Deborah Thomas:	00:00	Hello, my name is Deborah Thomas, editor and chief of American anthropologist, and this is Anthropological Airwaves.
Kyle Olson:	00:20	Welcome to our latest episode of Anthropological Airwaves. I'm Kyle Olson, your host for this episode. In this episode, we'll be talking about the multimodal in archaeology with Tiffany Earley-Spadoni of the University of Central Florida and Stefani Crabtree at Penn State University. Both Tiffany and Stefani are specialists in digital archaeology, whose work moves beyond intensified sensory or multimedia engagement with archaeological materials, rather emphasizing collaborative and participatory research and communication frameworks. Tiffany talks to us about collaborative methodologies in particular such as deep mapping and digital storytelling as several among many ways to address the challenges of cultural heritage management and preservation in Armenia. This project brings together and trains stakeholders, students and professionals from both us and Armenia to create multivocal digital narrative environments that transcend static and flat cartographies to tell rich stories about places of memory across political, cultural, and linguistic barriers. Stephanie tells us about how archaeology can address problems in the present day, using examples from her computational work on food webs to show how rich archaeological data sets can help us understand how human activity can affect the ecologies in which they are enmeshed, but, as Stefani makes clear, all of this powerful archaeological modeling isn't worth much if we don't communicate it well, and that requires collaboration, not just with our community stakeholders and academic audiences, but with journalists and the public as well.
Kyle Olson:	01:44	Together these conversations show how digital archaeology done well can contribute to working through contemporary problems. It's an interesting discussion and we hope you will enjoy.
Kyle Olson:	02:06	Yeah, so tell me about what you're working on currently.
Tiffany Earley-Spadoni:	02:09	Well I'm working on a variety of projects. First and foremost in my mind at this moment is we're about to go out to the field with my active field project in Armenia, the Vayats Dzor Fortress Landscapes Project, and this season we're going to be breaking ground on a fortress. It's a Late Bronze, Early Iron Age, cyclopean fortress, approximately 100 meters by 100 meters. We're doing two soundings and I'm really excited about it. Taking a group of eight students from the University of Central Florida out and I'm think it's going to be a great season.

Kyle Olson:		Cool. Yeah. So tell, tell me a little bit more about your project. I know it's a sort of landscape focused.
Tiffany Earley-Spadoni:		Yes. Okay. So the scope of the project is that we are investigating the rise and fall of fortress culture in two distinct periods. The first is the Late Bronze, Early Iron Age. When we see a fluorescence in this particular that we're studying. And then again we see another florescence of fortress culture during the 13th and 14th centuries. This is the period of the Mongol Ilkhanate, a period in which there is a Georgian vassal prince who rules this entire valley and we see another sort of spike in the construction of fortresses. So the question that we're asking is how, why did people in the past construct these fortresses and why did they subsequently abandon them?
Kyle Olson:		So, in your recent article in the Journal of Archaeological Science, is that right?
Tiffany Earley-Spadoni:		Yes, that's correct.
Kyle Olson:		Yeah. So you talked about a couple of different things, the ones that I'm really interested in, I'm interested in all of it, but for our listeners, I think it'd be really interesting to hear a little bit more about your ideas about deep mapping and digital storytelling.
Tiffany Earley-Spadoni:		Right, so my practice engages heavily with the digital humanities and two areas that I'm incredibly interested in now are, as you mentioned deep mapping, so I'll talk about that one a little bit. First, deep mapping differs from conventional mapping in that it is a layered multivocal digital environment rather than being a conventional, as they call it, "flat map". There's an intention to construct narratives it in this kind of mapping practice. And one really great example of this is the RICHES project at the University of Central Florida. The RICHES project at the University of Central Florida incorporates a variety of museum as well as archival collections in a rich GIS online environment. But even more than that, there are predictive algorithms that will suggest to you other materials that are germane to the objects that you're looking at or the documents that you're looking at. It also allows you to do something that's incredibly interesting, which is storyboard, so you can take the objects, the oral histories, all of the different rich media content that's in this environment and create your own story. I think that is a productive direction in which community mapping projects can go.
Kyle Olson:		So how have you used the deep mapping techniques in your research?

