC-350AD	1.5
Raban & Galilee 1985	Israel	550BP-500AD	2
Colquhoun & Brooks 1986	USA (S. Carolina)	500BC-200AD	3
Geng et al. 1987	E China	50-800AD	2.5
Ters 1987	Atlantic France	50BC-300AD	2.5
Walker et al. 1995	USA (Florida, GoM)	100-250AD	2
Dionne 2001	Canada (Quebec)	550BC-450AD	2
Behre 2007	German North Sea	1-300AD	1.5
Mörner 2007	Maldives	400-450AD	1.5
Meier **2008**	German North Sea	50BC-300AD	1.5

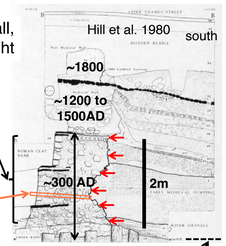
3) English archaeology example: Roman Londinium eroded estuary wall

(Romans abandoned Britain 410AD)



'Londinium' Roman fort & city, reconstruction, 4th C, looking NW
https://www.romanports.org/en/articles/ports-in-focus/553-londinium-engels.htm

Estuary-side wall, excavated sector, upright

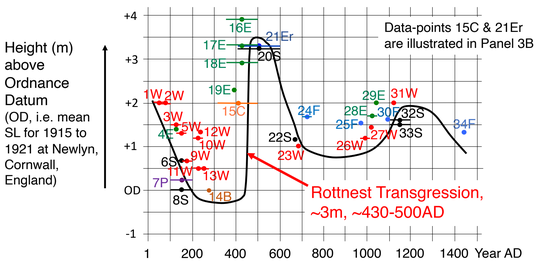


Surviving (truncated) Roman portion. Front face eroded (arrows) by estuary flow (Hill et al. 1980). Implies >2.5m rise in high-spring-tide level (HSTL), assuming wall foundation was laid at least 0.5m above HSTL. Top is Data-Point 21Er, Panel 4

Drain tunnel (Data-Point 15C, Panel 4) deliberately plugged with Roman construction rubble containing 4th C pottery (to prevent entry of rising river water?; Willcox 1980). Possibly plugged by 5th C Britons (they re-used or copied Romano-British pottery; Jones 2000; Gerrard 2016)

4) My new *tightly-dated* high-spring-tide-level (HSTL) curve for London, 1-1500AD

(based on 34 published *archaeological* data-points, much better-dated [tree-rings, coins, pottery sherds]; email me for sources)



Categories of HST-limiting data-points:

Red/W = waterfront (quay or revetment) extant top

Dark Green/E = top of dumped material (river embankment)

Dark Blue/Er = top of highest-known erosional front face of Londinium riverside city-wall

Black/S = top of waterlain sediments

Purple/P = peat

Brown/B = Roman riverside wall's lowest recorded base

Orange/C = deliberately plugged drainage-culvert through riverside wall

Pale Blue/F = floor of waterside building

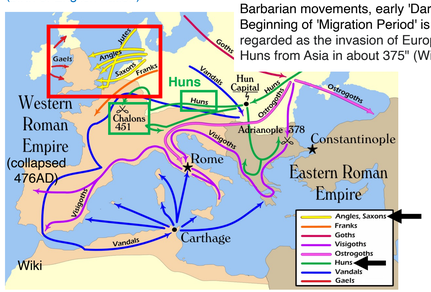
Horizontal bars indicate age uncertainty (no bar shown if < ~40yr)

* Cunliffe 1966 in CBA

** Cracknell 2005 'Outrageous Waves'

5) Explains 5th C Anglo-Saxon mass-migration to Britain

(birth of English nation)

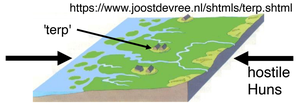


Barbarian movements, early 'Dark Ages'. Beginning of 'Migration Period' is "widely regarded as the invasion of Europe by the Huns from Asia in about 375" (Wiki).

