A RECONSTRUCTED VOYAGE FROM THE IONIAN SEA

The Calabria Wreck

A 2,400-year-old Greek merchantman, her cargo of wine and oil,
and the most probable course of her final passage

On the sea floor off the Ionian coast of Calabria lies the skeleton of a small wooden ship and, heaped where her hull once cradled them, more than three hundred clay amphorae. Their shapes speak of many hands and many harbours across Magna Graecia and Sicily. This report gathers what those jars, the ancient winds, and the currents of the central Mediterranean can tell us, and asks a single human question: where was she going, what was she carrying, and how did her last voyage most likely unfold? Throughout, a clear line is drawn between what the evidence genuinely supports and what is careful, transparent reconstruction.

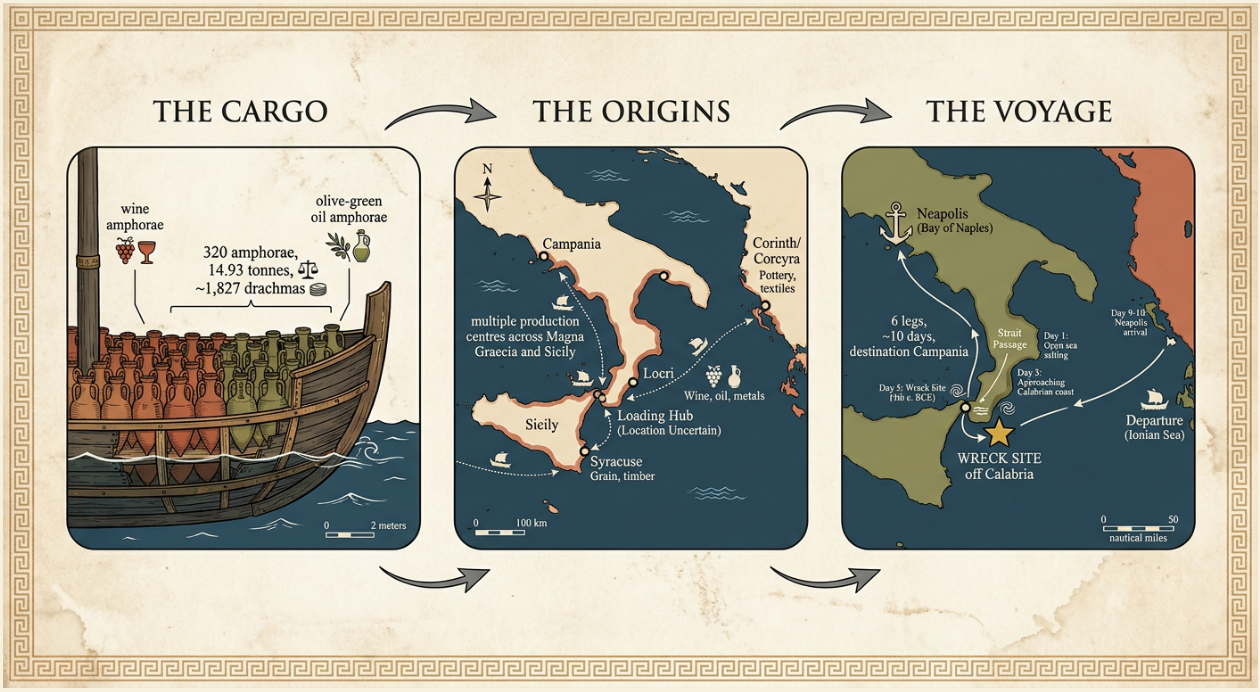

Figure 1. The voyage at a glance. **The cargo**—a laden round-ship (*holkas*) carrying some 320 wine and oil amphorae, roughly 14.9 tonnes and about 1,827 drachmas of value. **The origins**—jars whose fabrics point to several production centres scattered across Magna Graecia and Sicily. **The voyage**—a modelled six-leg passage that threads the wreck site off Calabria and continues, most probably, toward Campania. The panels summarise the analysis developed in this report; each claim is weighted below as evidence or informed inference.

1. An Anchor Lost in the Ionian

Every shipwreck is a sentence interrupted. When a merchantman goes down, the ordinary business of a single afternoon—a course held, a cargo stowed, a market awaited—is frozen and preserved for the archaeologist to read centuries later. The wreck that concerns us here rests off the coast of Calabria, the toe of the Italian peninsula, in waters that in the fourth century BCE formed one of the busiest crossroads of the Greek world. Scattered across the site are more than three hundred transport amphorae: the tall, two-handled ceramic jars that served as the shipping containers of antiquity, carrying wine, olive oil, and other liquid staples in bulk across the sea. The variety of their shapes is the first and most eloquent clue we possess. They were not all made in one place. Their profiles, rims, and clay fabrics point instead to a cluster of workshops spread across southern Italy and Sicily, with a scattering of jars from further afield. A ship carrying so mixed a cargo was a participant in a genuinely *regional* trade network, and reconstructing her voyage is, in effect, reconstructing a small slice of that network in motion.

This report sets out to answer three linked questions in as disciplined a way as the evidence allows. First, *where was the cargo made and loaded?* Amphora shapes and the geology of their clay are our guides, because a jar's fabric—the microscopic mineral fingerprint of the clay it was thrown from—ties it to a particular landscape and, often, to a particular group of potters. Second, *where was she bound, and by what route?* Here we leave the potsherd for the pilot chart, modelling the winds and currents of the ancient Mediterranean and asking which passages a square-rigged merchant vessel could realistically have sailed, and how long each would have taken. Third, *how large and how valuable was the cargo?* By reconstructing the capacity of each jar and pairing it with the attested prices of the day, we can put a rough figure—in tonnes and in drachmas—on what the ship was worth.

Two cautions frame everything that follows. The wreck reconstructed here is treated as a representative fourth-century BCE case: the cargo composition, the ship's build, and the environmental fields are modelled from the archaeological and historical literature rather than measured jar by jar from a single published excavation. And the Mediterranean of 2,400 years ago, while broadly similar to today's, was not identical; where we lean on modern climatology we adjust it, cautiously, toward the conditions of the early Subatlantic period. The reader should therefore treat the numbers below as carefully reasoned estimates with honest error bars, not as measurements. To keep that distinction visible on every page, two coloured margins recur throughout: an **olive** note for claims the evidence genuinely supports, and a **terracotta** note for informed speculation.