Tiffany Earley-Spadoni:	05:11	Well, one area that it is interesting to me in terms of deep mapping has to do with contested geographies. I work in the Caucasus, which is a part of the world which has experienced a warfare and genocide in its recent history. And even the simple act of assigning a place name can be a political statement of no small importance. So one place where we're interested in using deep mapping is as a way to apply a variety of toponyms to the same place as well as encourage the creation of content of people on both sides of the border who know these places and who want to talk about their stories associated with it. It's certainly a storytelling approach to mapping rather than, you know, sort of a flat, reified, political boundaries, that sort of thing. It definitely incorporates storytelling.
Kyle Olson:	06:09	Yeah. And I think, the last time we spoke, you told me about the way that you're training students in these methods as well.
Tiffany Earley-Spadoni:	06:15	Right? So we have a digital storytelling project. The first phase of it, is I went out with a group of students from the University of Central Florida and the goal of that particular season, or one of the many goals of that particular season was that at the end we would each produce a digital storytelling project. A digital storytelling could generically mean a multimedia presentation. But it also has a specific context. The Story Center in Berkeley, California a number of decades ago began digital storytelling as a politically engaged, socially active kind of practice. You know, these first person autobiographical stories meant to provoke thought a lot of times by using this story as a way to think about something bigger outside of that story. And so that is the genre that we experimented with in our first season of work.
Tiffany Earley-Spadoni:	07:13	Each of us produced a digital storytelling project. We actually did the worldwide international premiere at Haystack, which is a digital humanities conference that met in Orlando, that was so interesting. And our colleagues in Armenia liked the content that we developed so much that they expressed interest in contributing their own stories, which it was exactly what, you know, the direction that I wanted to go. Anyway. And so this summer in Yerevan, we will be hosting a digital storytelling workshops at the Institute, for our colleagues at the Institute of Archaeology and Ethnography ,where they will be producing multilingual stories in conjunction with the students that I'm bringing. So, there will be a team assigned to each story and then we'll tell that story in both English and Armenian, and the desire is to reach a worldwide audience as well as an audience in Armenia. The focus of this year's digital storytelling project is going to be on challenges faced in cultural heritage management and preservation in Armenia. And there are many

challenges. So there's the stories that they're going to work on producing.

| Kyle Olson: | 08:30 | Yeah. So tell me more about some of these challenges that you face in your research. |

| Tiffany Earley-Spadoni: | 08:34 | Well, here, here's an example of cultural heritage management challenges faced in Armenia. You are probably aware of the Areni cave complex, which is one of the most important Chalcolithic sites, frankly in the world. The reason why it's not a UNESCO world heritage site has everything to do with the politics of that and nothing to do with the importance of this site, which has, the world's among the world's oldest evidence for industrial scale viticulture, and the world's oldest leather shoe. It really is an amazing site. But at some point in early 2017, it was announced that the Armenian government was going to bid the management of this cave complex, which had previously been an under the authority of the Institute of Archeology and Ethnography. They were going to bid out the management of the cave complex to the highest bidder and the company did not need to have any previous experience managing archaeological sites are in cultural heritage management and some of the proposals even included bringing busloads of tourists to have lunch in the sensitive cave environment. This is but one of the many challenges that are faced in terms of heritage management in Armenia. My view of this was also that this is a big story and it was a story outside of anecdotes from my colleagues in Armenia, but I didn't hear about it in any sort of media outlet. And it made me think we need a better way to tell our story and this project that had been experimenting with, and digital storytelling seemed like a great way to do that. |

| Kyle Olson: | 10:10 | Yeah. Well, so thinking about that, you're talking about this cultural heritage management challenges. What are some of the things that your Armenian colleagues are most interested in, especially in this sort of collaborative environment with American archaeologists, American students? Where do your goals overlap? I mean, you've already said about the, they're very interested in the storytelling, but I'm wondering, you know, we have these ideas in the United States about community engaged, publicly engaged archaeology and I'm wondering the extent to which that this idea has traveled and how it's received when it does. |

