

Relative sea level at Perniö in Finland

Stuart Harris; Lucinges, France; August 2017

Summary

The Commune of Perniö in southwest Finland contains three historical civilizations: Norse, Finnish and Greek, described by classical composers of *Prose Edda*, *Kalevala* and *Iliad*. The date when a particular building was constructed can be inferred from sea level, which in turn requires a precise knowledge of sea level. This paper constructs a curve of relative sea level at Perniö for the last 12,000 years with notes on significant eras.

The historical significance of Perniö

In *Homer in the Baltic* (1995), Felice Vinci identified a region between Helsinki and Turku as the likely location of the Trojan War. It would be near a village named Toija and a hamlet Aija-la that sounded like Achaean.

In 2002, photographer John Catto of National Geographic and I searched for Troy and found it, half way between the town of Perniö and the village of Toija. It occupies most of a large farm named Pohjola, a legendary settlement in *Kalevala* that Finns have been trying to find for 200 years. Line K12.199 calls new head-hunting settlers *Turjan*, which Greeks changed to **Trojan**. To the east rises mount **Ida**, named *Ahde* meaning 'slope', whose eastern flank exudes hundreds of springs. To the west courses the river **Simois**, called *Siimaoja* from *Sima oiva* meaning 'first-rate beer'. To the south lies the island of **Lemnos**, called *Lemun* meaning 'fragrance'. And to the northwest, on an island called *Multa* meaning 'Earth', stood the immense citadel of **Asgard**, home of the Aesir, thousands of years before it became known as **Olympos**, from Olleme Pos meaning 'we are Po descendants'.

Within the Commune of Perniö, Norse, Greek, and Finnish history merge. Its cairns can be assigned to historical people, and cities can be found by following directions from classical writers.

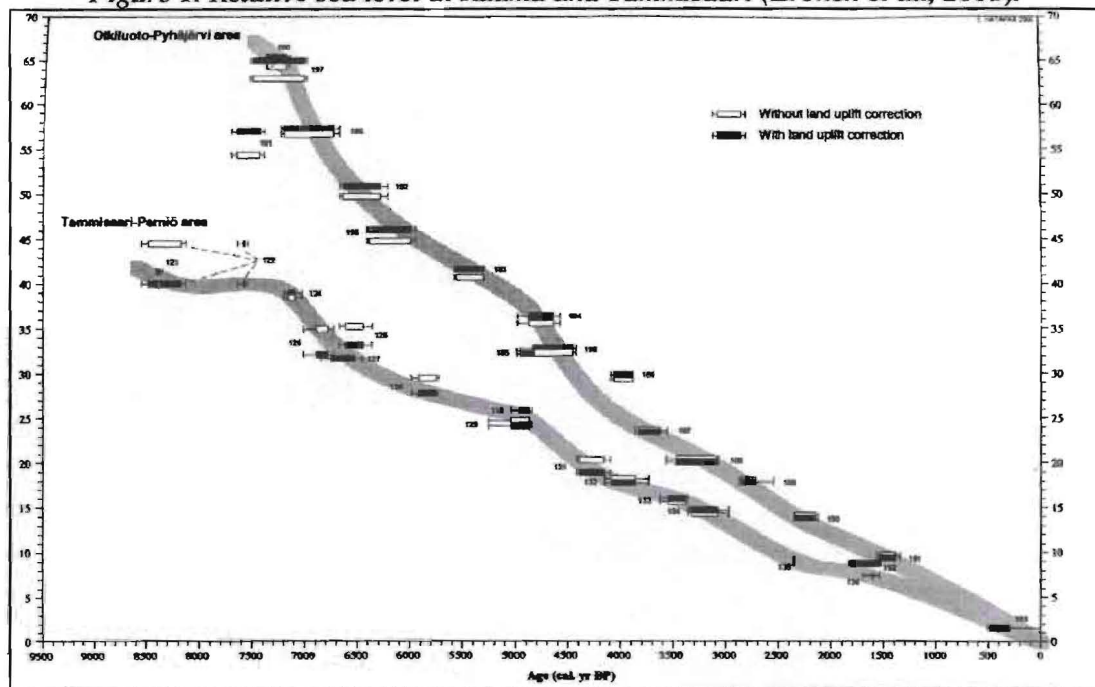
The most important reason to construct a curve of relative sea level is to estimate when a structure was built. When choosing where to locate a house, carpenters used a rule of thumb: it should be as close to the sea as possible, but no closer than a safety margin. They knew that the land was rising and the coastline would slowly ebb away. When icebergs were calving from the Scandinavian Ice Sheet, this safety margin was 5 fathoms (30 ft). When the glaciers were gone, the safety margin was reduced to 3 fathoms (18 ft). This rule applied to houses and store-houses, but not to barns, saunas or palisades.