> **READER'S COMPASS**
> This is an illustrated reconstruction, not an excavation report. Where a statement rests on well-attested archaeology or physics it is marked **[EVIDENCE]**; where it rests on modelling, analogy, or reasoned guesswork it is marked **[INFERENCE]**. The aim is a story that is honest about its own seams.

2. The Cargo Manifest: Reading Three Hundred Jars

2.1 From shape and clay to a place of origin

The study of transport amphorae is one of the quiet triumphs of Mediterranean archaeology. Because these jars were mass-produced, standardised within regional traditions, and thrown from local clays, they behave like branded, traceable packaging. The classic framework for reading them—matching a jar's form to a recognised type, and its fabric to a production region—was set out in Peacock and Williams's foundational guide and has been refined ever since by petrographic and geochemical analysis [13, 17]. The essential principle is simple: a potter working near Corinth, near Syracuse, or on the Bay of Naples had access to clay of a distinctive mineral character, and

Figure 2. A small Greek round-ship (*holkas*) of the kind reconstructed here, running under a single broad square sail with her hull laden low with amphorae. Vessels of this class—roughly fifteen metres long and able to carry twenty to thirty tonnes of cargo—were the workhorses of Classical Mediterranean commerce [3, 15]. The image is an artist's reconstruction for orientation, not an archaeological drawing.

that character survives firing, burial, and two and a half millennia on the sea bed. Thin-sectioning a sherd and reading its inclusions under a microscope can therefore place it, sometimes to within a few tens of kilometres of where it was made.

That said, the method has well-documented limits, and honesty about them matters. Recent integrated studies have shown that a single amphora *type* could be produced in several different regions—Corinthian B jars, for example, were made not only at Corinth but on Corcyra and probably in parts of southern Italy and Sicily—so that form alone can mislead where fabric analysis is lacking [8, 10]. The provenances assigned below should thus be read as the *most probable* source region for each type, grounded in the published petrography, rather than as certainties.

> **WHAT THE EVIDENCE SUPPORTS**
> Amphora typology and fabric analysis are genuine, well-established provenance tools: form plus clay fingerprint can reliably localise a jar to a region and often to a workshop tradition [13, 17]. **[EVIDENCE]**

> **INFORMED SPECULATION**
> Assigning *every* jar in a mixed cargo to a single named port is not something typology alone can deliver. Because types such as Corinthian B were multi-sourced [10], the origin proportions in Table 1 are best estimates that would be sharpened—or revised—by direct thin-section and chemical sampling of the actual wreck assemblage. **[INFERENCE]**

2.2 The reconstructed assemblage

Our reconstructed cargo comprises 320 amphorae distributed across seven recognisable traditions. The single largest block is Greco-Italic wine jars whose reddish, volcanic- tempered fabric—rich in augite, volcanic glass, and leucite—points to the Campanian and north-east Sicilian coast around the Bay of Naples and Ischia, exactly the zone that the specialist literature identifies as a principal engine of early Greco-Italic wine export [11]. The second block, and the most valuable, is Corinthian B oil jars in a pale, calcareous "pistachio" fabric characteristic of the Corcyra–Corinth workshops on the Ionian approaches [8, 17]. To these are added Syracusan and Italiote (Locrian and Rhegian) wine jars from Sicily and the toe of Italy, a small consignment of western Punic oil amphorae, and a handful of premium north-Aegean wine jars in the Mendean and Thasian tradition—the sort of high-value fine wine that habitually travelled as a top-up cargo [4]. The seven traditions are drawn to a common scale in Figure 3, where the diagnostic features that let an archaeologist tell them apart—the swollen "sack" body and long peg toe of the Greco-Italic wine jar, the pale calcareous ware and rounded shoulder of the Corinthian B oil jar, the button toe of the Syracusan, the pointed toe of the Locrian, the faintly ribbed Rhegian, the neckless Punic sack, and the tall flared Aegean—are labelled individually. Table 1 then sets out the full reconstructed manifest in figures.