| Tiffany Earley-Spadoni: | 10:42 | Well, one ultimate objective that I have for this project is I would like to empower our community stakeholders at the community level to tell their own stories about the places that |

we work in, in Armenia. And the whole idea for this digital storytelling project was in very first place inspired by the conversations that we would have with our community informants, when we would go from village to village on survey talking to the stakeholders and asking them about the places of memory, the places of importance in your community and some of these conversations that we had were so moving that I thought it would be wonderful if we could do some sort of project with this. At first I thought oral histories, that would be wonderful, but I like many people, struggle with a lot of the problems of capturing oral histories, how it structures these narratives and I thought to myself, what if there were some way in which they could tell their own stories and I happened to attend a conference session on digital storytelling and that that's where that idea took off, so that is in fact where I would like to take this project, but I see developing this project in, in sort of the interest in and the trust of my collaborators as a staged process.

Tiffany Earley-Spadoni: 12:04   But ultimately that's where I'd like to go. So right now, we're at stage two, and that is training on some level, both my students as well as my collaborators in Armenia, to become digital storytelling leaders themselves. So they're capable of leading and facilitating workshops, both in Armenia and elsewhere. So that's where we are in in this particular project development.

Kyle Olson: 12:30   So these digital stories that you're developing storyboards, the multimedia. This is all going on the RICHES website?

Tiffany Earley-Spadoni: 12:39   No, we have a website called Infinite Armenias that is going to be the project home for this particular project. And I don't 100 percent know what Infinite Armenias is, will become, because rather excitingly, I'm not the primary storyteller in this case and I really look forward to seeing what everyone does with it. I was surprised with the stories that we developed this time. And that's one thing I like about it is that I'm not dictating to students. I'm not, you know, I would never dictate to my colleagues in Armenia, but this is where they are developing their own content and their own interests in a collaborative environment. And collaboration is a really important part of the digital storytelling practice. This idea that we're all doing it together in the same space when we'll be in Armenia, our Armenian collaborators, me, my students, we'll all be developing stories in the same room. And that is very much derived from the workshop practice they have at a place like Story Center in Berkeley.

Kyle Olson:		Cool. Well, thanks for sitting down and talking with us today. I'm looking forward to seeing Infinite Armenias in all of its infiniteness.
Tiffany Earley-Spadoni:		Alright, thank you Kyle.
Kyle Olson:		I did prepare a little thing, from your website. So there's a quote on the front page. It says, "I think that by calibrating our modern models on the archaeological past, we can better understand the trajectory of humanity today and into the future." What do you mean by that?
Stefani Crabtree:		I think that there are a lot of challenges that we're facing today, like global warming for example, or famine, things like that that can seem insurmountable or these huge forest fires that are everywhere, but even though these things can seem insurmountable, there are parallel challenges that occurred in the past and I think as you know, as an archaeologist, you talk to any archaeologist and they'll have myriad examples of, you know, a migration of people out of our region or people responding to external environmental pressures or people using the environment to a point where it changes beyond a tipping point where people can't go back to how it was before. And so what I mean by that is I do think archaeology can save the world. We study systems that are experiments in the past and if we have good enough data, we can look at these trajectories of these societies and we can look at what was robust and what made resilient societies and where things were made things more vulnerable for people in the past.
Stefani Crabtree:		And so I really think, you know, my career is just starting, but one of the things that I want to do is really use archaeological data for the kinds of challenges that we're all facing today. I think that it is imperative for us to do that. A lot of scientists today, we'll build models that are maybe retrodicted back 100 years or 200 years, but we have thousands of years of data so we can literally calibrate our models of the present and the future on the past where we have good data. And so that's what I mean by that. I think for most archaeologists, this is probably noncontroversial. We know that these things happened in the past, but I think that our science can really give something to the study of how people are interacting with the earth today.
Kyle Olson:		So what's an example from your own research that sort of demonstrates this point?
Stefani Crabtree:		So the Ancestral Pueblo people lived in the Four Corners area of the US southwest: Utah, Colorado, New Mexico, Arizona. And

they migrated into the region around AD 600 bringing with them a full suite of domesticates, and by AD 1300 they had completely abandoned this region. And so they had 700 years of successfully farming in the region. Their population grew to population densities that are similar to what are there today, and then it was time for them to go and they migrated to areas where the modern descendant communities are today and they brought with them these centuries of knowledge of how to interact with the environment and what worked and what didn't work. And so the prevalent cases interesting because the preservation that we have in the American southwest enabled the growth of tree ring chronology, lets you know where it began was by taking tree rings and calibrating them backwards and making this grand chart to understand what the dates of things, but you can also look at the width of tree rings to understand moisture and heat versus cold drought versus moist conditions, which can enable you to recreate with incredible precision past environments.

