



NATIONAL ENDOWMENT FOR THE

Humanities

DIVISION OF RESEARCH PROGRAMS

## **Narrative Section of a Successful Application**

The attached document contains the grant narrative of a previously funded grant application, which conforms to a past set of grant guidelines. It is not intended to serve as a model, but to give you a sense of how a successful application may be crafted. Every successful application is different, and each applicant is urged to prepare a proposal that reflects its unique project and aspirations. Prospective applicants should consult the application guidelines for instructions. Applicants are also strongly encouraged to consult with the NEH Division of Research Programs staff well before a grant deadline.

Note: The attachment only contains the grant narrative, not the entire funded application. In addition, certain portions may have been redacted to protect the privacy interests of an individual and/or to protect confidential commercial and financial information and/or to protect copyrighted materials.

Project Title:	Between East and West at the End of Antiquity: The Marzamemi “Church Wreck”
Institution:	Stanford University
Project Director:	Justin Leidwanger
Grant Program:	Collaborative Research

## STATEMENT OF SIGNIFICANCE AND IMPACT

*Between East and West at the End of Antiquity: The Marzamemi “Church Wreck”*

The Marzamemi Maritime Heritage Project is a collaborative excavation, survey, and heritage management initiative centered on the maritime landscape of southeast Sicily, a vital Mediterranean crossroads for the movement of people, goods, and ideas from antiquity to the present. Since 2013, fieldwork has focused on the remarkable “church wreck,” preliminarily explored in the 1960s and named for its unique cargo of prefabricated 6<sup>th</sup>-c. AD architectural and decorative religious elements. Casual references to this massive (~200-ton) load appear routinely in studies of late antique and early Christian architecture. The lack of systematic investigation, however, has made anything beyond superficial discussion of decontextualized marble impossible, leaving obscure the greater social, economic, religious, and political significance of the assemblage. The cargo is generally described as a complete church sent at imperial behest, and thus testimony to Justinian’s active agency in rebuilding the newly reconquered western Roman Empire. Yet this model presumes that all patronage radiated from the imperial center, followed prescribed forms exclusive of local agency, and occurred wholly outside networks that entangled peoples, places, and commodities across the late antique world.

Recent fieldwork and analysis at Marzamemi since 2013 have prompted alternative hypotheses that fundamentally challenge these earlier interpretations. Alongside the marble elements, a substantial cargo of processed agricultural goods—likely wine or oil—in jars drawn from all around the eastern Mediterranean complicates any model of official imperial shipment for which such casual side ventures were tightly restricted. Similarly, reevaluation of the architecture suggests that elements came from a wider variety of quarry sources, and were carried in uneven numbers, non-standardized sizes, and vastly different stages of completion. The wreck reflects far more than a prefabricated or “flat-pack” structure designed for rote assembly at a single destination. Together with emerging clues about the ship, crew, and cargo—from cooking pots, iron fasteners and tools, to transport amphora lids and mineral pigments—this assemblage raises critical questions about interrelated issues of private commercial and directed exchange, local and imperial patronage and propaganda, urban and provincial religious life, and maritime connectivity more generally. A holistic view that embraces the complexity of this assemblage and situates it within its historical and archaeological context is fundamental to exploring the social, political and other processes that fostered and sustained socioeconomic connectivity.

Reflecting a multidisciplinary collaboration among American, Italian, and other scholars, this proposal seeks funding to expand the Marzamemi church wreck investigations with three seasons of selective intensive excavation combined with digital modeling, formal and compositional analysis. Targeted excavation forms the basis for understanding the range and diversity of the non-architectural cargo and its commercial context, along with small finds, hull and other remains that might speak for the personal and cultural connections of the crew. Levels of prefabrication and production standardization within the assemblage are best explored through 3D modeling and compositional analysis. Full recording is critical for research into mechanisms behind the shipment, but also for the communication of results and the creation of an interactive public outreach experience on land and underwater. As an expected centerpiece for the new “Museum of the Sea” in Marzamemi, the wreck offers an opportunity to broaden the social and economic relevance of archaeological fieldwork with educational programs, heritage dive trials, sustainable coastal development and refugee dialogs, and the exploration more generally of the town’s deep ties to the sea. This dynamic space provides a platform for confronting difficult but pressing concerns of human culture through the lens of Sicily’s multifaceted and changing maritime identity.

Connectivity has long been identified as perhaps the single most important factor in the dramatic and varied trajectories of cultural change seen across the Mediterranean at the end of antiquity (e.g. McCormick 2001; Wickham 2005). The truly unique nature of this shipwreck assemblage, its location astride some of the busiest Mediterranean sea lanes, and its historical context amid the twilight of the Roman Empire now provide an ideal opportunity to evaluate the role of communication and exchange in these profound transformations of the ancient world.

## NARRATIVE

*Between East and West at the End of Antiquity: The Marzamemi “Church Wreck”***Substance and content**

Sicily’s role as a nexus of communication and trade across the Middle Sea forms a persistent theme in *longue durée* studies of connectivity extending back to prehistory (Braudel 1972; Horden & Purcell 2000; Broodbank 2013). This centrality was of prime importance during the Roman and late antique eras, when the discrete cultural and economic trajectories of these two great basins converged under Roman imperium and then diverged along different paths with the dawn of the early medieval world (Reynolds 1995; Sodini 2000). Extensive maritime archaeological remains provide evidence for communication and underscore the diverse networks that passed local coasts not only between east and west, but also between south and north, carrying—among many other goods—North African agricultural produce to feed the metropolis of Rome (McCann & Oleson 1997; Arnaud 2005). The material record underwater and on land highlights the island as an active partner in this exchange, its shores variously interconnected or oriented toward nearer and more distant lands (Malfitana 2008). Particularly during the increasing fragmentation of Late Antiquity, Sicily remained one of the final critical nodes—geographically, culturally, and economically—linking two regional eastern and western Mediterranean networks (Zanini 1998; Lo Cascio 2009).

Since 2013, the Marzamemi Maritime Heritage Project has investigated dynamics and long-term change in the seaborne connections and maritime landscape of southeast Sicily (Fig. 1). Integrating previous discoveries with new excavation and analysis from the pioneering work of Gerhard Kapitän (1961), the project establishes a framework for comprehensive research and heritage preservation of the Marzamemi area and south toward Capo Passero, the last headland before North Africa. More than a dozen shipwrecks and multiple coastal installations ranging from anchorages to fish salting workshops attest to local maritime activity from the Classical era through Late Antiquity. Among the most important clues to the scale of connectivity are several monumental stone cargos. One vessel (Marzamemi I) carried monolithic columns and architraves that provide a late 2<sup>nd</sup>- or early 3<sup>rd</sup>-c. AD date, while another

(Marzamemi III) of unknown date produced a granite column raised in the early 20<sup>th</sup> c. and currently standing in a piazza in nearby Pachino (Kapitän 1971).