Sampling relative sea level

The first step is to collect actual data. In 2001, Matti Eronen et al. carefully measured relative sea level at Rauma north of Perniö and Tammisaari south of Perniö (Figure 1). In addition to precise elevations, they corrected for local changes in uplift or settlement.

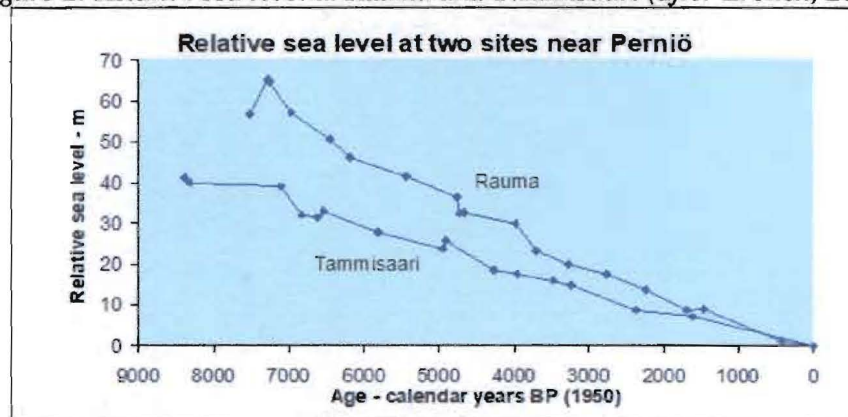
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Figure 1. Relative sea level at Rauma and Tammisaari (Eronen et al., 2001).



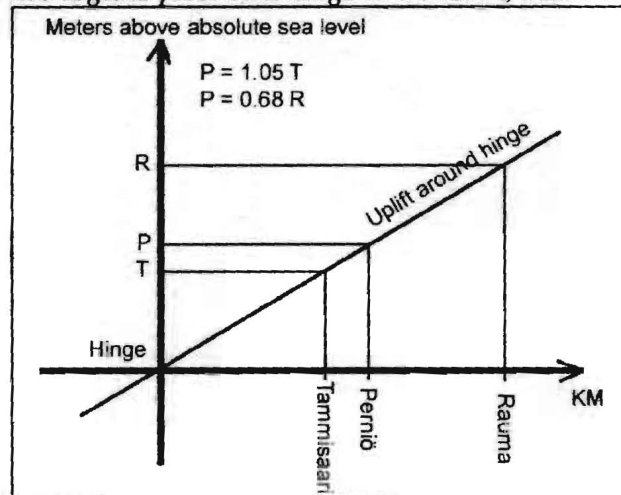
These two surveys can be simplified to a series of points (Figure 2).

Figure 2: Relative sea level at Rauma and Tammisaari (after Eronen, 2001).



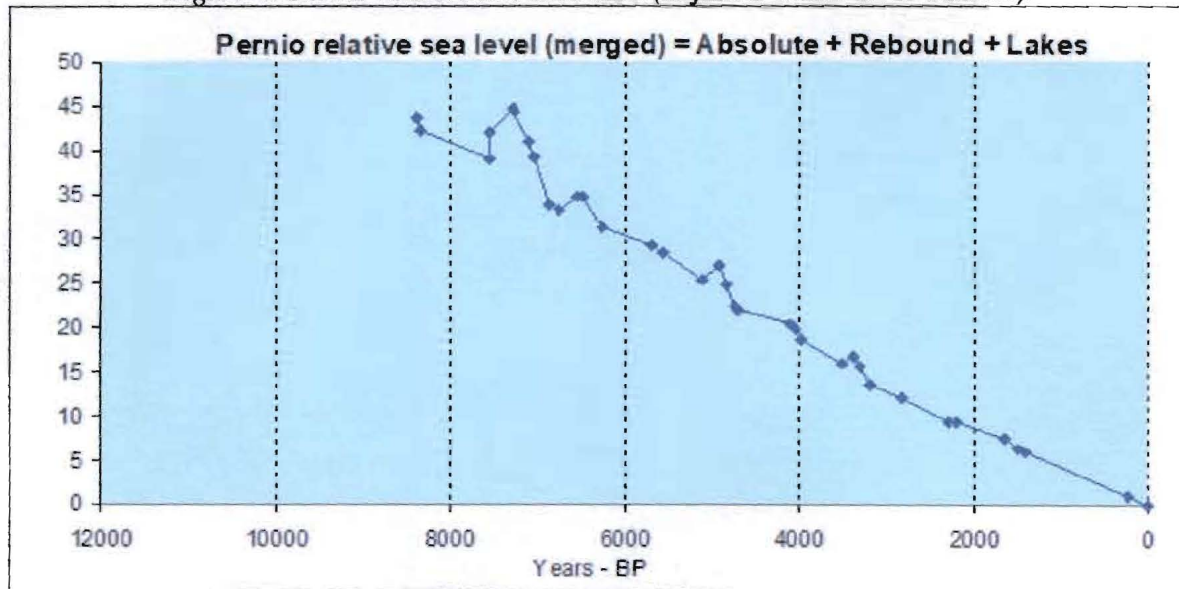
To apply these measurements to Perniö, they must be ratioed by their distance to an imaginary hinge line. Uplift in southern Finland can be modeled as a rigid plate that rotates around a hinge in the open sea between Finland and Estonia. After some trial and error, Perniö is 1.05 times Tammisaari and 0.68 times Rauma (Figure 3).