Stefani Crabtree: 18:01 And so that's one thing that we can do to look at how the Ancestral Pueblo people interacted with their environment. We can recreate so well the environment of that 700 year trajectory of people in the past and then we can look at building upon that, the choices people made, what were their likely crop yields. We can look at pollen records and see the clearance of forests over time. There's one from this feature on the Mesa Verde land form known as Mummy lake, where pollen, arborial pollen decreases and decreases throughout the time that people are there. And so as an environmental archaeologist, I can look at all these different pieces and put them together and, and see how people were interacting with their environment, how they were clearing the forest to plant maize fields. They're planting maize fields so they could eat and so their turkeys that they domesticated could eat.

Stefani Crabtree: 18:56 But then you get into this cycle where it becomes a rigidity trap where it's very difficult to get out of relying on maize so heavily. And so some of the work that I do is using this environmental data and I can use that data to recreate ecosystems. So one of the things that I do is food-web modeling. So, if you watched Captain Planet in the 1980s like I did, you know that a food chain is you know, a plant gets its energy from the sun and it grows. And then the herbivore, let's say your bunny comes over and eats the plant and then we'll say that a wolf comes and eats the bunny. And then the wolf ends up being eaten when it dies by carrion eating animals like a buzzard or something. And so that's a food chain, but if we connect the bunny, not just to the sage brush, but also to, you know, chenopodium, and rabbit

brush and all these things and we get all these other links and when we connect to the bunny as a food source, not just to wolves, but say to cougars and to people and things like that, we can recreate these ecosystems in silico, which then can tell us about the ecosystems that the Pueblo people lived in.

| Stefani Crabtree: | 20:11 | So I can do things like simulating the removal of trees. So we've known since the 70s, there was forest clearance that happened almost looking like clear-cutting today. But what does that actually mean for the overall ecosystem? How does that affect the decisions that people make to make a living? I need to grow more corn because I have kids and I need to feed them. How does the decision of cutting down 20 trees affect the rest of the ecosystem? And so these are the kinds of approaches that I like to do because I think that we can then recreate these ecosystems from past, which then we can understand where these robustnesses and vulnerabilities are, and then we can look at that in the publication, say we know violence increased, we know people migrated out of this area, this may have been a proximate cause for that. |

| Stefani Crabtree: | 21:06 | Where are we today, let's say in the American southwest, how are we interacting, as the United States of America with these same ecosystems? And so that's where I think those parallels can be drawn between the past and today. |

| Kyle Olson: | 21:28 | So what do you think the role of archaeologists is in the public and political discourse around these sorts of problems in the present? |

| Stefani Crabtree: | 21:30 | I think it's challenging for a number of reasons. I think one reason is it's not always easy to find common language. You know, we go to conferences and all kinds of jargon and we talk to each other in 15 minute bits. I think it's challenging because of perception of what archaeology is. I think that it can be very challenging for archaeologists to engage with the public because it's easier to not do it. It's easier to talk to other people who have the same language, who are excited by the arcane things that we get excited about, but in general, I do think that the public is interested in archaeology and when I say the public I made being on an airplane, for example, if I'm on an airplane and I'm not wearing headphones, inevitably end up sitting and talking to my seatmate. |

| Stefani Crabtree: | 22:25 | And question three is always what do you do? And if I want to have a long conversation, I say I'm an archaeologist. 9 times out of 10, this person is going to say, when I was a kid, I wanted to do that. Right? It's a very exciting field, but the idea of what we |

do for the people who know, we don't think dinosaurs is this idea of adventure and finding golden idols and things like that. It's not as much. It's very romantic. And you know, there's a lot of archaeology that is romantic. I think. Um, I think studying the past is a quite romantic endeavor and living in a foreign culture where you did not grow up and you're trying to experience these things can be very romantic, as you know. Um, but there's a lot about archaeology that's mundane and so being able to talk about the importance of archaeology beyond just the importance of preserving our past, I think is important as an archaeologist.