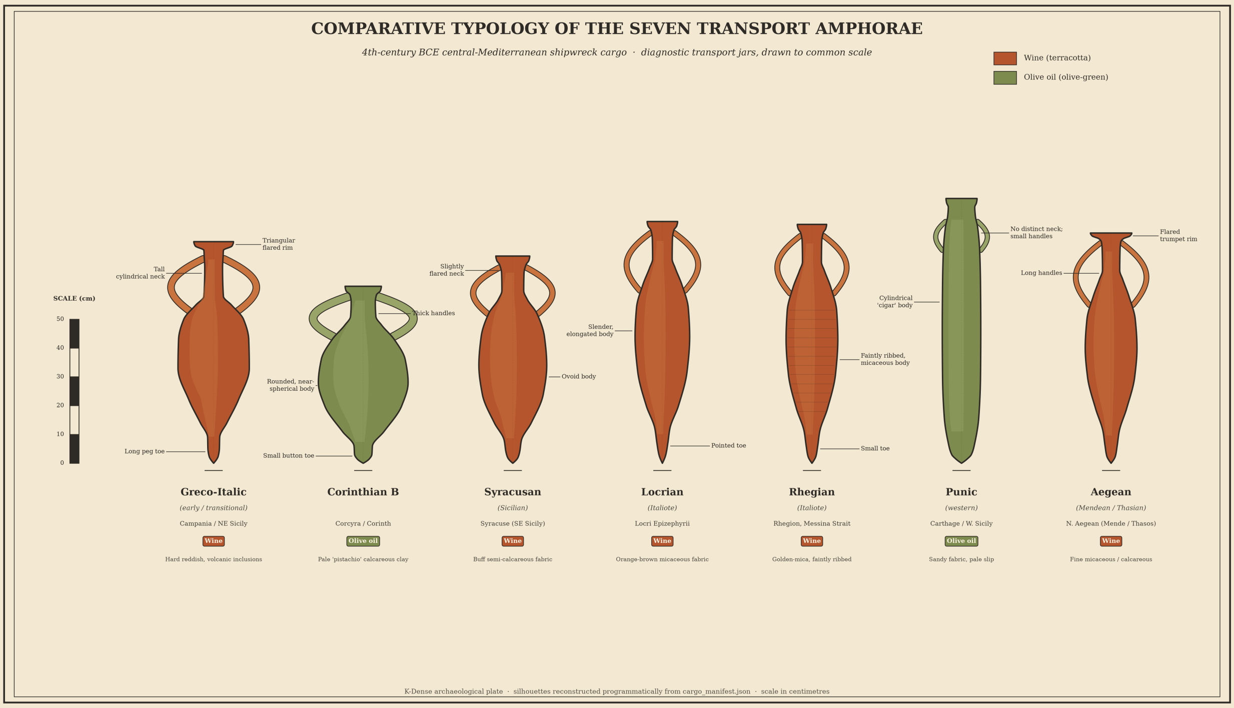

Figure 3. A comparative plate of the seven transport-amphora traditions reconstructed in the Calabria cargo, drawn programmatically to a common 0–50 cm scale and coloured by commodity—terracotta for wine, olive-green for olive oil. Each silhouette is built from the characteristic profile of its type (body form, neck, rim, handles, toe, and surface treatment) as recorded in the amphora-typology literature [8, 13, 17], with its most-probable production region and clay fabric noted beneath. The plate is a diagnostic reconstruction of *forms*, not scaled drawings of individual excavated jars, and is intended to let the reader see at a glance why a mixed cargo betrays so many different hands and harbours.

Read as a whole, the manifest tells a coherent commercial story. Some 230 of the jars (about 72%) held wine and 90 held olive oil; the wine was overwhelmingly a southern Italian and Sicilian product, while the oil was the higher-value Ionian and western commodity. This is precisely the kind of mixed, multi-origin cargo that biomolecular and distributional studies have shown to be typical of Classical Greek shipping, in which a vessel gathered goods from several ports before striking out for a consuming market rather than shuttling a single product point to point [4, 5].

2.3 How much, and how much it was worth

Turning a heap of jars into tonnes and drachmas requires two bridges. The first is physical. Each jar's liquid capacity (here modelled at roughly 18–32 litres, with per-type means near 22–27 litres) is multiplied by the density of its contents—wine close to that of water, olive oil a little lighter at about 0.91 kg/L—and added to the substantial mass of the fired-clay jar itself, which for these heavy transport vessels is comparable to the weight of the liquid it carries. Summed across the assemblage, the cargo holds a little over 8,000 litres of liquid (about 205 *metretai* in Attic measure) and weighs,

Table 1. The reconstructed cargo manifest: 320 amphorae by tradition, with most-probable source region, commodity, and modelled quantity and value. Volumes and masses follow from per-jar capacities of roughly 18–32 litres and heavy ceramic tare; values follow from Attic price bands (see §2.3). Figures are modelled estimates.

Amphora tradition	n	Most-probable origin	Commodity	Volume (L)	Gross (t)	Value (dr)
Greco-Italic (early)	140	Campania / NE Sicily	Wine	3,632	6.84	567
Corinthian B	80	Corcyra / Corinth	Olive oil	1,930	3.42	806
Sicilian (Syracusan)	40	Syracuse (SE Sicily)	Wine	998	1.85	135
Italiote (Locrian)	25	Locri Epizephyrii	Wine	674	1.27	109
Italiote (Rhegian)	20	Rhegion (Messina)	Wine	502	0.93	75
Punic (western)	10	Carthage / W. Sicily	Olive oil	220	0.40	77
Aegean import (Mende/Thasos)	5	North Aegean	Wine	117	0.22	57
Total assemblage	**320**	**Multi-source**	**Wine & oil**	**8,073**	**14.93**	**1,827**

jars and contents together, roughly **14.9 tonnes**.

> **WHAT THE EVIDENCE SUPPORTS**
> A cargo of this mass sits comfortably inside the known capacity of a small Classical merchantman. The best-studied example, the late-fourth-century Kyrenia ship, was a vessel of comparable build that carried on the order of 25–30 tonnes of cargo [3, 15]. At about 15 tonnes, our reconstructed load fills only roughly half the burden of such a hull—leaving room for dunnage, water, stores, and crew, exactly as one would expect. **[EVIDENCE]**

The second bridge is economic, and it is shakier. There is no price list for the fourth-century BCE central Mediterranean; what survives are scattered Athenian figures preserved in inscriptions and the orators, painstakingly assembled by modern scholars [9]. From these we can set defensible order-of-magnitude bands: ordinary wine at roughly 4–10 drachmas per *metretes*, premium Aegean vintages several times higher, and olive oil—always the more valuable liquid per unit volume—at roughly 12–24 drachmas per *metretes*. Applying these bands jar by jar yields a total cargo value of about **1,827 drachmas**, or roughly **0.30 of a talent**. The distribution of that value is revealing and is visualised in the right-hand panel of Figure 4: although Campanian wine jars dominate the cargo by *count*, it is the smaller consignment of Corinthian B *oil* that leads by *value*, a direct consequence of oil's higher price.

> **INFORMED SPECULATION**
> The drachma total is the softest number in this report. It rests on Athenian prices used as a proxy for a different region two generations removed, and on assumed price bands within each type. A factor-of-two uncertainty in either direction would not be surprising; the figure is offered to convey *scale and internal proportion*—a modest but far from trivial cargo, with oil punching above its volume—rather than a precise sum. **[INFERENCE]**