The most tantalizing is the Marzamemi II wreck, the focus of several recent campaigns and the proposed multi-year project (Fig. 2). Lying at 7-8 m deep about 1 km offshore, this wreck is conspicuous for its unusual cargo that included 200 or more tons of prefabricated interior architectural elements: columns, capitals, bases, and panels carved with early Christian iconography, including components of an ambo, chancel screen, and perhaps an altar and ciborium (Figs 3 & 7). First reported to the authorities by a local fisherman in the late 1950s, the site remains unique more than a half-century later in the corpus of nearly 2000 known Mediterranean shipwrecks. It was investigated in the 1960s by Kapitän, whose limited financial means rendered such efforts rather cursory. But the “church wreck” label drew public attention and the site became emblematic of the early development of maritime archaeology (van Doorninck 1972; Throckmorton 1987). That the marbles were not later spolia—as had been initially considered—is clear from their semi-finished state: rough edges, incompletely carved details, quarry marks, etc. (Fig. 6). Brief references to the site as a passing example of stone transport appear across the breadth of late antique and early Christian architectural studies (e.g. Krautheimer 1986; Ousterhout 1999), but the lack of systematic excavation means that the broader social, economic, religious, and political significance of the site has largely been overlooked in favor of the decontextualized marble elements (e.g. Barsanti 1989; Purpura 2008). Considered within its broader context, this monumental cargo provides an unusually detailed window into the intersection of patronage, politics, religion, economics, and socioeconomic connectivity more broadly during a transformative period of Late Antiquity.

The Marzamemi assemblage represents neither a complete church nor a random assortment of available pieces. Rather, the purposeful collection of specific decorative elements must point to a strategy intended for maximum visual enhancement of structures that would otherwise have been built largely of local stone (wherever “local” would have been). The relief-sculpted elements—chancel screen, ambo, altar, ciborium—were focal points of early Christian practice, and their design and substance thus became critical elements in the communication of religious ideas and beliefs (Peschlow 2006; Doig 2008).

Materiality was key: in his ekphrasis celebrating the consecration of Constantinople's Hagia Sophia under Emperor Justinian (r. AD 527-565), Paul the Silentiary (*Descr. S. Soph.*) evokes the poise of columns from Thessaly, marbles from Proconnesus that resemble paintings, speckled Phrygian stone gleaming with purple and silver flowers, and porphyry sprinkled with little bright stars. The mottled verde antico ambo, the raised platform from which readings and sermons were delivered, was a clear visual focus (Krueger 2005), a point underscored by Paul the Silentiary's encomium of the remarkable Hagia Sophia example, said to have drained an entire year's Egyptian tax revenue. The distinctive carving—christogram with garlands and Latin crosses—on the chancel screen panels at Marzamemi offers a date during the reign of Justinian, who facilitated re-conquest of the lost western empire and presided over temporary reunification of east and west. Given this historical context and clearly elite cargo, Kapitän (1980), following Ward-Perkins' model of the marble trade (1957), argued that such a deeply symbolic assemblage must reflect a complete set of decorative elements shipped at imperial behest by Justinian for an important 6<sup>th</sup>-c. church in his newly rebuilt North Africa. If so, beneath this decorative program and reconstructive munificence were specific messages of imperial authority and liturgical orthodoxy.

To what extent might the collection of these materials for shipment indicate a state-driven and centralized effort? Visual culture featured prominently in 6<sup>th</sup>-c. strategies to bolster political power, to which religious authority was closely tied, and in communicating messages to the masses (Brown 1999). Official policies to establish standard doctrine and ritual were not uncommon (Carra Bonacasa 2002; Alchermes 2005). Procopius' (*De Aedificiis*) long register of fortifications, civic infrastructure, and especially churches built or repaired by Justinian provides ample witness to the emperor's personal interest in restoring high urban and religious life in reclaimed "Roman" cities and towns throughout the west (Cameron 1985; de' Maffei 1988). Surely the size of the cargo—immense by standards of the day at 200 or more tons—places it in the arena of elite activity (Casson 1995). If the Marzamemi vessel represents one of very few shipments that can be clearly linked to imperial intervention, it would offer direct insights into the much-discussed but often archaeologically invisible fiscal movement of goods that tied together the socioeconomic world of Late Antiquity (McCormick 1998; Wickham 2005).

Virtually all discussions of the shipwreck assume that any cargo so massive in size and so expensive to procure must stand as a symbol of Justinian's active agency (e.g. Purpura 2008, Castagnino Berlinghieri & Paribeni 2015). Yet a fundamental problem remains: the model presumes that all patronage radiated from the imperial center, followed prescribed forms exclusive of local agency, and occurred wholly outside the complex networks that entangled peoples, places, and commodities across the late antique Mediterranean. Justinian was certainly engaged in Italian and North African construction through donations of materials and craftsmen, but the emperor was never the only instigator behind monuments. A certain Julian, about whom little is known other than his background as a banker (*argentarius*), leveraged his wealth to construct several churches and other public buildings around Ravenna according to Agnellus' *Book of Pontiffs of the Church of Ravenna*. Anastasius' *Miracles of St. Demetrius* recounts (fancifully) an African bishop's purchase of an ambo and columns from a ship captain bound for Marseilles. Decorative pieces like those from Marzamemi, fashioned to prescribed standards within the important quarries on the island of Proconnesus, at the heart of the empire near Constantinople (Barsanti 1989), need not always bear the mark of centralized civic and religious authority. The local epigraphic record of administration and export nowhere indicates exclusive state use of, or even absolute control over, these marble resources (Asgari & Drew-Bear 2002). Elements could be procured beyond the imperial inner circle and some seemingly found their way onto what appears to be a sophisticated private commercial market (Sodini 1989; Marano 2014). A more nuanced picture allows local elites to play key roles in religious and secular building sponsorship (Deliyannis 2010).

The force of the argument for Justinianic patronage at Marzamemi rests on the coherence of the assemblage as reported by Kapitän, whose surface counts cataloged 28 matching sets of columns, bases and capitals, and assigned them to a single building. Perhaps one third of these architectural materials were excavated and raised in the 1960s; today they remain exposed in outdoor storage in Siracusa, where they have often been mistaken to comprise the complete cargo. Fieldwork in 2014-2015 revealed not only the larger unexcavated part of the cargo accounted for by Kapitän, but various additional elements in unmatched numbers that cannot be neatly assembled into a single building. New measurements of well-

preserved elements suggest that certain capitals and bases on board the ship might not join the columns alongside which they traveled, even providing for a generous leeway in post-Classical proportions (Terry 1988; Ousterhout 1999). The emerging picture seems to indicate several smaller sets and groups that may not belong to a single architectural plan. Formal study since 2013 has revealed considerable variety in the level of finish among these “semi-finished” products, with some elements nearly complete (and even polished) and others barely emerging from their rudimentary block forms, lending further evidence for the involvement of more complex mechanisms than initially supposed. Even the stone provenance appears less uniform than recognized: initial stable isotope analysis has revealed, in addition to Proconnesus, sources that likely include the northern Aegean island of Thasos, and perhaps Paros or Attica. This distinction holds critical implications for current understanding of regulations and markets of quarry resources (Hirt 2010; Russell 2013). A cargo obtained at some remove from the imperial hand that exploited Proconnesus as Constantinople’s depot allows a more flexible model of how and which private individuals could acquire products.

