

Inka Expansionism: A Comparison of Radiocarbon and Historical Dates

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Abstract

This article evaluates the standard chronology of Inka expansionism across the Andes, as presented in the Spanish chronicles, in light of 143 radiocarbon dates obtained from Inka contexts throughout the former empire.¹ Cabello Valboa's (1951 [1586]) chronology, which is the basis for most modern historical interpretations, suggests that the Inka expansion out of the Cuzco region occurred around AD 1438 and that most of the Andes were conquered after 1463. In contrast, the radiocarbon dates indicate that the Inkas had

established a presence throughout the Andes shortly after 1400, which almost doubles the accepted duration for much of the Inka polity. The radiocarbon dates not only cast doubt on the validity of the historical chronology used by Andeanists for the last half century, but require a substantial rethinking of the nature of Inka history as recorded during the Colonial era.

The formation of the Inka empire was one of the most remarkable accomplishments of the indigenous Americas. Among the empire's more striking features was its apparent brevity--less than a century according to the chronology that Andeanists have used for the last 50 years. It is generally accepted that the Inkas expanded their control beyond the Cuzco heartland and established the largest empire of the Americas in three generations. In doing so, the Inkas integrated hundreds of ethnic groups, living along the Andes from Ecuador to central Chile, into a single polity. Most scholars have examined the process of Inka expansionism by reading the conquest and early Colonial chronicles and local inspection reports from Peru and Bolivia. Although some historians have doubted the accuracy of these historical reconstructions synthesized from conflicting accounts, they have been hesitant to compare the documentary sources with chronometric data. Archaeologists, conversely, have been gradually accumulating information on the Inka occupations of particular regions through carbon-dating, with an eye to assessing the timing of the imperial expansion into those regions. This paper examines the emergence of Inka power in light of radiocarbon dates assembled from the entire empire, including a number of our own previously unpublished dates. When the chronometric information is compared with the conventional historical syntheses of Inka expansionism, the documentary chronology is called into question.

In the written versions of the royal narratives, recorded in the decades after the European invasion, the Inka royalty traced their ancestry through eleven generations from the mythical founder of Cuzco, Manqo Qhapaq, to the last undisputed ruler of the empire, Wayna Qhapaq. Most of the major early Colonial writers of

Peru provided lists of those rulers and sometimes suggested spans for their reigns. Although there is general, although not complete, conformity among the various king lists, the suggested dates and lengths of each reign vary markedly among sources (T. 1).

The Inka chronology that is in general use today was first proposed in 1586 by the cleric Miguel Cabello Valboa (1951 [1586]). By Cabello's reckoning, the imperial era began in AD 1438 when the Inkas achieved a glorious victory over a rival ethnic group called the Chankas, from the Andahuaylas region west of Cuzco. The era lasted essentially through the reigns of three successive rulers: Pachakuti Inka Yupanki, Thupa Inka Yupanki, and Wayna Qhapaq. Inka dominion concluded with a civil war between two of Wayna Qhapaq's sons, Atawallpa and Waskhar, which drew to a close just as the Spaniards invaded the Andean highlands in 1532. In 1944, lacking any means of determining absolute dates, John Rowe (1944:57) suggested that Cabello's estimates provided the most plausible sequence then available for the imperial era. It must be emphasized that Rowe's judgment was not a credulous endorsement of a favorite writer, but was a cautious recommendation based on a close analysis of many sources. Most scholars have followed his suggestion over the years, despite the widespread use of radiometric dating in archaeology since the late 1940's.² Over time, however, enough chronometric evidence has been accrued that we can begin to assess critically the value of Cabello's and other historical chronologies.

Understanding the chronology of imperial Inka expansion is important in our interpretations of the empire as a whole. Radiometric confirmation that the Inka expanded beyond the Cuzco Valley and established their control across the Andes in less than a century would support the historical view of the Inka polity as an extraordinary, but ultimately fragile, formation that lasted but a few lifetimes. Conversely, if dating techniques suggest that the empire lasted appreciably longer than the chronicles grant, current views of Inka developmental history will be called into question. During their reign, the Inkas dominated over a hundred distinct ethnic groups, built more than 2,000 provincial installations along 30,000 km of upgraded roads (see

Hyslop 1984, 1990), resettled perhaps half of the population in some provinces, and developed a vast state economy. Exploits of that scale, though still remarkable, would have been less dramatic if spread over a longer period than the three to four generations that the traditional sequence allows. Possible division of the imperial era into successive stages would also help us to understand the strategy of imperial rule under changing conditions. Under the circumstances, if the radiometric chronology were found to be at odds with the historical accounts, the implications for the reading of history could be profound.