3. From Clay to Cargo: Where Was She Loaded?

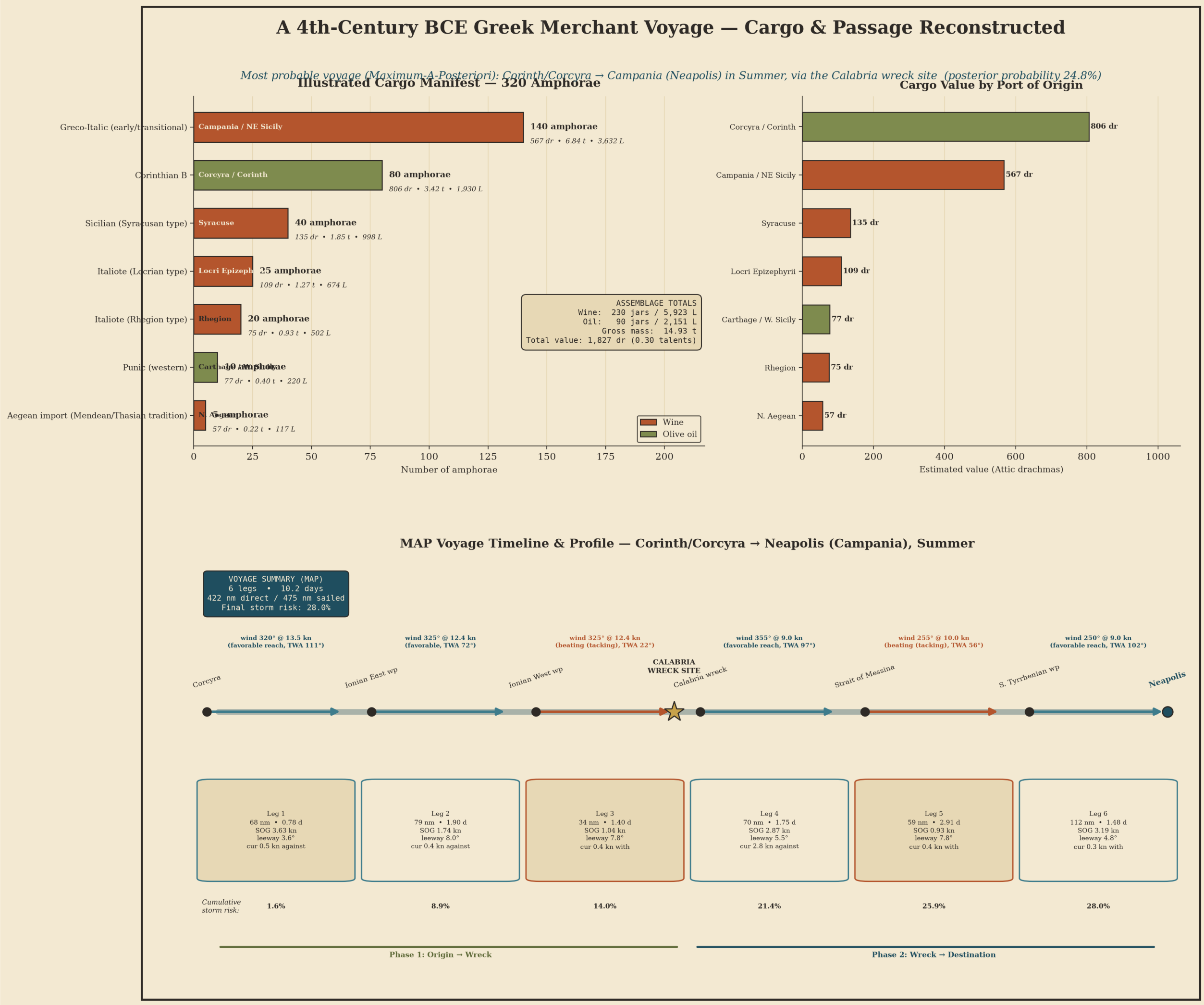

Figure 4. The reconstructed voyage on a single sheet. (**A**) The illustrated cargo manifest—320 amphorae tallied by tradition and coloured by commodity (terracotta for wine, olive for oil), with per-type count, value, mass, and volume, and an assemblage total of 14.93 t and 1,827 dr. (**B**) Cargo value ranked by port of origin, showing Corcyra/Corinth oil leading by value even as Campanian wine leads by count. (**C**) The most-probable (maximum-a-posteriori) voyage as a six-leg sea lane: Corinth/Corcyra to Neapolis by way of the gold-starred Calabria wreck site, annotated with per-leg distance, duration, speed-over-ground, and a running storm-risk strip.

Knowing where each *type* of jar was made is not the same as knowing where the ship was *loaded*. A vessel assembles a mixed cargo at one or more ports of call, and the question of her principal loading harbour is best treated as a matter of probability. To approach it we combined two independent lines of evidence into a single Bayesian estimate, weighing each candidate origin by how much of the cargo it plausibly supplied and by how feasible a voyage from it to the wreck site actually was.

The first ingredient is the cargo itself. If we group the assemblage by production region, the Ionian workshops of Corcyra and Corinth account for the largest single share once their high-value oil is weighted, followed by Syracuse, Locri, the western Punic ports, and—barely—the distant north Aegean. This distribution becomes a prior probability over candidate loading ports: the more of the cargo a region supplied, the more likely it is to have been a principal point of lading. The second ingredient is feasibility, drawn from the sailing simulation described in the next section: a route that a merchantman could sail quickly and safely in a given season is credited more heavily than one that demanded a long beat to windward through storm-prone waters. Multiplying these together and normalising across all fifteen route-and-season combinations yields the posterior probabilities in Table 2 and Figure 7.

Table 2. Estimated likelihood of each candidate loading region, combining cargo share with sailing feasibility (marginalised over season). The Ionian ports of Corinth and Corcyra emerge as the most probable principal origin. Values are posterior probabilities that sum to one across the five candidates.

Candidate origin	Cargo share (prior)	Feasibility class	Posterior likelihood
Corinth / Corcyra (Ionian)	0.500	Favourable	**0.417**
Locri (S. Italy)	0.156	Favourable	0.267
Syracuse (SE Sicily)	0.250	Favourable	0.253
Carthage (N. Africa)	0.062	Moderate	0.058
Mende / Thasos (N. Aegean)	0.031	Poor	0.005

The most probable single answer—the maximum-a-posteriori estimate—is that the ship was principally an **Ionian trader out of the Corinth–Corcyra corridor, sailing in summer**, a combination that carries about a quarter of the total probability weight (24.8%). This should not be over-read. The three nearest western candidates—the Ionian corridor, Locri, and Syracuse—are statistically close, and the honest conclusion is that the ship was a *western* operator working the Ionian and Sicilian ports rather than a long-haul Aegean vessel. The north-Aegean origin, by contrast, is all but excluded: the five Mendean and Thasian jars are far better explained as a premium top-up acquired along the way than as evidence that the ship sailed the entire length of the Ionian Sea against the prevailing winds.