Whether the Marzamemi ship’s elements reflect a concerted top-down effort to exercise control over religious architecture and liturgy in the west or underlie a more organic desire among local elites or church officials to bring urban architectural trends to the provinces is currently unclear. The nature of the connection between this cargo, civic life, and patronage cannot be answered solely on the basis of decontextualized elements. Key to determining the motivation, mechanisms, agents and crew at play is the larger shipwreck assemblage, which to date has generally been overlooked. Recent discovery of orpiment—a mineral used particularly for dyes (Pliny, *Natural History* 34.56)—raises questions about whether the ship may have carried decorative supplies to add international flair to local construction.

After the ~200 tons of stone, ceramics are the most common secondary finds. Although they are no longer accounted among the inventoried finds in Siracusa, Kapitän described a few diagnostic galley wares: a fine plate of North African origin, and a so-called “wine thief” for decanting from large jars into smaller serving vessels. Our recent fieldwork has revealed additional fine and common wares in fabrics likely indicating North African and eastern Aegean origins, along with cooking wares, a mortar, and even

tiles that might signal a covered galley. Kapitän's notes hint at the presence also of "globular" transport jars almost certainly similar in type to those uncovered by the other major late antique shipwreck investigation of the 1960s: the 7<sup>th</sup>-c. Yassiada vessel in Turkey (Bass & van Doorninck 1982; Leidwanger 2014). If, as their numbers suggest, these jars reflect more than simply supplies for the crew, they would provide critical new evidence for the carrying of mundane processed agricultural goods alongside elite marble. Preliminary compositional analysis of the ceramic assemblage has revealed transport jars from all around the Aegean, northeast Mediterranean and coastal Levant (cf. Pieri 2005; Reynolds 2005). Several dozen simple ceramic stoppers which once sealed the jars were found deep in silt in one small test area, suggesting that additional excavation offers our best chance to establish the minimum size and diversity of this cargo as well as the organization of different components within the hold. Salvage and looting make full accounting impossible, but these fragmentary ceramics underscore the scale and geographical origins of what appears to reflect a secondary shipment.

The diverse assemblage of small finds provides another window into the cultural background of sailors and merchants and the commercial world in which they were embedded. A secondary cargo of everyday agricultural goods now takes on primary importance, raising questions about the relationship between "high" and "low" exchange as well as state-driven and private distribution (Horden & Purcell 2000). Could trade items like wine or oil have traveled easily alongside official cargos despite strict regulations intended to minimize commercial interference in vital imperial flows of goods (Reynolds 1995)? Or does such a consignment suggest that this ship was contracted through a private commercial agent (Durliat 1998; Tchernia 2011)? From the standpoint of late antique connectivity and the transformation of the ancient world, the wreck sits at the intersection of two landmark models: McCormick's (2001), views of economic activity and revitalization emphasize the shipment of luxuries, while Wickham (2005) sees the movement of bulk goods (oil, grain, pork, and building stone) as the primary factor in sustaining and shifting Mediterranean contacts. The Marzamemi cargo breaks down this dichotomy and entangles the two models. Several hundred tons of marble underscore the economic significance and popular benefit of such building programs; the opulence signified by their consumption



speaks to elite networks, even as they traveled alongside processed agricultural goods destined for a more mundane and varied market.

Beyond the ceramic and architectural remains, test investigations conducted by the Soprintendenza's office several years ago (Tusa 2015) indicate hull remains may be preserved in the sand to the south. Recent fieldwork has revealed a number of iron fasteners as well as what appears to be a section of braided rope wrapped around the base of an architectural element (an attempt to secure cargo or even salvage after wrecking?). Simple nail concretions are yielding new insights: some preserve wooden remains while other clenched examples offer basic dimensions for hull components—and surprisingly small framing—that may help us to understand how vessels handled dense loads. Does the ship exhibit the same design and construction techniques typical of smaller late antique merchant vessels (cf. Santamaria 1995; Kocabaş 2015), or does it reveal modifications for the transport of heavy loads? Were vessels purpose built to transport particular cargos—as Petronius' (*Satyricon* 117.12) *navis lapidaria* reference might imply—possibly revealing specialized and directed exchange (Carlson & Aylward 2010; Beltrame & Vittorio 2012)? Or could independent merchants adapt ships to carry this dense cargo like any other merchandise? Construction features could provide a window not only into the transitional shipbuilding technology of this era toward less labor-intensive methods (Pomey et al. 2012), but also into the identity and socioeconomic world of those engaged in transport (Gould 2000; Adams 2001).

The Marzamemi shipwreck is poised to answer questions at the heart of historical inquiry into the social, political and other processes that foster and sustain cultural and economic connectivity. The impressive preservation of the wreck's marble cargo and the site's accessibility have unfortunately also resulted in illicit intervention by looters. As recently as 2014, two decorative panel pieces were discovered 0.5 km from the site, while additional objects have been confiscated by local authorities. The shallow depth and easy accessibility that makes the site an ideal one for excavation and student training also highlight the timeliness of systematic documentation to ensure the long-term survival of a truly exceptional resource. We envision research and valorization of the site in several allied formats: the traditional scholarly monograph and thematic journal publications, a fully open 3D archive of the

architectural materials and plans, virtual and physical display as anchor exhibit for the recently established local Museum of the Sea, and eventually physical reconstruction of a replica site on the seabed as a centerpiece for regional archaeological outreach and tourism.

Understanding the church wreck in its socioeconomic context is a means to an additional end. By collaborating with local experts for the Museum of the Sea, we explore the human experience of maritime connectivity by integrating archaeological remains within the broader context of the town's historical ties to the sea (Aliffi 2006; Sorbello 2010). At present, two major themes are central in Marzamemi and the Mediterranean more broadly: sustainable development and the refugee plight. Formerly boasting one of the most important tuna fishing operations in the Mediterranean, Marzamemi's livelihood has suffered from commercialized overfishing and related environmental pressures (Ravazza 2000; Longo & Clark 2012). Only recently has the town seen re-investment in regional infrastructure, including extension of the Catania-Siracusa highway to this corner. Nascent agri- and ecotourism initiatives along with festivals and the new museum aim to attract an international demographic to the region's beaches, food, and culture (Di Blasi & Arangio 2015). Linking heritage preservation with environmental sustainability on land and at sea provides a balanced and robust alternative to global economic paradigms that stress short-term gain over long-term interests (Di Trapani 2002; Borsellino et al. 2006; Sabloff 2008; Cassia et al. 2015). Centuries and even millennia of cultural interaction and population movement between west and east, south and north are an enduring feature of the Sicilian landscape, celebrated in the island's language, toponyms (Marzamemi's own name is likely of Arabic origin), architecture, literature, and food. Such movements are of particular relevance in an era and region where political, social, religious, and economic upheavals have wrought catastrophic human consequences and brought out a darker form of Mediterranean connectivity. Once-cheerfully painted North African "clandestini" boats now overflow local harbors and are piled high on their docks. Alongside these modern reminders, the ancient cargos provide historical depth to the dramatically varied human experience of connectivity across the sea. Vivid presentation of the material culture of mobility challenges local communities to turn tragedy into hopeful opportunity, reminding themselves, visitors, and neighbors old and new that each crossing—whether

fortuitous or desperate—has and continues to remake the Mediterranean and its cultures. Within the setting of non-politicized arenas like marine preserves and the Museum of the Sea, research-driven archaeology can provide an educational platform for confronting difficult but pressing local and global concerns through dialog within and across cultural boundaries (Skartveit & Goodnow 2010; Elia 2014).