Figure 3: The two regions pivot on a hinge to the south, with Perniö in between.



By applying these ratios, both surveys combine into a single set (Figure 4).

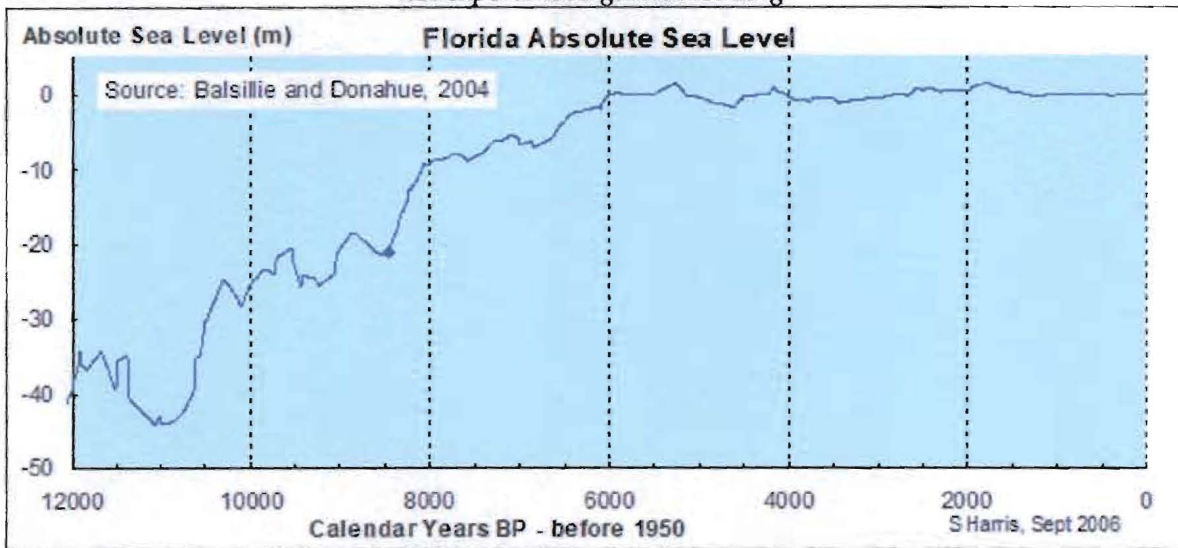
Figure 4: Perniö relative sea level data (adjusted within error bounds).



Next, each point must be converted to absolute sea level to account for glacial rebound. Balsillie and Donahue (2004) did the work; they combined sixteen datasets of absolute sea level in and around Florida into a single curve going back 14,000 years. Unlike all previous estimates, they demonstrated that sea level oscillated both periodically and randomly, with abrupt transitions (Figure 5).