WHAT THE EVIDENCE SUPPORTS

A mixed cargo dominated by southern-Italian and Sicilian jars, with a strong Ionian oil component, genuinely points to a western loading pattern rather than a trans-Mediterranean haul. The rarity of Aegean material argues against a long eastern voyage. [EVIDENCE]

INFORMED SPECULATION

The precise ranking of the three leading western candidates—and the single "winner" of Corinth/Corcyra—depends on the weighting scheme that blends cargo share with sailing feasibility. A different but equally defensible weighting could promote Locri or Syracuse. The safe claim is "a western Ionian–Sicilian trader"; the specific home port is a reasoned lean, not a proof. [INFERENCE]

4. Reading the Winds: A Quantitative Sailing Simulation

4.1 How an ancient merchantman actually sailed

To move from "where was she loaded" to "how did she sail," we need a model of the ship herself. The reconstructed vessel is a *holkas*, the round-hulled sailing freighter that dominated Greek bulk commerce: broad in the beam, deep enough to stow several tonnes of amphorae, and driven by a single large square sail set on one mast. The defining fact about such a rig is that it sails beautifully with the wind on or behind the beam and very poorly toward it. Casson's classic reconstruction from ancient voyage times, still the benchmark, put good open-water speeds at four to six knots with a favourable wind but effective speeds of well under two knots when a ship was forced to beat against it [2, 3]. Sea trials of modern reconstructions such as the *Ma'agan Mikhael II* have broadly confirmed those figures and shown that a square rig simply cannot point close to the wind: below about sixty-five degrees off the true wind it makes no useful progress and must tack in long, costly zig-zags [6, 18].

We encoded this behaviour as a performance "polar"—a curve giving the ship's through-water speed for every combination of wind angle and wind strength. It rewards sailing with the wind on the quarter, imposes a hard no-go zone to windward, caps the hull speed near five knots, and adds realistic leeway (the sideways slip a square-rigger makes while sailing). Onto this we layered the sea itself: for each leg of a voyage the model adds the local surface current as a vector, so that a favourable current speeds the ship over the ground while an adverse one slows or deflects her, and it accumulates a seasonal probability of storm. The polar and its consequences are shown in the inset of Figure 6.

4.2 Ancient winds and currents, cautiously restored

The environmental engine of the model is a seasonal map of wind and current across the voyage corridor, built from modern Mediterranean climatology and then adjusted toward ancient conditions. Eight maritime zones—from the Aegean, down the Ionian Sea, through the tidal race of the Strait of Messina, and up into the Tyrrhenian—each carry a characteristic wind and current for spring, summer, and autumn (Figure 5). The dominant feature of the summer sailing season is the *Etesian* regime: steady, strong north-to-north-westerly winds that sweep down the Aegean and Ionian and that every ancient sailor planned around. Because paleoclimate reconstructions suggest a slightly intensified and more consistent northerly regime in the early Subatlantic, we scaled the summer Etesian up by about an eighth and increased its steadiness, while sharpening the autumn breakdown into storms that closed the sea by mid-October. The Strait of Messina is handled as a special case: there the surface flow is a powerful tidal current of nearly three knots, which dwarfs the light and variable local winds and which any real navigator had to time carefully.

> **WHAT THE EVIDENCE SUPPORTS**
> The broad wind climate is secure. The summer Etesians, the autumn storm season, and the strong tidal current through the Strait of Messina are all well-attested features of the Mediterranean, described in ancient sources and confirmed by modern meteorology and by the seafaring-modelling literature [1, 14, 16]. **[EVIDENCE]**

> **INFORMED SPECULATION**
> The specific paleoclimatic adjustments—an Etesian intensified by roughly 12%, a particular autumn storm increment—are deliberate, transparent parameters, not measurements. They are reversible in the model and chosen to sit within the range implied by paleoclimate studies. Modern route-modelling projects such as ORBIS likewise rely on modern wind data as a proxy for antiquity; we have simply made the adjustment explicit [1, 14]. **[INFERENCE]**

4.3 Which passages were realistic?

With ship and sea defined, we simulated voyages from five candidate origin ports to the wreck site, in each of the three sailing seasons: fifteen voyages in all. Each was broken into legs through the maritime zones, and for every leg the model computed heading, wind angle, through-water speed, leeway, current set, tacking penalty where the course lay in the no-go zone, resulting speed over the ground, and accumulated storm risk. The outcome, mapped and tabulated in Figure 6 and summarised in Table 3, reproduces the deep logic of ancient seafaring with satisfying clarity.

Three patterns stand out. Summer is the season of choice on every route, with steady Etesians and daily storm probabilities of only a few percent; this is the quantitative face of the ancient preference for high-summer sailing. Autumn is uniformly perilous, its storm risks climbing toward