### **History of the project and its productivity**

A preliminary visit by Leidwanger in fall 2010 on the invitation of Sebastiano Tusa, director of the Soprintendenza del Mare (the official body charged with heritage management off the Sicilian coast), aimed to evaluate several sites across the island for potential work, after which the Marzamemi area was selected for a long-term collaborative project. A 2-week trip in fall 2012 allowed logistics planning and survey of the site's condition in light of evidence for growing illicit salvage, including the Coast Guard's confiscation of looted materials. Clear signs of new disturbance along with discrepancies and missing objects from Kapitän's plan suggested a sustained effort aim at comprehensive recording. The Marzamemi Maritime Heritage Project began in 2013 with a focus on non-intrusive surface mapping and artifact study of the church wreck (Leidwanger & Bruno 2014). Increasing threats to this submerged heritage with intensifying tourism as well as the development and restoration of a large (3000-m<sup>3</sup>) space in a 19<sup>th</sup>-c. winery (Palmento di Rudinì) provided critical help for this new collaborative project, and a multi-year permit (*collaborazione*) was signed between Stanford and the Soprintendenza.

Despite its location in shallow water that facilitates lengthy dive times, the Marzamemi wreck poses a challenging site and dynamic environment. The cargo is dispersed across a sandy and rocky depression at 7-8 m of depth within a surrounding reef that rises to 4.5 m deep. At 65×35 m, the extensive site was likely dispersed through the wrecking process and by centuries of violent wave action. Shifting sands with storms allowed small finds to filter into the seabed while variously obscuring and revealing larger objects, even between seasons. The adjacent reef has partially collapsed and settled atop cultural material (Fig. 5). Local reports suggest that some disturbance may be the unfortunate result of dynamite fishing around the mid-20<sup>th</sup> c. This situation has necessitated new digital mapping methods sufficiently precise and accurate to unravel dynamic site formation processes and to contextualize Kapitän's earlier

explorations (Fig. 4). Photogrammetry in 2013-2014 produced a working plan for all exposed architectural elements and small finds. With adapted 3D technology developed by heritage documentation specialists led by Leopoldo Repola from Suor Orsola Benincasa University in Naples, we expanded this plan in 2015 to include the surrounding reef topography at sub-cm accuracy. Though preliminary, these efforts have already allowed us to test the arrangement of cargo and to hypothesize the vessel's original orientation. The Naples team also initiated a program of structured light scanning on architectural elements whose uneven preservation presents a challenge for traditional recording and analysis (Fig. 7). The technique offers significant promise: from simple planning of conservation and restoration, to projecting full dimensions from partial materials, to virtual reassembly of broken pieces into individual panels and eventually into their intended features. These approaches are critical for understanding levels of prefabrication and standardization, and in turn the individuals and mechanisms behind the shipment.

Two initial excavation seasons (2014-2015) explored a promising area near the middle of the site (Fig. 2). Targeted excavation in 2014 of four 4×4-m units aimed to overlap partially with Kapitän's apparent area of focus, to align our plans and his, and to contextualize his work (Leidwanger & Tusa 2015). Building on this new knowledge and encouraged by the concentration of small finds even in previously explored areas of the site, the excavation area was enlarged to the east and south in 2015 (Leidwanger & Tusa forthcoming), where tightly packed architectural elements and fallen rocks afforded protection to objects large and small and the potential of good preservation (Fig. 5). The discovery of ceramics, metals, and architecture—including the best preserved fragment of the stone ambo to date (Fig. 3)—indicates that this large area was wholly overlooked by both Kapitän and other (illicit) visitors. A mix of full and partial excavation has been completed over an area of 176 m<sup>2</sup>, reflecting about 10-20% of the presumed area of the site. While most shipwreck projects aim at full excavation, the present research agenda can be met through 100% recording combined with excavation of just over 50% of the estimated area of the site (Fig. 2), leaving certain unthreatened parts of the site for future research and dive tourism.

With the support of various sponsors, the dedication of Pachino's mayor and others, a field conservation and artifact processing lab has been established at the historic Palmento di Rudinì under the

guidance of Asaf Oron, the project's professional conservator. Work space, storage areas, and purpose-built basins for desalination now make this facility ideally suited to support all phases of maritime archaeological work, from recording and data processing to larger-scale conservation, and eventual display and public outreach. With the formal establishment in 2015 of this space as the Museum of the Sea, the mayor of Pachino is creating a foundation to facilitate its development. Leidwanger is joining its board, together with Tusa, the mayor, and representatives of the University of Catania and corporate backers, ensuring the Marzamemi project continued round-the-clock access and allowing us to develop with local partners the multifaceted museum and community outreach center envisioned above.

After three seasons of fieldwork that established the logistics and laid the foundations for the current proposal, we are now poised to expand our investigations along two major axes: intensive excavation in several promising areas (Fig. 2), and digital modeling combined with compositional analysis of the marble architectural corpus on land and underwater. Despite Sicily's long history of progressive underwater cultural heritage management (Tusa & Brancato 2009; Tusa & Li Vigni Tusa 2010), the Soprintendenza's mandate is necessarily concerned with survey, protection, and valorization. Local capacities for more intensive and sustained research-driven investigations like the Marzamemi project have remained limited, necessitating the acquisition of dedicated equipment and space to meet new logistical, conservation, and other demands. All excavation and diving equipment has now been procured, lab and work spaces are outfitted, field methods have been tested and refined, and a professional staff is at hand. These seasons also allowed us to develop training programs, including for undergraduates who rarely benefit from such experiences given the cost and complicated logistics; already the project has offered opportunities for students from seven universities. In 2014 we began a long-term partnership with local archaeologist Laura Falesi, whose runs a unique training program for teenagers from all around Italy, providing week-long introductions to natural and cultural heritage in the seas off Marzamemi. This broad foundation of fieldwork has allowed us to understand the complexity and potential of the site, situating us now confidently to initiate larger-scale explorations.

Annual peer-reviewed publications have appeared or are in press for each of the three field seasons. Regular paper and poster presentations have been offered at professional meetings, and more specialized discussions at several conferences. Marzamemi shipwreck material currently features prominently in the traveling “Sicily and the Sea” exhibit in Amsterdam, and the upcoming opening at the Ashmolean Museum of Oxford has garnered much recent press (BBC, *Times*, *Telegraph*, *Mirror*, *Independent*, etc.). To reach a broad audience, the project maintains an active website and blog (<https://marzamemi.stanford.edu>), and has been featured in a series of news reports in Italy and the USA. Public talks have been offered through the AIA’s national lecture program, and a richly illustrated article targeting the Italian public is in production for *Archeologia Viva*. A full list of these follows.

Leidwanger, J. & S. Tusa. Forthcoming. “Marzamemi II ‘Church Wreck’ Excavation: 2015 Field Season.” *Archeologia Maritima Mediterranea* 13.