The Historical Chronology

The ascent of the Inkas to rule the Andes was chronicled in more than twenty major accounts. Many were written by Spaniards transcribing or interpreting native narratives (e.g., Cieza de León 1984 [1551], 1967 [1553]; Betanzos 1996 [1557]), although some native Andeans also wrote to explain their history and society to a largely European audience (e.g., Garcilaso de la Vega 1960 [1609]; Santa Cruz Pachacuti Yamqui Salcamayhua 1950 [1613]; Guaman Poma 1980 [1614]). Because Andean peoples had no writing system of their own, most chroniclers synthesized numerous oral versions of Inka history. Sometimes conflicting accounts were assembled into single narratives. Pedro de Sarmiento (1960 [1572]), for example, wrote a composite history of the Inkas for Viceroy Toledo, based largely on interviews in and around Cuzco with about a hundred elites and record-keepers. The mnemonic knot records, called kipu, upon which Andean peoples often relied for their histories, accounting, and other purposes were considered to be so exact that the Spaniards allowed them to be read into court records in conjunction with testimony. Because a recording tool is capable of great precision does not necessarily imply that the contents are accurate, however, and mnemonic devices may have been used on occasion to impart a false reliability to a particular claim (see Callapiña 1974 [1542/1608]; Rowe 1985; Urton 1990). What is of special interest here is that various accounts that drew from kipu records presented distinct visions of Inka history.

In the king lists presented in most accounts, and as synthesized by Rowe (1946), the mythical Inka dynastic founder Manco Qhapaq was followed by a succession of ten more rulers. Until the eighth ruler, Wiraqocha, the Inkas' sphere of influence was largely confined to the Cuzco region, where they were enmeshed in sometimes volatile politics, alliances, and conflicts. Wiraqocha reportedly had grander visions and made a foray into the Lake Titicaca basin in an effort to take advantage of wars among the Qolla and Lupaqa, who were the most powerful societies there. Nonetheless, the scope of his domain is generally characterized as though it had been limited to the south Peruvian highlands.

Cabello judged that the imperial era proper began in AD 1438, when the Inkas under Wiraqocha were attacked by the Chankas. When Wiraqocha and his heir designate, Inka Urqu, fled Cuzco rather than contest the assault, a valiant young prince named Inka Yupanki led a supernaturally-assisted defense of the town and vanquished the Chankas. Inka Yupanki then assumed the honorific name Pachakuti ("Cataclysm" or "Restorer of the Earth") and usurped the throne from his aging father. Soon after, Pachakuti began a series of conquests in the southern Peruvian Andes toward Lake Titicaca, which initiated the formation of the empire.

According to the major narratives, Pachakuti ceded military command to his young son Thupa Inka Yupanki after some time and retired to build the sacred capital of Cuzco (see Rowe 1946:203-209; Rostworowski 1988; Pärssinen 1992 for detailed reviews). Accompanied at first by militarily experienced relatives, the youth led conquests throughout the northern Andean highlands and Peruvian coast. He subsequently annexed the southern Andes in a grand campaign around the time of his father's death. Cabello estimated that Thupa Inka Yupanki's ascension to military leadership occurred about AD 1463 and to the throne about 1471. The next monarch, Wayna Qhapaq (rule 1493-1526), firmed up the imperial frontiers, expanded the northern domain, and solidified administrative control. His sudden death, and that of an heir designate, in an epidemic set the stage for the war between his sons. That conflict ended with Atawallpa's adherents triumphant, just as the Spaniards arrived in 1532.

That conquest sequence, or something akin to it, is supported in part by information in local reports. Among them are inspections conducted in 1569-1586 and published in the Relaciones Geográficas de Indias (1965), and interviews held on behalf of Viceroy Toledo in 1570-72 in the central Peruvian Andes and Cuzco area (Toledo 1940, V. 2, 3). Witnesses from the Upper Mantaro Valley, for example, testified that their ancestors had been conquered by Thupa Inka Yupanki (Toledo 1940 (II):19, 24, 32). Similarly, in 1571 numerous witnesses in and around Cuzco stated that their abuelos (glossed as grandfathers or ancestors) had personally served or had been resettled by Thupa Inka Yupanki, Wayna Qhapaq, and even Pachakuti (e.g., Toledo 1940:65, 101, 108, 112-113, 159). Asked specifically about the ages of the rulers at death, two Toledan witnesses consulted a painted board and kipu for information. They reported that Pachakuti died at the (probably apocryphal) age of 100, Thupa Inka Yupanki at 58 or 60, and Wayna Qhapaq at 70 (Toledo 1940:173; see also 140).