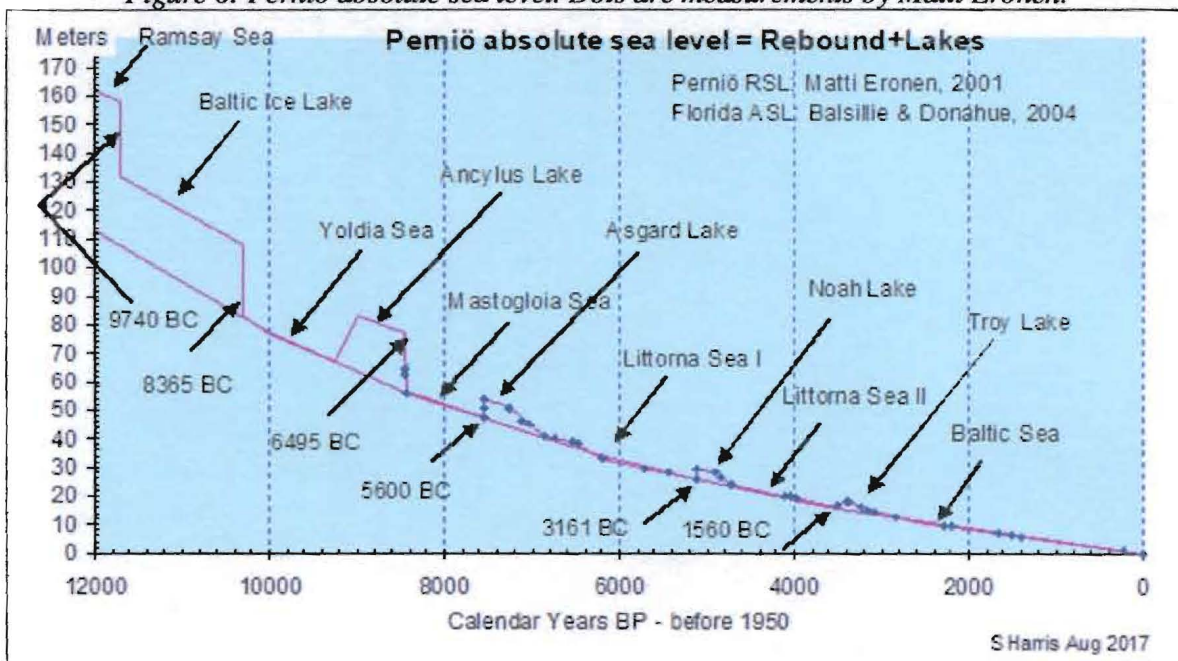
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Figure 5: Florida absolute sea level. Balsillie and Donahue (2004) chose Florida because it had not experienced glacial loading.



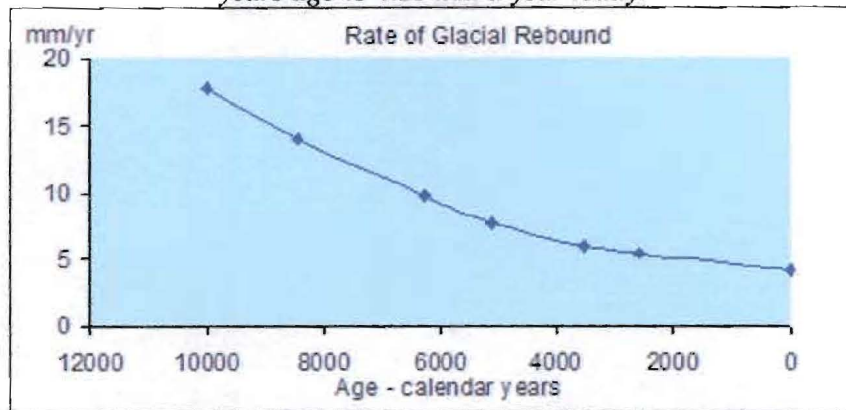
Subtracting Florida absolute sea level from Perniö relative sea level leaves Perniö absolute sea level, a simple curve that combines glacial rebound and freshwater lakes in the Baltic Sea Basin (Figure 6).

Figure 6: Perniö absolute sea level. Dots are measurements by Matti Eronen.