| Stefani Crabtree: | 23:28 | I think that the past deserves being preserved. I think that museums are important. I think everyone should experience those, but I think going beyond that side of things, which is I would say the vast majority of how the public in the airplane would interact with archaeologists. And expressing the kinds of things we can get from measuring 10,000 long bones of deer, that's not the kind of thing that seems very exciting to the public. The things you can get out of it, you know, for example, okay, I just came up with this idea of measuring 10,000 long bones of deer. But if you had a time series of that, you may be able to say something about the selective pressure of human hunting, right? Are they getting smaller? What's happening? What are people doing? And those kinds of lessons I think are very tangible. So I think we need to get better at communicating with the public about the things that are quote, boring unquote, cause they're not boring, they're not mundane. But learning how to communicate them is difficult. |

| Kyle Olson: | 24:39 | I guess one question that many people have with respect to this question of public engagement is as archaeologists, as professionals, do you think we should be writing our own pieces in popular magazines, newspapers, op-eds? Should we let journalists do their job? |

| Stefani Crabtree: | 24:59 | I think I know what you're getting at. As archaeologists, we write a lot, and we do a lot of research, and we have to decide when we're going to collaborate. And so when people approach me to collaborate on things, a lot of the time it is because they want my quantitative skills, or I work in a region where they went to work. But I think that aside from writing books, the vast majority of the work that we do is with collaborators. We recognize that other people have expertise that we do not. And so one of the papers that I had come out just last year in American Antiquity was with Paul Hooper, Kyle Bocinsky and many other people. But one of the reasons I wanted to work with Paul is because he's very good at developing these |

mathematical models that then can become the backbone for the kind of computational modeling, which is called agent based modeling that I do.

Stefani Crabtree:	26:00	One of the reasons that I wanted to work with Kyle is because he's very good at translating the ideas that I have and the code that I write into more efficient code. And we worked very well together and we've published a lot together. I could have, I suppose, done that paper myself. That would've been terrible though! Because things get better when you work with other people and when you bounce ideas off of other people. And that's why we go to conferences -- that's why we give these papers. We, I don't give papers and then hope no one comes up and talks to me. I hope that I have conversations with, you know, over a glass of wine later and it, it develops into more collaborations and better ideas. So when a journalist approaches me and wants to ask my opinion on something or write about some of the work that I've done, I love it.
Stefani Crabtree:	26:58	Because it is another form of collaboration, and I have spent the last decade getting into academia and learning that vocabulary and how to talk and do the kinds of work that I do. I work with ecologists and computer scientists and archaeologists, but that doesn't necessarily translate very well into an article for the Washington Post. So when Annalee Newitz contacted me and wanted to talk about some of the Pueblo work that I do on what happened at Chaco Canyon. I was really excited about that because, well, one, it says that somebody out there thinks my work is cool, and Annalee is an amazing writer – both, you know, in journalism, but also she's a novelist, a sci-fi writer. And I knew that she would be able to take the ideas that I have with these, you know, $5 words that I use and translate them into something that is going to reach a much broader audience in a much more precise manner than I could ever do on my own. Because it is a skill, as I'm sure you know right now I am rambling like all academics do. But I think, you know, one of the things when you collaborate with a journalist because that's what you're doing, is they're taking your work and distilling it. You have to learn how to use your words to make sure you're getting your point across. And so I think it's important. I think it's vital and I think public engagement in archaeology and in science is vital for us to be a sustainable society.
Kyle Olson:	28:48	Thank you all so much for listening and be on the lookout for the next installment of Anthropological Airwaves. Until then, don't forget to rate and review us wherever you get your podcasts and to tell your friends, colleagues, and students

about the great work our guests are doing. Take care, and we'll be with you again soon!