Repola, L., S. Tusa, J. Leidwanger, A. Cerrato, D. Signoretti & R. Memmolo. Forthcoming. “Three-Dimensional Underwater Survey: Representing the Past with New Tools for Musealization.” *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*.

Leidwanger, J. & S. Tusa. 2015. “Marzamemi II ‘Church Wreck’ Excavation: 2014 Field Season.” *Archeologia Maritima Mediterranea* 12: 103-115.

Leidwanger, J. & N. Bruno. 2014. “Marzamemi II ‘Church Wreck’ Excavation: 2013 Field Season.” *Archeologia Maritima Mediterranea* 10: 191-198.

Leidwanger, J. 2016. “The Marzamemi ‘Church Wreck’: New Excavations and Heritage Management off Southeast Sicily.” 117<sup>th</sup> Annual Meeting of the AIA. San Francisco, 6-9 January.

Repola, L., S. Tusa, J. Leidwanger, A. Cerrato, D. Signoretti & R. Memmolo. 2015. “Three-Dimensional Underwater Survey: Representing the Past with New Tools for Musealization.” 1<sup>st</sup> International Conference on Metrology for Archaeology, Benevento, Italy, 22-23 October.

Leidwanger, J., S. Pike & A.J. Donnelly. 2015. “Revisiting the Origin and Destination of the Late Antique Marzamemi ‘Church Wreck’ Cargo.” Association for the Study of Marble and Other Stones in Antiquity (ASMOSIA) XI Conference, Split, Croatia, 18-22 May.

- Leidwanger, J. & A.J. Donnelly. 2014. "Imperial Architecture on the Move: The 'Church Wreck' at Marzamemi." 49<sup>th</sup> International Congress on Medieval Studies. Kalamazoo, 8-11 May.
- Leidwanger, J. & S. Tusa. 2014. "The Late Antique 'Church Wreck' at Marzamemi, Sicily: 2013 Excavation Season." [Poster] 115<sup>th</sup> Annual Meeting of the AIA. Chicago, 2-5 January.
- Leidwanger, J. 2015. "Fifty Years On: Revisiting the Late Antique Marzamemi Shipwreck." Maritime Stone Trade from Antiquity to the Middle Ages, Ca' Foscari University of Venice, Italy, 14-15 May.
- Leidwanger, J. 2015. "Between East and West at the End of Antiquity: The Late Roman 'Church Wreck' at Marzamemi, Sicily." Matthews Memorial Lecture, University of Pennsylvania Museum, 18 April.
- Leidwanger, J. & L. McPhie. "Marzamemi Maritime Heritage Project." <http://marzamemi.stanford.edu>
- Plus various public lectures by Leidwanger and Tusa on the church wreck at Istanbul (3/2014), Berkeley, CA (10/2014), St Catharines, Ontario (11/2014), Stanford, CA (3/2015 & 5/2015), Walla Walla, WA (3/2015), Pacific Grove/Monterey, CA (4/2015), San Francisco, CA (4/2016).

### **Collaborators**

Director **Justin Leidwanger** oversees all aspects of the church wreck excavation and the broader Marzamemi Maritime Heritage Project. Following an MA in Nautical Archaeology at Texas A&M University in 2005, Leidwanger earned a PhD from the graduate group in the Art and Archaeology of the Mediterranean World at the University of Pennsylvania in 2011 before joining Stanford's Department of Classics as Assistant Professor in 2013. Currently the Omar & Althea Dwyer Hoskins Faculty Scholar, Leidwanger founded and directs Stanford's Maritime Archaeology Lab, which supports fieldwork and analysis related to Marzamemi and other projects. His research and publication focus on the formation of regional and interregional maritime networks across the Roman and late Roman world, the topic of his current book scheduled for submission in December 2015. He has been actively directing fieldwork since 2003, and between 2011 and 2015 served as co-director for a 5-year coastal research program at Burgaz in southwest Turkey, as well as the late Roman specialist for underwater surveys off Turkey's shores. He jointly leads teams undertaking restudy of two famous late antique shipwrecks excavated in the 1960s and early 1970s at Yassiada in Turkey, the topic of his recent co-edited volume. A major focus of his research

remains underwater cultural heritage law and ethics, about which he organized (with Greene, Leventhal, and Daniels below) a series of workshops, position and policy papers. At least 50% of Leidwanger's research efforts are devoted directly to the Marzamemi fieldwork and administration, with the remainder focused on synthetic research on late antique economy, exchange, and connectivity.

The Marzamemi church wreck excavation is conducted as a *collaborazione* with the Soprintendenza del Mare – Regione Siciliana, represented by **Sebastiano Tusa** and **Nicolò Bruno**. Tusa leads the Soprintendenza, assuming responsibility for all cultural and natural heritage off the island, while Bruno heads management of heritage in this area. Having earned his PhD at Sapienza University of Rome, Tusa is one of the most experienced archaeologists in Sicily. He previously directed the Soprintendenza for Trapani, and holds a faculty post at Suor Orsola Benincasa University in Naples. Among his most successful endeavors were archaeological diving trails and other innovative practical programs associated with his leadership of the European Commission-sponsored ArchaeoMap Project ([www.archaeomap.eu](http://www.archaeomap.eu)). His numerous publications range from the naval battle landscape of the First Punic War to a late Roman wreck near Trapani and the development of museum programming and cultural tourism. Bruno studied archaeology at the University of Catania and has worked with the Soprintendenza for more than fifteen years; a native of the region, he provides crucial logistical support and helps the project draw connections to local communities and stakeholders throughout southeast Sicily. Wide-ranging responsibilities keep Tusa from participating for the entire season (estimated 10% of his annual workload), but Bruno is on site for all work, representing 80% of his efforts during the summer fieldwork and 20% off season.

From the start, the Marzamemi project has benefited from the dedication of key staff members who are committed to collaborating throughout the grant period. **Tiziana Fisichella** serves as Field Director, organizing the progress of work, maintaining excavation records, and serving as an archaeological resource for staff and students. She brings nearly two decades of experience ranging from prehistoric through medieval contexts, especially underwater in Sicily, where she supervised both the Archaic Gela and late Roman Marausa shipwreck excavations. Fisichella devotes 100% of her summer



months to the preparations, fieldwork, and cleanup at Marzamemi, and 10% of her time over the remainder of the year. **Matteo Azzaro**, technical diver and owner of El Cachalote Diving Center in Marzamemi, manages logistics, not least ensuring safety according to European standards, handling movement and lifting of large objects on site, and more generally fulfilling the requirements of Italian law that govern technical aspects of underwater scientific activity. In the summer 50% of his efforts and the majority of his boat pilots and permanent staff of 8-10 cater primarily to project needs, managing boat operations, dive gear, dredge maintenance, and tank fills. Off season, Azzaro is charged with monitoring this and other submerged archaeological sites around Marzamemi. A **Diving Safety Officer** is selected annually in coordination with Stanford's Diving Supervisor; together they ensure that personnel are fully trained and field tested, that they undertake proper planning and safety precautions and maintain diving records. This staff member devotes 100% of her/his efforts during the season and 10% during the spring.