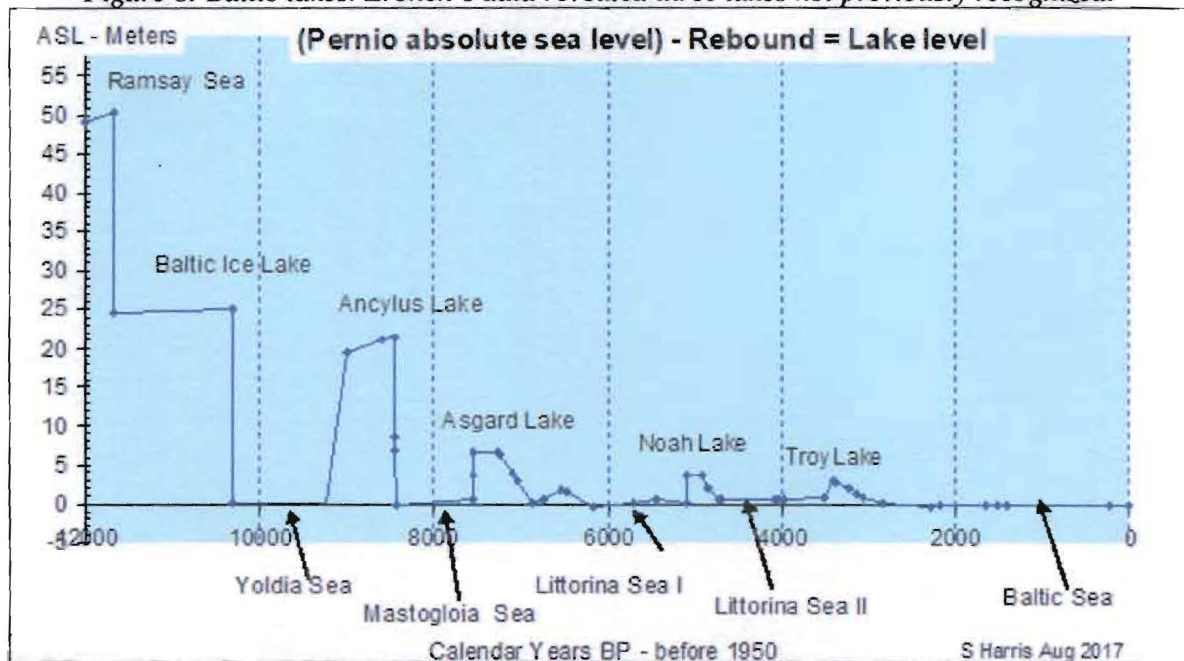
From this data, model and extrapolate glacial rebound, which has steadily declined for twelve thousand years (Figure 7).

Figure 7: The rate of glacial rebound at Perniö has declined from about 25 mm per year 12,000 years ago to 4.23 mm a year today.



Now subtract glacial rebound from Perniö absolute sea level to leave an intuitive view of the height above sea level of a series of freshwater lakes in the Baltic Sea Basin (Figure 8). For anyone familiar with these lakes, what immediately stands out are three new lakes, which I have named **Asgard Lake**, **Noah Lake**, and **Troy Lake**, for reasons below.

Figure 8: Baltic lakes. Eronen's data revealed three lakes not previously recognized.



Finally, reverse this procedure by adding lake level, glacial rebound and Florida absolute sea level to generate a detailed curve of relative sea level at Perniö (Figures 9 and 10). With this tool, each elevation has a date when it bordered the sea. There is some overlap, but generally one knows the approximate age to begin with. Dots are sampled data points.

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Figure 9: Relative sea level at Perniö to 11 ka. Earlier than 11 ka, Perniö was tiny islets.