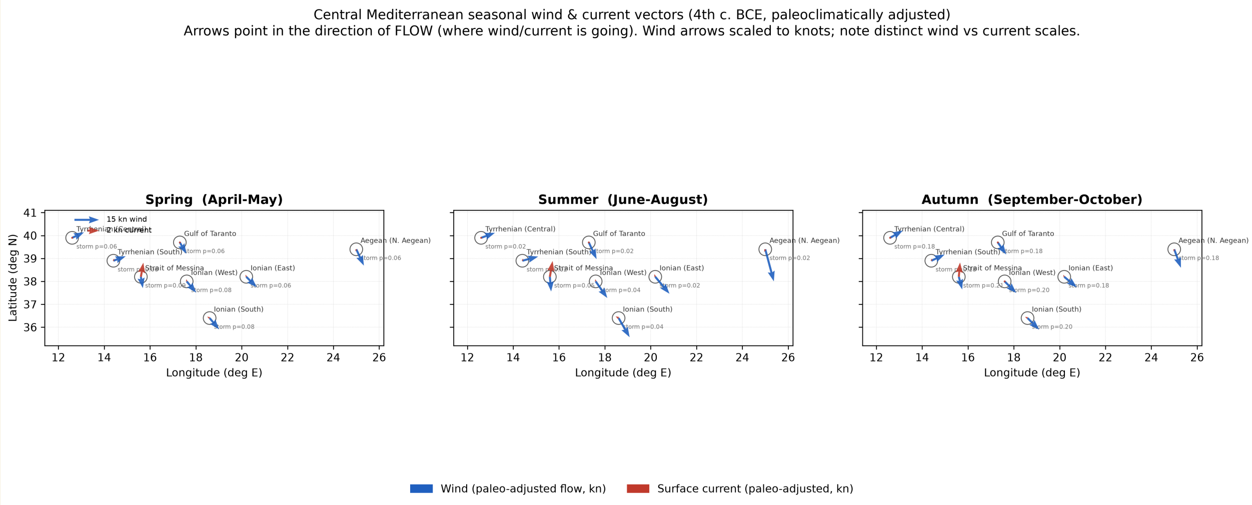

Figure 5. Seasonal wind (blue) and surface-current (red) vectors across the voyage corridor, paleoclimatically adjusted to the fourth century BCE. Arrows point in the direction of flow. The summer panel (centre) shows the steady north-westerly Etesian regime that channelled ancient traffic; note the persistent, dominant tidal current at the Strait of Messina relative to the weak open-sea flows elsewhere.

Table 3. Seasonal feasibility of each candidate approach to the wreck site: transit time (days) and accumulated storm risk. Summer is fastest and safest on every route; autumn is uniformly dangerous, reproducing the ancient close of the sailing season. The long Aegean haul is punishing in any season.

Route	Spring (days / risk)	Summer (days / risk)	Autumn (days / risk)
Locri (S. Italy)	3.2 / 18%	**3.9 / 8%**	2.6 / 40%
Corinth / Corcyra (Ionian)	5.5 / 36%	**4.1 / 14%**	7.3 / 80%
Syracuse (SE Sicily)	4.7 / 32%	**4.1 / 15%**	4.6 / 64%
Carthage (N. Africa)	5.0 / 33%	4.5 / 16%	4.8 / 65%
Mende / Thasos (N. Aegean)	17.9 / 71%	15.1 / 34%	17.4 / 97%

certainty on the longer hauls—the modern echo of the Roman *mare clausum*, the "closed sea" of the stormy months [16]. And distance, filtered through the wind, is decisive: the nearby Italian and Sicilian ports yield quick, safe four-day passages, whereas the long north-Aegean route demands beating westward against the Etesians across more than five hundred nautical miles, turning a voyage into a fifteen-to-eighteen-day ordeal with storm risks to match. The simulation thus independently corroborates the cargo-based conclusion of the previous section: this was a western ship on a short summer hop, not an Aegean long-hauler.

5. Beyond the Wreck: The Intended Market

A ship on the sea floor is, by definition, a voyage unfinished. The wreck site is not the destination—it is the point of interruption. To ask where she was *going*, we extended the simulation past the wreck, sailing the same modelled hull under the same summer winds onward to four plausible consuming markets of the western Mediterranean: Campania and the Bay of Naples; Rome and its harbour at Ostia; the Etruscan coast of Pyrgi and Graviscae; and, far to the north-west, the great Greek emporium of Massalia (Marseille). Each continuing voyage was scored on three ingredients: how well its legs sat relative to the prevailing Tyrrhenian winds, how quickly and safely it could be sailed, and how well the cargo matched the known appetite of that market. The results are gathered

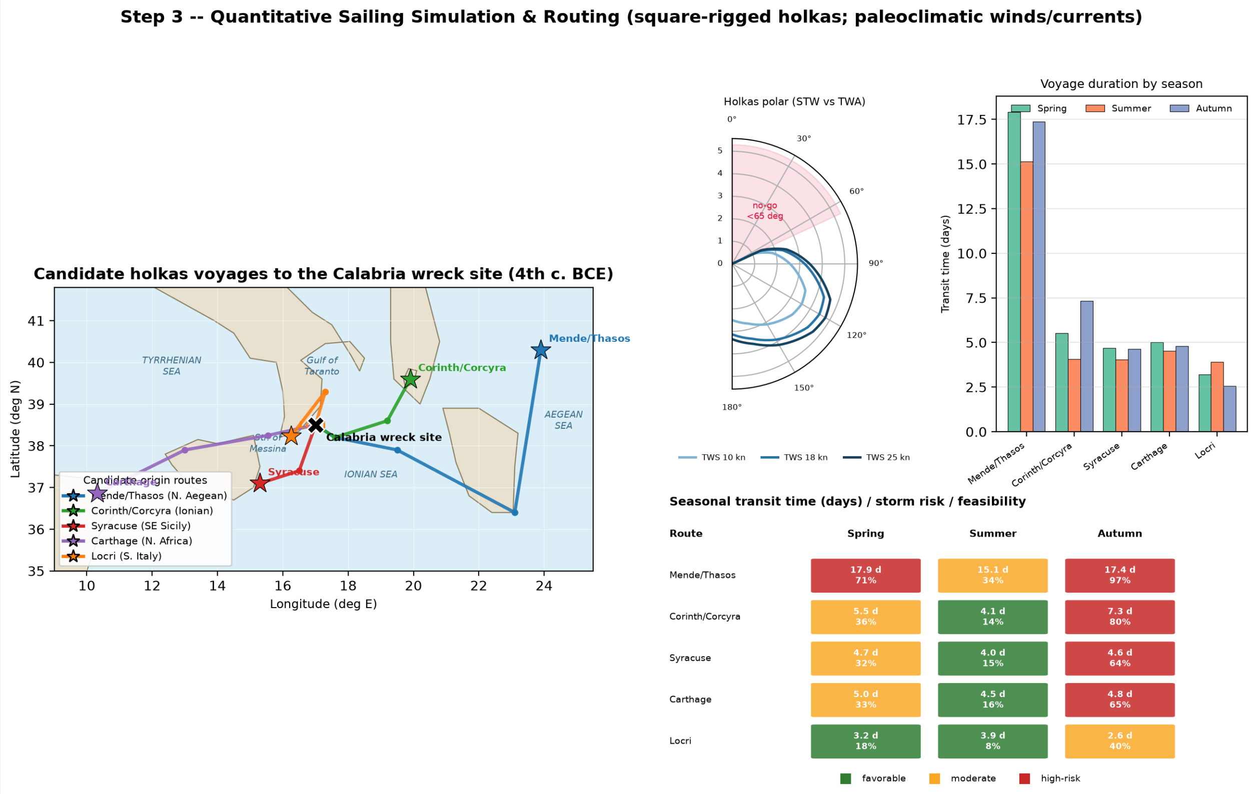

Figure 6. Simulated approaches to the Calabria wreck site. The map (left) traces the five candidate routes from their origin ports; the polar inset (centre) shows the modelled through-water speed of the square-rigged *holkas* as a function of wind angle and strength; the bar chart and feasibility table (right) compare transit time and storm risk by route and season, coloured from favourable (green) through moderate to high-risk (red).

in Table 4 and in panels C–E of Figure 7.