For the mapping of underwater archaeological sites, **Sheila Matthews** has unparalleled experience, having served in this role for her entire career with the Institute of Nautical Archaeology's (INA) Bodrum Research Center. Matthews is jointly responsible for the recent and ongoing final publications of the medieval Serçe Limanı and 17<sup>th</sup>-c. Mombasa shipwrecks, and has reported widely on these sites as well as her own innovations in 3D mapping. She devotes 100% of her summer months to the Marzamemi fieldwork, and 33% off season to the processing-intensive object and site modeling. She is joined by the 3D documentation team led by **Leopoldo Repola**, whose laboratory at Suor Orsola Benincasa University in Naples has pioneered underwater photogrammetry and methods of public engagement through exhibits mixing objects and media with virtual and augmented reality. With his team of 3-5 engineers, computer scientists and archaeologists, Repola will implement his ScubaLibre underwater mapping system and direct the structured light scanning for a complete architectural inventory of the site, tasks which will require 100% of his time during 5 weeks of gathering data in the field plus post-processing and analysis amounting to 25% of his off season research time.

For nearly 20 years, **Asaf Oron** has led professional efforts to conserve objects of underwater cultural heritage, including seven years as head of INA's conservation laboratories in Bodrum, Turkey

and more recently with the University of Haifa. Oron devotes 100% of his field time to overseeing the conservation and finds processing labs, the retrieval and processing of sediment and other samples, and the preparation and raising of objects underwater to ensure their safety. During the off-season, 10% of his efforts go toward remote planning for lab needs of the project and coordinating with museum personnel the monitoring of objects undergoing desalination. Associate Professor of Environmental and Earth Sciences and member of the Classics faculty at Willamette University, **Scott Pike** is organizing and implementing chemical and mineralogical approaches to the architectural cargo: petrography, stable isotope analysis, electron paramagnetic resonance spectroscopy, and maximum grain size. Pike's analytical expertise and his deep knowledge of ancient Mediterranean stone—including critical distinctions among the numerous and easily confused white and grey marbles—has made him North America's foremost expert, with landmark publications on sources and variation within the Pentelic quarries near Athens. **Brita Lorentzen**, postdoctoral fellow at Cornell University, has been intensively involved in wood analysis for late antique shipwrecks in Turkey and Israel; she will undertake species identification and sourcing, as well as any possible dendrochronological dating. Pike and Lorentzen will each spend one week in the field on alternate seasons along with one month of lab analysis annually.

A variety of material specialists contribute toward particular elements of the assemblage. **Ben Russell**, Lecturer in Classical Archaeology at the University of Edinburgh, lends expertise in the logistics and economics of stone quarrying and carving, prefabrication, and transport in the Roman world, the subject of his recent book. The project "The Art of Making in Antiquity" (<http://www.artofmaking.ac.uk/>) with which he was previously involved as postdoctoral scholar helped to revolutionize how we understand and interpret the processes, workshop organization as well as the economics and logistics of sculptural and architectural production. Russell will play a key role in formal study of the elements, including quarry marks, standardization, and finish. He will work with Stanford PhD student and architectural specialist **Simeon Ehrlich**, who is undertaking the major study of the ambo, chancel screen and related panels under the supervision of Leidwanger and Bissera Pentcheva, Associate Professor in Stanford's Art and Art History Department and expert in early Byzantine architecture. For two decades,

**Paul Reynolds**, ICREA Research Professor at the University of Barcelona, has stood at the forefront of late Roman ceramic study, with numerous specialist publications and landmark synthetic volumes on the circulation of pottery and exchange across the Mediterranean between the 1<sup>st</sup> and 7<sup>th</sup> centuries. His unparalleled knowledge of not only forms and fabrics, but the broader picture of the primary material evidence for late antique maritime trade will elucidate the wreck's overlooked commercial cargo. A historian by training as well as a practicing archaeologist, **Andrew Donnelly** offers a critical perspective on the textual and material evidence for the formation of ethnicity in light of the complex connectivity of Late Antiquity. His dissertation, which he will defend in spring 2016, uses food (cooking pots, textual descriptions, etc.) as a lens for exploring identity and cultural transformation in Italy during this crucial period. Interpretations of the church wreck cargo and shipboard items are intimately tied to potential markers of ethnicity as foodstuffs prepared, consumed, and carried by the ship and its sailors offer clues about the identity of this fluid maritime community. Finally, **Michael Jones** of INA has studied wooden remains from late antique and early Byzantine shipwrecks for nearly a decade. His prior PhD and current postdoctoral work includes a slender galley and a bulky merchant vessel from the salvage excavations at Yenikapı, Constantinople's Theodosian harbor, situating him perfectly to make the most of both concretions and other larger hull fragments.

The heritage management component of the project is led by **Elizabeth Greene**, Associate Professor of Classics at Brock University in Canada and specialist in maritime archaeology and underwater cultural heritage. In addition to directing excavations and surveys off the Turkish coast over the past 15 years, she has been engaged in articles, policy papers and other activities related to the protection and promotion of submerged heritage, the topic of a series of international workshops she organized with Leidwanger and the remaining two members of the heritage team. The first of these, **Richard Leventhal**, is Professor of Anthropology at the University of Pennsylvania, Executive Director of the Penn Cultural Heritage Center, Curator of the American Section and former Director of the Penn Museum. **Brian Daniels**, Director of Research and Programs at the Penn Cultural Heritage Center, works around the globe to engage local stakeholders in safeguarding cultural heritage. This team combines

theoretical grounding and practical expertise in maritime heritage, museum development, community engagement, and the intersection of cultural heritage preservation and economic development. Greene has been engaged fully with the summer fieldwork since 2014 and will also devote 20% of her research efforts off season to heritage initiatives; Leventhal and Daniels anticipate week-long visits in alternate years as well as a 10% time commitment annually through the Penn Cultural Heritage Center partnership.

## Methods

Evaluating competing hypotheses about interrelated issues of private and directed commerce, local and imperial patronage, urban and provincial religious life, maritime connectivity, and political propaganda necessitates situating this assemblage within a wider cultural context that includes varied cargo, personal items, hull remains, and the like. Through several seasons of work at Marzamemi, our questions have been refined, our methods tested and adapted, and the site's extent and challenges have been clarified, but the ultimate interpretation is dependent on a structured program that mixes targeted excavation with recording and analysis across the entirety of the assemblage both above and below water.

While certain questions can and should be answered through nonintrusive means, explorations over the past seasons have demonstrated the immense value of **excavation** in several promising but largely unexplored areas. The dynamic environment at Marzamemi, in which sand has shifted and salvage has been prevalent, has left artifacts below approximately 20-30 cm of loose sand—and often into even lower strata—or wedged under and around architectural elements or large rocks and reef. The discovery in these lowest levels of a much richer and more varied assemblage of small finds has been transformative for our interpretation of the site. Already a finer-grained view of the galley wares offers context for select fragments (particularly a famous African plate) reported by Kapitän. Nowhere is excavation of small finds changing the wreck's story more profoundly than the recent identification of a far-flung assemblage of transport jars from all around the eastern Mediterranean. Distinguishing between shipboard provisions and commercial assemblages requires ceramic quantification and analysis: while the containers that held sailors' rations purchased over the course of the journey would likely have been limited in number and varied in form, we might assume that larger collections of jars were connected to a mercantile venture.