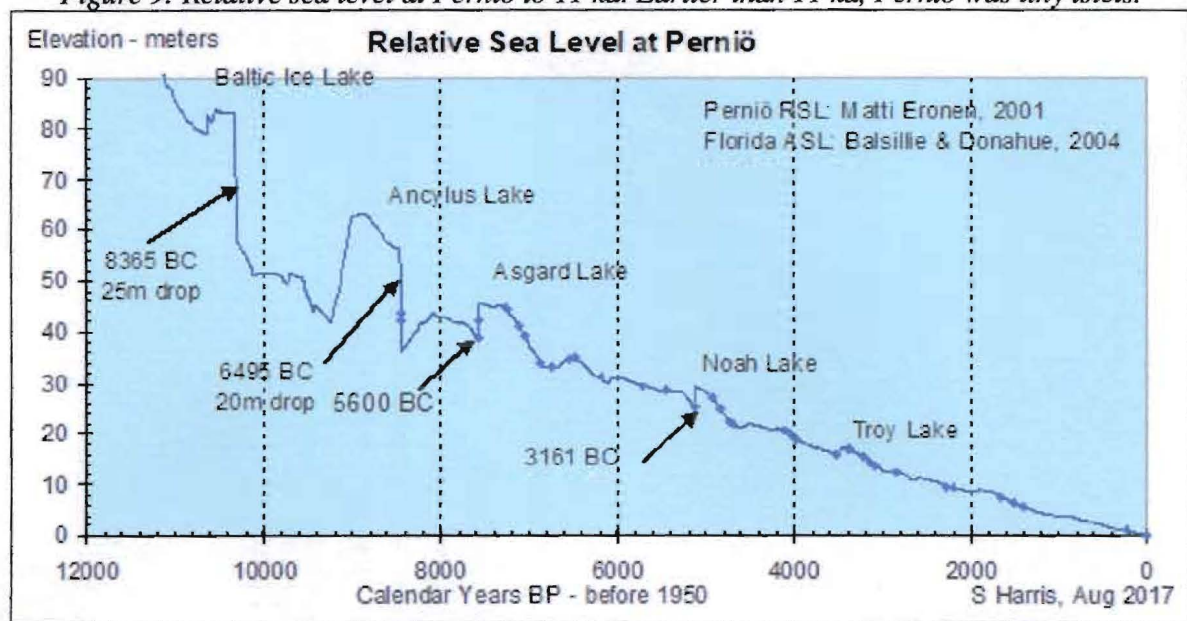
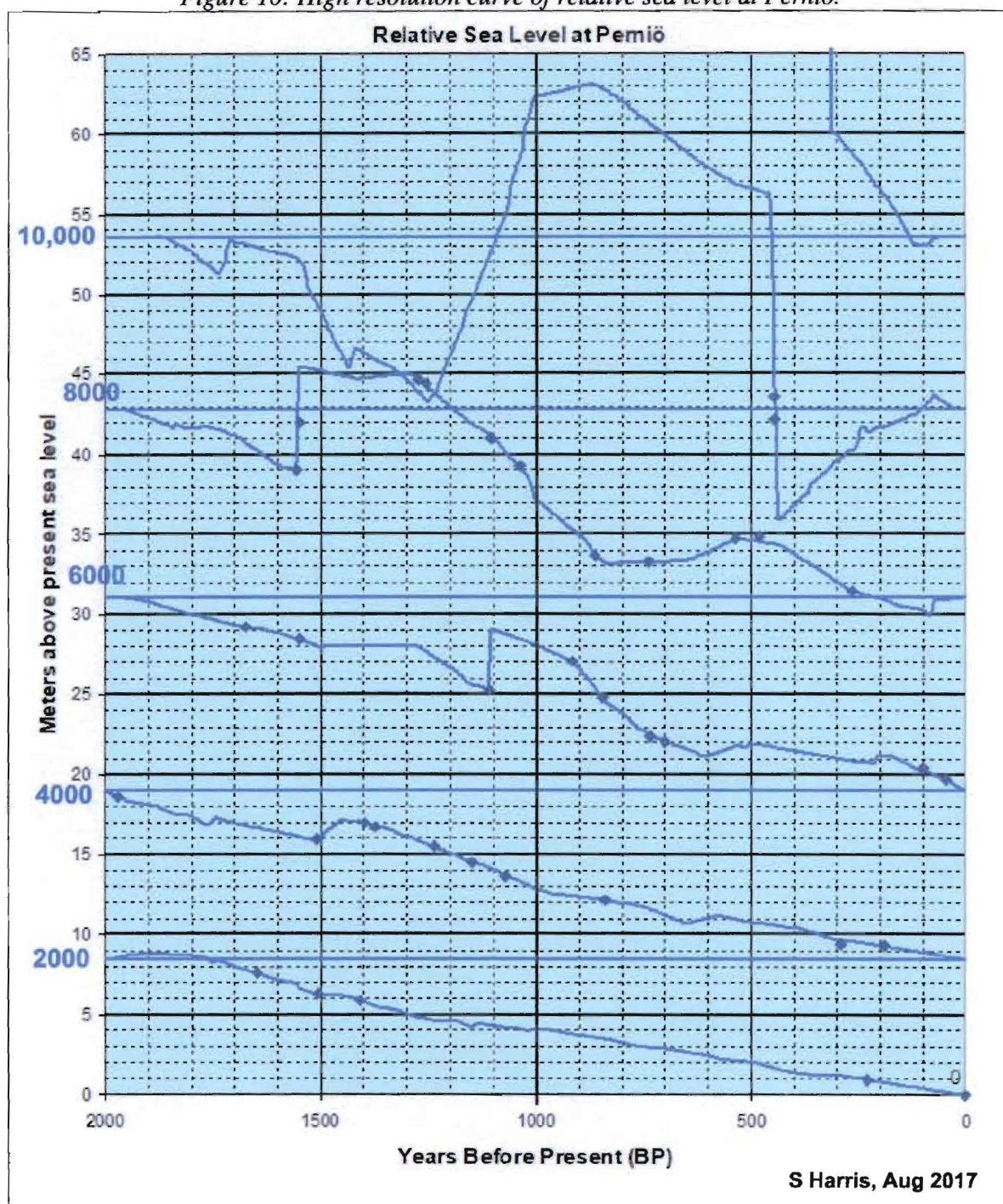


Figure 10: High resolution curve of relative sea level at Perniö.