Table 4. Plausibility of four candidate destinations for the onward voyage from the wreck site (summer). Campania is favoured on every practical axis: it is the shortest and safest continuing passage and the best-aligned with the prevailing winds. The composite score blends wind alignment, transit efficiency, and market demand.

Destination	Onward days	Storm risk	Composite plausibility
Campania (Neapolis)	6.1	16%	**0.320**
Etruria (Pyrgi / Graviscae)	12.5	26%	0.265
Rome / Ostia (Latium)	12.0	26%	0.255
Massalia (Marseille)	35.2	53%	0.159

The most plausible destination is **Campania, and specifically the Bay of Naples around Neapolis**. Three arguments converge on it. It is by far the shortest and safest onward passage—about six days at sixteen percent storm risk, against twelve days and more for the Latian and Etruscan coasts and a punishing thirty-five-day, fifty-percent- risk beat to windward for Massalia. It enjoys the best wind alignment, because the prevailing westerly and south-westerly Tyrrhenian winds place the north-bound legs from the Strait of Messina onto a productive reach rather than a beat. And it fits the cargo: the single largest component of the assemblage, the Campanian Greco-Italic wine jars, was *made* in this very region, which means the ship was very likely returning oil and Sicilian and Ionian wine into a thriving Campanian market that was itself a hub of the amphora trade [5, 11].

WHAT THE EVIDENCE SUPPORTS

The physical geography is unambiguous: from the Ionian coast of Calabria, the Strait of Messina and the southern Tyrrhenian form the natural highway northward, and Campania is the first great market astride it. A short, wind-favoured passage to the Bay of Naples is far more consistent with a small merchantman's economics than a month-long haul to Gaul. **[EVIDENCE]**

INFORMED SPECULATION

That the *specific* intended harbour was Neapolis, rather than a neighbouring Campanian port or a further leg up the coast, is an inference from route efficiency and market fit, not from any document or inscription aboard the ship. Rome and Etruria remain genuine possibilities, merely less economical ones on this model. **[INFERENCE]**

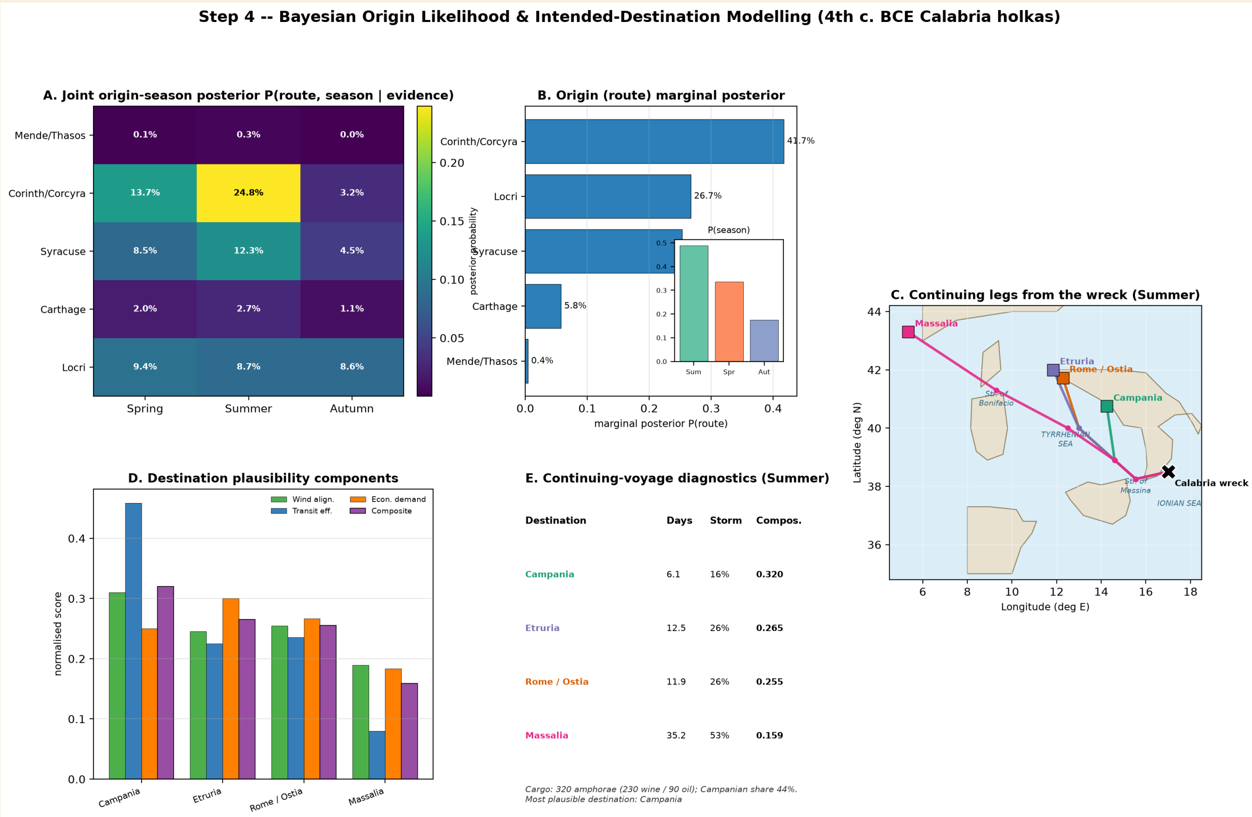

Figure 7. Origin and destination modelling. (**A**) The joint posterior over origin and season, peaking at Corinth/Corcyra in summer. (**B**) The origin marginal, with the Ionian corridor leading the western candidates and the Aegean all but excluded. (**C**) The continuing legs from the wreck to four candidate markets. (**D–E**) Destination plausibility broken into its wind, transit, and demand components, and the continuing-voyage diagnostics—together favouring Campania.