Most of the jars that once held agricultural products—likely wine and oil—have been lost to casual salvage, but dozens of lids or stoppers discovered to date in just one area underscore how imperative excavation and subsequent analysis will be for evaluating the significance of such a secondary cargo. Even the better-known architectural cargo is coming into new light through excavation as Kapitän's hypothesis of a single building from 28 matching columns, capitals, and bases is challenged by the discovery of additional elements and variation within presumed sets.

Excavation will focus on three areas over the course of three seasons (Fig. 2): the wide sloping area toward the reef along the east (2017), the large sandy area at the south (2018), and the rocky area along and under the reef to the north (2019). Our system of excavation reflects a combination of longstanding techniques (water dredges, 4×4-m site grids, tethered lift balloons, photogrammetry, etc.) adapted from years of experience together with innovative methods devised for the particular challenges of the church wreck. One important example in this latter category is our new digital recording system (ScubaLibre), a stereoscopic scanner that provides a dense stereo matcher in conjunction with a robust visual algorithm. In practical terms, this system offers higher precision and accuracy, and relies less on interpolation, than traditional methods of single-camera photogrammetry common in archaeology (cf. Balletti et al. 2015; Demesticha et al. 2014), allowing us to produce daily plans as an excavation record in addition to the detailed full site model (Fig. 4). The widely available materials and open-source software will eventually provide a rapid, powerful, and economically viable option (~\$1000) for archaeological and heritage management projects, on land and underwater, where needs are pressing but budgets are limited (McCarthy & Benjamin 2014; Skarlatos et al. 2012).

Although a shipwreck site is generally a self-contained context, systematic **survey** in the area is warranted for several reasons. First, the shallowness of the area and the dynamic environmental factors that have contributed to this complex site formation suggest that the wrecking process was a violent one. Local topographical recording is necessary to posit a plausible scenario: might the ship, caught in the surge of a difficult storm, have bottomed out on a reef that was even shallower in antiquity when accounting for tectonic-driven subsidence. The possibility of jettison to lighten such a heavy and

awkward cargo load seems slim but should be investigated in the surrounding area. Reports of materials removed illicitly also merit survey; the discovery in fall 2014 of two important panel pieces abandoned between the site and shore underscores the imperative of systematic documentation in this open area. Headed by Bruno, this effort is planned for 2-3 weeks in 2017, when we aim to cover the intervening distance toward the shore (west) and 250 m in other directions using basic diving survey.

A program of **digital modeling** aims to compile a 3D archive of the architectural cargo serving several key research goals. Degrees of prefabrication and standardization within the assemblage provide an invaluable window into the mechanisms and individuals behind this cargo, yet the surfaces are often unevenly preserved or too obscured for traditional formal analysis. Studying the weathering and pitting processes is crucial for long-term preservation. Recording and evaluation of these faces will allow us to reconstruct digitally their original dimensions and surfaces, to ascertain the levels of finish, and also to discern traces of tool impressions, quarry marks, or other signatures of workmanship (Fig. 6). As fragmentary individual components of larger architectural and decorative features (ambo, chancel screen, colonnade, etc.), the elements present two simultaneous puzzles: first, basic reassembly of the broken panels and other marbles into the quarry state in which they would have been transported, and second, the reconstruction of semi-finished pieces into their intended architectural forms. The current dispersal of the collection necessitates a fully digital approach; the shifting landscape of heritage management in Sicily over the past 50 years has left Kapitän's material in Siracusa—then the authority responsible for the site—while our own finds reside in Marzamemi. Alongside excavation and analysis, a digital archive provides an ideal tool for valorization of a collection divided among two museums and the seabed. The local Museum of the Sea, dive trails, and other initiatives offer a powerful setting for innovative engagement—augmented reality, immersive environments, virtual scenarios—with a mix of real objects, virtual and physical copies, reconstructions, as well as a shipwreck replica on the seabed as a regional centerpiece of heritage tourism and public outreach (Petriaggi et al. 2013; Repola et al. 2015).

Of the several methods tested in the field in 2015, structured light scanning with Artec Eva (<http://www.artec3d.com/hardware/artec-eva/>) proved ideal for the task of basic data collection given its

precision, portability, availability, ease of use, and software stability (Repola et al. forthcoming). The resulting models for raised objects can also be compared with models of finds left in situ and captured through focused application of the ScubaLibre system. Led by Repola, this fieldwork will utilize a specialized database (Fig. 7) currently being developed in Naples and slated for more extensive testing in 2016, as well as software designed by Repola's engineering and computer team to facilitate more efficient processing, auto-recognition, and virtual reconstruction of fragmentary materials. Recording will unfold over two seasons—Siracusa materials in 2017, local storeroom and seabed materials in 2018—with 2019 dedicated to any further finds as well as analysis, reconstruction, and implementation of the online interactive component for the architectural archive as an extension of the project website (<https://marzamemi.stanford.edu>). In light of these demanding storage requirements, Stanford is providing 5TB of file sharing space with high-speed access from around the world. In collaboration with Stanford's Digital Repository—where we aim to deposit the final project archive (<https://sdr.stanford.edu/>)—we have created a full data management plan outlining protocols to ensure long-term sustainability, public accessibility, and reliable transfer through all phases of research from collection to dissemination.

Closely tied to documentation is a program of **compositional analysis** of the architectural and other finds. The stone elements present the greatest challenge but speak directly to issues of standardization and patronage. Given the discovery and publication of numerous quarries over the past decades, the various aesthetically similar white and grey marbles now appear far less uniform than initially suggested. Finer distinctions can only be recognized through expert application of analytical methods with reference databases: stable isotopes, petrography, electron paramagnetic resonance spectroscopy, and maximum grain size. Drawing on his comparative collection, Pike's efforts should allow us to determine not only the presence of alternate or additional stones but the degree to which the variation observed in the assemblage reflects different sources, quarries, or even veins within a single quarry (e.g. Pike 2005; Attanasio et al. 2008). For the more limited ceramics, particularly the transport jars, analysis will be undertaken at Stanford's Maritime Archaeology Lab by Leidwanger, who has published recent mineralogical (petrographic) studies on similar late jars from cargos along the coasts of

Turkey and Cyprus (Leidwanger 2014; Leidwanger et al. 2015); a limited number of samples will be studied also by XRD (x-ray diffraction) under the supervision of Yona Waksman (Archaeology and Archaeometry Lab at Lyon's Maison de l'Orient et de Méditerranée), among the best known experts in this technique for late antique, Byzantine, and medieval pottery (Waksman et al. 2014).

### **Work plan**

We anticipate a transitional field season in 2016 where we aim to finish work of the earlier project phase as we embark on a large-scale program that will complete investigations at the church wreck site over the following three years (2017-2019). Each season will run for at least two months—June and July, avoiding the more expensive high tourism season from mid-August—and involve six-day work weeks (Monday-Saturday) to maximize productivity and diving safety.

**Pre-grant** (before 10/2016): Team completes excavations in central sandy area, refines 3D documentation methods and database; heritage team installs mixed-media “micro-exhibit” in historic tonnara (tuna factory) in Marzamemi's heavily trafficked town square, gauges visitor response and heritage awareness via digital and human survey; artifact conservation; interim publications.