History of Baltic freshwater lakes and seas

Ramsay Sea, 51m above sea level, coalesced from a string of lakes that bordered the south coast of the Scandinavian ice sheet. In 9740 BC, lake level dropped 26m when a lobe of ice causing a dam was breached to form Baltic Ice Lake.

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Baltic Ice Lake, 25m above sea level, lasted 1400 years, until breached by a catastrophic flood in 8365 BC, which opened a channel to the Kattegat called the Billingen Gateway. In just 1 or 2 years, or some say in six months, lake level dropped 25m to sea level, to become Yoldia Sea.

Yoldia Sea lasted 1000 years before its channel was cut off in 7300 BC to form Ancylus Lake.

Ancylus Lake, 20m above sea level, lasted 800 years before a channel opened up in 6495 BC; lake level dropped 20m to sea level to form Mastogloia Sea.

Mastogloia Sea lasted 900 years, from 6515 to 5600 BC, before its outlet was abruptly closed to form Lake Asgard.

Asgard Lake, formed from an abrupt 6.7m rise above sea level, lasted 700 years, from 5600 to 4900 BC, until an outlet eroded down to sea level to form Littorina Sea. During this time, the Aesir and Vanir ruled the Baltic from their capital at Asgard. Palisades were erected around cities to repel an increasing number of hostile giants. An alternate name would be Kinnunka.

Littorina Sea I lasted over 700 years, from 4900 to 3161 BC, until an abrupt blockage from Noah's flood in 3161 BC formed Noah Lake. During this time, many palisaded cites occupied the northern half of the Commune of Pernio.

Noah Lake, formed abruptly with a 3.6m rise above sea level in 3161 BC, lasted 500 years, from 3161 to 2660 BC, until an outlet eroded down to sea level to form Littorina Sea II. The abrupt formation occurred at the same time as Noah's Flood in 3161 BC. During the lake's existence, Finland was deserted.

Littorina Sea II lasted 1100 years, from 2660 to 1560 BC, until the sill of the outlet raised above sea level to form Troy Lake.

A global catastrophe in 2450 BC appears to have eliminated whatever life was left in Finland.

In 2193, a devastating flood drowned a large fraction of the Baltic and North Sea population. Marauders forced any survivors to flee to islands or mountains for protection. A century later, in 2092, after encountering hostile tribes on the Rhine, Gaia and Ouranos arrived on the shore of Poland with 600 men and women. They were metal smiths, from the copper mining region of the upper Sil River between Spain and Portugal, which they left to escape drought. The next year Gaia remained in Poland to build Gdansk, while the others, joined by a large group of locals called Finns, settled the sparsely-populated coastal regions of eastern Sweden, southwest Finland and northern Estonia. In Finland, Ouranos rebuilt Asgard to become Olympos. In Sweden, Ares founded Thebes (Vasteras) beside a great inland branch of the sea. After a source of pure iron was discovered, Hera developed this hematite mine and built a port complex down river at Gävle; her brother Poseidon built large transport ships at Gdansk; and her brother Hades built an enterprise 6 km east of Tallinn in Estonia to convert the hematite into steel. Smiths at Thebes used Hera's emblem, a stork. One of their principal markets was Friesland, whose sea kings possessed silver knives. Long after bronze supplanted steel, Gdansk prospered as the leading builder of ocean-going transport ships.

According to Frisian history, this was only half their group, the other half having migrated west to Ireland. Irish annals say 600 Fomorian men and women arrived in six longboats a hundred years after the flood, in 2093 BC.

Troy Lake, 2.9 m rise above sea level, lasted 440 years, from 1560 to 1120 BC, until an outlet eroded down to sea level to form the Baltic Sea. Troy dominated this era, founded as Dardania in

1430 BC, until the end of the Trojan War in 1190 BC. Numerous cities populated the area; all built palisades after the predations of Hercules and other raiders. Other major trading centers on the lake included Athens, Thebes and Gdansk. The eastern and western Baltic vied for control of shipping of metal, amber, furs, salt, tar, paint, tools and battle gear.

Baltic Sea has lasted 3100 years, from 1120 BC until today. The sea near Perniö has no tide, tastes slightly brackish and is opaque due to a dark red algae bloom. Consequently, almost no shipwrecks have been recovered because of limited visibility. Perniö became a major port for supplying Sweden until 1700's AD, when it silted up and Salo took over. Its name means 'Thor' in Russian.