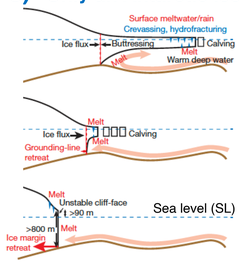
Rottnest Transgression, interpreted here as spanning 70yr, ~430-500AD (e.g. Panel 4), partly explains 5th-Century(C) exodus to SE Britain, underway by 450AD (dendro, artefacts, skeletal-DNA; Curry 2022), of Saxon and Angle families fleeing their 'Low Countries' coastal-plain man-made village-mounds (google 'terp'). Already in 1982, Hawkes invoked 5thC mass-migration of Anglo-Saxon refugee "boat people", driven by SL rise. Similarly, according to Jones (2000), during the 440s and 450s, "a great impetus to the emigration of the Anglo-Saxons was the rising sea levels". Probably preventing the migrants from instead moving inland, hostile Huns were advancing from the east (map shows site of 451AD Battle of Châlons [Wiki], limit of Hun incursion). Thus, Anglo-Saxons were intolerably 'squeezed' between rapid eastward shore-retreat (see below) and west-advancing Huns. Immigration into Britain was apparently unopposed: eastern Britons, unprotected by Roman troops (departed 410AD), had by 441AD already been subjugated by rebellious Saxon mercenaries (Jones & Casey 1988).

Rapid shore retreat, ~300m/yr, assuming 3m SL rise in 70yr (would cause high-spring-tide line to migrate ~20km across the nearly-flat coastal plain)

https://www.joostdevree.nl/shtmls/terp.shtml



6) Only an Antarctic ice-collapse event ('MICI') can explain such a fast SL rise (Rottnest, 3m in 70yr, i.e. 4cm/yr; contrast 3mm/yr currently)



DeConto & Pollard 2016

HYPOTHETICAL Antarctic 'Marine Ice-Cliff Instability' (MICI).

Requirements:

(A) buttressing ice shelf completely gone;

(B) grounding line exceeds ~700m below SL;

(C) retrograde bedrock slope.

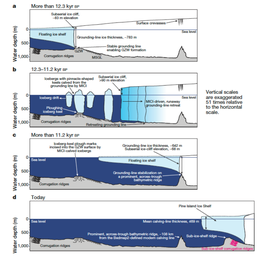
Greenland does not satisfy (B) or (C), e.g. Wood et al 2021

Wise et al. 2017

Seabed "corrugations" and V-shaped iceberg plough-marks suggest a MICI event ...

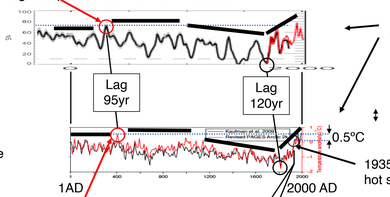
... loosely dated as spanning ~12.3 to 11.2kyrBP

cf. Blanchon & Shaw 1995 (their CRE-2 event) started 11.5kyrBP, ~7.5m, lasted <160yr (i.e. >4.5mm/yr)



7) Rottnest SL rise likely driver: Sun's 310AD super-surge, causing 405AD Arctic temperature super-spike

310AD strongest solar-magnetic peak of the interval 1-1885AD



GRAPH A. Wu et al. 2018. Reconstructed Sunspot Number (SN; proxy for solar-magnetic output), from ice-core Be10 & tree-ring C14. Red = International sunspot number for 1749-2013 (Clette et al. 2014)

GRAPH B. McKay & Kaufman 2014 (in red). Proxy-based Arctic (60-90°N) mean surface-air temperature anomaly (relative to 1961-1990 average). Decadally averaged annual values.

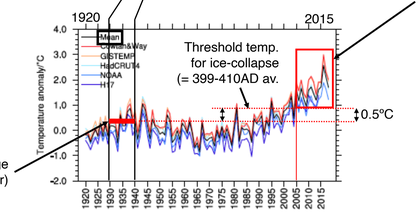
NB broad correlation (with ~100yr time-lag, attributable to ocean thermal inertia), i.e. Sun was main control of Arctic (and global) temp. (cf. Svensmark 2007) ... UNTIL ...

... ~1940, when man-made warming overtook solar control ... Higgs 2022 ...

1935 peak (= 1929-1940 av.) was 0.5°C cooler than 'Rottnest hot spike' of 405AD (399-410AD average) ... BUT ...

405AD peak (i.e. 399-410AD av.) was the warmest of the interval 1-2000AD

GRAPH C. Xiao et al. 2020. Arctic mean surface temperature anomaly, 1920-2018 (thermometers; 5 different datasets)



... since 2005, every year's mean annual temp. has exceeded the 1929-1940 average (red bar) by >0.5°C, i.e. MICI ice-collapse threshold re-breached; collapse expected to start ~2030 (25yr lag)

Post-2005 warmth man-made, by airborne soot ... Higgs 2023 ...

Sharing is encouraged