**Off season** (10/2016-3/2017): Matthews, Repola and digital team expand database around 3D models, design web interface allowing public access to interactive models; Leidwanger and Tusa visit Kapitän's unpublished archives at Oxford while participating in Ashmolean/Allard Pierson exhibit (“Sicily and the Sea”) with Marzamemi material; 3D data processing; stone and ceramic analysis; artifact desalination; analysis of heritage surveys and exhibit results; field report publication and presentation.

**Season 1** (4/2017-9/2017): Limited rock moving by Azzaro pre-season to clear for work; staff and students excavate 8-m wide trench extending 12 m (Fig. 2) from central sandy area up sloping reef to southeast where we anticipate substantial undisturbed ceramics, hull, and architectural remains; survey (led by Bruno) around site and toward shore to follow up looting reports; digital team records Kapitän materials in Siracusa; artifact conservation; additional heritage survey data collection.

**Off season** (10/2017-3/2018): Matthews, Repola and digital team conduct intensive data processing of 3D models, begin matching fragments; Leidwanger, Donnelly and Russell make research



trip to north Adriatic for comparanda; stone and ceramic analysis; artifact desalination; heritage team leads fuller study of long-term management and museum plan; field report publication, presentation, and various specialist studies (see below).

**Season 2** (4/2018-9/2018): Team excavates six discrete (4×4-m) units at southwest (Fig. 2), aiming to test site limits across area of scattered surface elements, ceramics, concretions, and reports of hull remains; digital specialists record architectural collection locally in Marzamemi, continue database development; field planning for full museum exhibit (led by Greene); artifact conservation.

**Off season** (10/2018-3/2019): Matthews, Repola and digital team continue intensive 3D data processing and fragment matching; first interactive architectural and site models online; stone and ceramic analysis; artifact desalination; heritage team finalizes plans/logistics for larger museum exhibit; field report publication, presentation, and specialist studies (see below).

**Season 3** (4/2019-9/2019): Limited rock moving by Azzaro pre-season to clear for work; staff and students excavate units at northern edge of site in rock/reef tumble (Fig. 2), offering potential for well-preserved/untouched materials and clues to depositional history; heritage team directs installation of new museum exhibit; artifact conservation, restoration.

**Post-grant** (after 9/2019): Field report publication and presentation; non-excavation work continues as necessary, with shift toward final artifact restoration, specialist study, and publication; finalize 3D models, continue architectural restoration and reconstruction; enhanced online presence, museum-based outreach, and sustainable heritage initiatives including replica dive site; synthetic report and popular article (fall 2019); full deposit of data in digital repository and final volume (by fall 2022).

### **Final product and dissemination**

Prompt, wide, and open dissemination of results is of paramount importance to the Marzamemi project. For **scholarly audiences**, journal articles provide a timely outlet for regular fieldwork reports, specialist and short synthetic studies. Peer-reviewed reports have been published annually, aimed at professionals in maritime archaeology and Mediterranean trade, and future articles are envisioned in this same series. Brief field reports can be expected at the AIA annual meetings. A range of specialist

presentations and publications will be offered according to the most innovative aspects of the project: for example, two technical pieces, provisionally planned for the *Journal of Archaeological Science* and the *International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, will follow the 2016 field tests of improvements to our innovative 3D mapping (by Repola, Leidwanger and Matthews). Papers are in preparation on late antique standardization as an economic institution viewed through the lenses of architecture and ceramics (for a January 2016 workshop organized by Leidwanger), and on the historical context and geography of patronage in 6<sup>th</sup>-c. Italy (by Donnelly and Leidwanger, for submission in fall 2016 to the *Journal of Late Antiquity*). A series of additional articles will explore socioeconomic facets of the project, including the organization of the late Roman trade in prefabricated architectural materials (by Russell, Leidwanger and Ehrlich, solicited by the editor of the *Journal of Roman Archaeology* for 2017), the ancient to modern maritime landscape of the Marzamemi region (by Leidwanger and Tusa, for submission in 2018 to the *Journal of Maritime Archaeology*), and late antique shipboard life (by Leidwanger and Greene, for submission in 2018 to the *International Journal of Nautical Archaeology*). Toward the end of fieldwork, a broad and synthetic article is envisioned on the role of the shipwreck in the late antique economy (to be submitted to the *American Journal of Archaeology* in 2019). While readership and peer-review are primary concerns when contributing to a scholarly dialog, preference will be given to such journals with green or other liberal open access policies, allowing us to contribute immediately and freely through the website and Stanford Digital Repository (<https://sdr.stanford.edu/>). With this stable and free platform, the Marzamemi project will archive all relevant models, images, plans, and other data in non-proprietary formats (3D pdf, xml, etc.), providing easy public access through a stable URL with high search engine ranking.

**Public dissemination** is no less important. The site has been the subject of more than a dozen popular lectures in the US, Italy and elsewhere by Leidwanger and Tusa, and Leidwanger's service as a national lecturer for the Archaeological Institute of America provides a critical opportunity to reach an interested public. Already an article in Italian is nearing submission (December 2015) for the popular journal *Archeologia Viva*, while a parallel and richly illustrated piece is planned for *Archaeology*

*Magazine* in 2019 as a complement (50 years later) to Kapitän's 1969 church wreck article. The 3D digital documentation underway not only necessitates an expanded database (Fig. 7), but provides an opportunity to bring lively interactive educational models to a broader public: for example, building a narrative around models of broken prefabricated architecture that trace the process of early Christian church construction, decoration and use. A planned redesign of the website (in 2016-2017) aims to extend its functionality, incorporate the growing archive of digital models using Stanford's server space, and provide a platform offering a mix of 3D renderings, video, and other media. But public dissemination must also take the form of local exhibition and engagement, and here the new Museum of the Sea provides a central and dynamic institution through which the project can reach individuals of all ages and backgrounds. A preliminary "micro-exhibit" and heritage surveys (2016-2017) will help to inform the development of a fuller museum and heritage management plan in collaboration with local stakeholders. A short catalog authored by Greene, Leidwanger and Tusa will accompany the exhibit. The various programs supported by the project and run collaboratively with local stakeholders—dive trails, Falesi's youth camp, etc.—allow archaeology to contribute to dialogs about natural and cultural heritage preservation and sustainability.

Even in the digital age, the scholarly monograph provides a critical outlet for **comprehensive final publication**. Two volumes are envisioned for the Marzamemi church wreck excavations, the first covering the site, historical context, environment, excavation, cargo and other ceramics, hull remains, and small finds, with a second dedicated to the architectural cargo and supplemented by interactive 3D models, reconstructions and other resources through the website and digital archive. These will be edited by Leidwanger and Tusa, authored by the key collaborators and other specialists as necessary, and submitted for publication by fall 2022 as part of Texas A&M University's longstanding and premier Ed Rachal Foundation Series in Nautical Archaeology, for which Leidwanger recently co-edited a volume on the 7<sup>th</sup>-c. AD Yassiada shipwreck (Carlson et al. 2015). The simultaneous online release of data through the Stanford Digital Repository will extend the final report's functionality through the incorporation of interactive 3D models, plans, comprehensive artifact catalogs, and other digital resources.