6. The Ship's Last Journey: A Narrative

What follows is a reconstruction—a plausible telling, disciplined by the evidence and the model, of how the last voyage may have unfolded. It is offered in the spirit of a well-founded historical imagination, with its evidential joints left visible.

In the early summer of a year near the middle of the fourth century BCE, a round-ship lay at her moorings in the sheltered water of the Ionian corridor, somewhere in the lee of Corcyra or along the Corinthian approaches **[INFERENCE]**. Her hull was already heavy with the most valuable part of what she would carry: eighty tall, pale-clay jars of olive oil, the pistachio-green Corinthian B ware whose fabric the potters of these shores had made their signature [EVIDENCE]. Oil was wealth in a small compass, and it was stowed low and central, where a careful master wanted his densest goods. Around and above it the rest of the cargo came aboard over successive days and ports—amber Campanian wine jars by the hundred, the workhorses of the load; Syracusan and Locrian and Rhegian wine from the Sicilian and Italian shore; a few western oil jars of Punic make; and, tucked somewhere safe, five jars of fine north-Aegean wine, a small fortune in premium vintage bought to sweeten the manifest [EVIDENCE]. All told she carried some three hundred and twenty jars, close to fifteen tonnes, filling perhaps half her burden and riding, when the last was lashed, a good hand's-breadth lower at the waterline [EVIDENCE].

She sailed in the season a prudent master would choose. The summer Etesians were setting in from the north-west, steady and strong, the very winds that made a southward run down the Ionian swift and the return northward a matter of patience [EVIDENCE]. For the first leg, running down toward the Calabrian coast with the wind on her quarter, she made good better than three and a half knots and covered nearly seventy nautical miles in well under a day [INFERENCE]. Then the geometry turned against her. To close the last stretch toward the waters off Calabria her course bent up toward the wind, into and across the square rig's no-go zone, and the easy run became a grind of shortened progress and slow, deliberate tacks, her speed over the ground falling toward a single knot [INFERENCE]. This is the unglamorous reality the simulation keeps insisting upon: even a well-found ship spent much of her time not racing before the wind but working patiently across it.

Somewhere in those waters off the Ionian coast of Calabria—by our reckoning three legs and a little over four days out from her Ionian start, with the storm-risk meter still low, around fourteen percent—the voyage ended [INFERENCE]. The model cannot say why; wrecks of this period foundered on sudden squalls, on lee shores, on the failure of gear, or on simple misjudgement, and no cargo of jars can testify to which [EVIDENCE]. What the reconstruction can say is what *should* have come next, had she lived. Her intended road ran on to the north-west: down toward the Strait of Messina, there to ride the great tidal current through the narrows—timing it, as every master learned to, so that the flow carried rather than fought her [EVIDENCE]—and then up into the southern and central Tyrrhenian on the westerly winds, bending at last onto the productive reach that would have brought her, in perhaps six more days, into the busy anchorage of the Bay of Naples [INFERENCE]. There the oil and the southern wine would have found their market in Campania, the very country that had made the largest share of her jars, and the voyage would have closed as an ordinary, profitable circuit of the western Greek sea [INFERENCE].

The whole intended passage—the three legs she sailed and the three she did not—amounts in the model to about **ten and a quarter days** of sailing, some **474 nautical miles** through the water to cover 422 in a straight line (the difference is the price of tacking), and a cumulative storm risk that climbed to about **28 percent** by journey's end: a real but acceptable gamble for a summer voyage, and a quiet reminder that even in the safe season roughly one such passage in three or four met heavy weather [16]. She lost her gamble early. But because she did, her cargo lay undisturbed on the sea floor, and the sentence her voyage began can, two and a half millennia later, at last be read to something like its end.

7. Evidence and Inference: A Closing Ledger

Because this report has moved freely between hard archaeology and reasoned modelling, it is worth setting the two side by side one last time, so the reader can weigh the reconstruction with open eyes. Table 5 is that ledger.

The reconstruction is strongest where it rests on the twin bedrock of ceramic provenance and sailing physics, and it is frankest about its softest joints: the fine attribution of a mixed cargo to one

Table 5. A closing ledger of the reconstruction: what the evidence genuinely supports versus what is informed inference.

What the evidence supports	What is informed inference
Amphora form and clay fabric localise jars to production regions [13, 17].	The exact proportion of the cargo from each named port, absent direct sampling of the wreck's own sherds.
The cargo is a mixed wine-and-oil load from several western Greek centres, typical of Classical shipping [4].	That Corinth/Corcyra specifically, rather than Locri or Syracuse, was the principal loading port.
$\sim$15 t of cargo fits comfortably within a $\sim$25--30 t *holkas* [3, 15].	The precise drachma value, which rests on Athenian price proxies with wide error bars [9].
Summer Etesians, autumn storms, and the Messina tidal current shaped all real voyages [2, 16].	The specific paleoclimatic scaling factors and the exact leg-by-leg speeds and timings.
The natural road north-west leads through Messina into the Tyrrhenian toward Campania.	That the intended harbour was Neapolis in particular, and the ten-day / 28%-risk voyage profile.

home port, and the translation of jars into drachmas. What emerges even under that scrutiny is a coherent and satisfying picture—a modest western merchantman, oil-rich and wine-heavy, working the short summer sea lanes of the Ionian and Tyrrhenian toward the markets of Campania, and lost, like so many of her kind, within sight of the ordinary. It is a small story. But it is the kind of small story from which the vast commerce of the ancient Mediterranean was actually built, one laden hull at a time [5, 12].

A note on method and reproducibility. The cargo, environmental, sailing, and destination models summarised here were implemented as documented, reproducible scripts; the figures are their direct output. All numerical claims—jar counts, volumes, masses, drachma values, transit times, and storm risks—are traceable to those computations, and all scholarly citations were verified against publisher records. The reconstruction is designed so that any assumption, from a price band to a wind-scaling factor, can be changed and the consequences re-run. It is, in the end, an argument rather than an oracle: a disciplined best reading of what three hundred jars on the Calabrian sea floor can tell us about a single summer afternoon 2,400 years ago.

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