8365 BC: the end of Baltic Ice Lake coincided with the end of Middle Stone Age

The start of a 25m catastrophic drop in the Baltic Ice Lake in 8365 BC coincided with the end of the Middle Stone Age in Europe, when northern Europe was struck by a large, disintegrating fragment of Comet Cluster Encke. Multiple impacts scorched the land, melted the ice sheet, flooded the Baltic, and left a tell-tale spike in ammonium in GISP2 ice core from Greenland. Pollen cores throughout Europe show a spike in carbon followed by a complete absence of carbon. When growth resumed, many species had disappeared, including all animals. New people gradually spread across the land from the east and south. They employed a New Stone Age tool kit and planted billions of oak trees for their pigs, the only domestic animal that can safely eat acorns.

Voluspa, the oldest part of Norse mythology, recounts this catastrophe when it predicts another like it, to be called Ragnarok. It was recited to Odin by his first wife, Urð (pr. earth), Vala of the Past, mother of Thor. In verse 3, she calls the Baltic by the name *Kinnunka*, meaning 'sea with boats having prow and stern extensions of the wooden keel'. 'Heaven' originally meant the highest part of an island.

Twas the earliest of times when Ymir lived;
there was not sand nor sea nor cooling wave.
Earth had not been, nor Heaven on high,
trade lacked Kinnunka and nowhere was there grass.

3161 BC: the creation of Noah's Lake coincided with Noah's Flood

The radiocarbon estimate of 3160 BC for the creation of Noah's Lake matches 3161 BC, the year of Noah's flood. Emilio Spedicato of the University of Bergamo established the date of the Noachian Flood by two independent means:

Genesis says the Noachian Flood occurred 600 years after the birth of Noah, whose birth date is set at the start of the old Hebrew calendar, 3761 BC.

The Toltecs said that 1716 years passed between the end of two worlds, which were destroyed by tremendous rains and lightning from the sky.¹ If the second was the Biblical

¹ On his web site "Wyatt Archaeological Research", Ron Wyatt quotes the Toltec flood information.

In the first half of the 1500's, the Aztec chieftain Ixtlilxochitl wrote "Ixtlilxochitl Relaciones", a history relating the archives of his family and the ancient writings of his Aztec nation. He claims descent from the Toltecs, who passed down the following tale.

"It is found in the histories of the Toltecs that this age and first world, as they call it, lasted 1716 years; that men were destroyed by tremendous rains and lightning from the sky, and even all the land without the exception of anything, and the highest mountains, were covered up and submerged in water "caxtolmolatli" (translated to read

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Exodus in 1445 BC, which North America experienced as a stupendous flood, then the first was Noah's flood in 3161 BC².

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Eronen, Matti; Glückert, Gunnar; Hatakka, Lassi; Van de Plassche, Orson; Van der Plicht, Johannes; Rantala, Pasi (2001); Rates of Holocene isostatic uplift and relative sea level lowering of the Baltic in SW Finland based on studies of isolation contacts, 2001, *Boreas*, V30, pp17-30, Oslo.

Vinci, Felice (1995); *Omero nel Baltico*, reprinted in paperback as *The Baltic Origins of Homer's Epic Tales*, 2005, Inner Traditions, Vermont. From the List of Ships in Book 2 of the *Iliad*, Vinci matched a hundred names with places, in sequence. The Achaean heartland was Denmark and the Trojan heartland was Finland. Odysseus lived on the island of Lyo, Agammon at Copenhagen, and Hector half way between Turku and Helsinki, near Perniö.

Wyatt, Ron; on his web site "Wyatt Archaeological Research", Wyatt quotes the Toltec flood information.

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"fifteen cubits"); and here they added other fables of how men came to multiply from the few who escaped from this destruction in a "toptlipetlocali;" that this word nearly signifies a close chest; and how, after men had multiplied, they erected a very high "zacuali", which is to-day a tower of great height, in order to take refuge in it should the second world (age) be destroyed. Presently their languages were confused, and, not being able to understand each other, they went to different parts of the earth....

² The estimated date of Exodus has decreased from 1447 BC fifty years ago to 1446, then to 1445 BC due to subtle refinements of the start of Solomon's reign. In addition, 1445 BC was the year of a spike in the size of particles that fell from outer space onto the Greenland ice sheet, thus matching the plague of falling cinders.