Collectively, the historical evidence suggests that the span from Pachakuti's era to AD 1532 was less than a century. The historical statements further indicate that the advent of Inka armies outside southern Peru, and perhaps the Lake Titicaca basin, occurred no more than 70 years (i.e., post-1463) before the Spanish invasion. Farther south, in Argentina and Chile, the first imperial presence may have occurred no more than 50-60 years before the empire's collapse. In the farthest reaches of the northern empire, the last conquests were reportedly accomplished within little more than a decade of the Spanish invasion. Considering that the reorganization of newly subjected societies was largely attributed to Thupa Inka Yupanki and Wayna Qhapaq, the imperial era ostensibly endured little more than half a century in most areas of the Andes (AD 1463-1532). Two maps of the conquest sequence, prepared by Rowe (1946:205) and Pärssinen (1992:139) on the basis the documentary evidence, are presented here in Figs. 1 and 2.

Despite the nearly universal use of Cabello's imperial-era chronology, some researchers have questioned its accuracy (e.g., Duviols 1979; Zuidema 1983; Urton 1990; Bauer 1992). One reason for doubt arises from the purposes of the narrative accounts and another from the ways those accounts may have been

modified in recording. In Inka politics, controlling the content of royal history implied controlling the right to rule. The dynastic narratives in particular authenticated the ruler's legitimacy and the stature of his supporting kin groups. In the time of the Inkas, it seems to have been public knowledge in Cuzco that the dynastic histories were liable to revision and that both the past and Inka social structure were periodically retailored to fit relations of power. Chroniclers sometimes commented that they were told distinct, incompatible versions of Inka history, or that the royal narratives were periodically reworked (e.g., Cieza 1967 [1553]:173; Betanzos 1996 [1557]:3).

The chronicler Cieza de León additionally pointed out that the king lists glossed over some individuals, perhaps even after the start of imperial expansion. In a general discussion of Inka rulership, Cieza explained that the mnemonic specialists (khipu kamayuq) charged with publicly recounting Inka annals deliberately underplayed, or even omitted, deficient rulers when citing the royal histories.

...and if among the kings one turned out indolent, a coward, given to vices and a homebody without enlarging the domain of his empire, it was ordered that of such [kings] there be little remembrance or almost none at all; and they attended to this so closely that if one [king] was found [in the histories] it was so as not to forget his name and the succession; but in the rest they remained silent, without singing the songs [as they did] of the others who were good and valiant.³

Cieza's comment indicates that poorly regarded monarchs may have been intentionally effaced from public memory by the early Colonial era, with only the more transcendent rulers retaining a place in the histories of the imperial expansion.

Flexibility in the narratives allowed each ruler to justify the shifting basis of power among Cuzco's competing aristocratic factions. The importance of controlling history may be seen in two native accounts said to have been dictated directly from khipu records. One royal account, whose authenticity is in some doubt (Urton 1990), was reportedly taken down in 1542 from Inka record-keepers who came out of hiding in the hills

south of Cuzco to testify to Spanish authorities (Callapiña et al. 1974 [1542/1608]). They related that Atawallpa's victorious generals had tried to kill all the historians they could find in Cuzco a decade earlier, declaring that it was time to begin history anew. The survivors' account attributed extensive conquests into the central Peruvian highlands and southern Bolivian altiplano to Yawar Waqaq and their ancestor Wiraqocha, not to Pachakuti or Thupa Inka Yupanki. They did not even mention the Chanka war, which was so pivotal in most later histories.

Conversely, lawsuits filed in Cuzco in 1569 by the descendants of Thupa Inka Yupanki and Wayna Qhapaq ignored Wiraqocha and Pachakuti and ascribed all important conquests to the later emperors (Rowe 1985 [1569]). The lawsuit was filed in an effort to reclaim alienated estates, in part because many of Thupa Inka's descendant kin group, along with virtually all of Waskhar's kin, had been wiped out in the slaughter in Cuzco at the close of the dynastic war. Thus, conquests often attributed to armies under Thupa Inka's generalship, during Pachakuti's reign, were later claimed by Thupa Inka's descendants as his and his son=s alone. Clearly, history was remade to suit the times.

The uncertainties of royal succession also presented opportunities for brief reigns that may have been played down in the royal annals recorded in the Colonial era. Without going into the details, it is sufficient to note that each succession from Yawar Waqaq onward was reportedly contested. At various times, competition for the throne entailed regicide, fratricide, thwarted or successful palace coups, usurpation, voluntary cession of claims to the throne, civil war, or some combination thereof.

Spanish authors also helped to amend history by selecting among differing narratives. In his introductory letter to the Viceroy Mendoza, for example, Betanzos (1996 [1557]) wrote that he favored the accounts told by the oldest and most respected among his native witnesses. He disparaged accounts by common Indians as credulous, and discounted reports that contradicted his own by arguing that their authors and even the translators had misunderstood their witnesses. Intriguingly, Betanzos was said to have been a member of the Spanish party who took down the 1542 Pacariqtambo khipu kamayuq account (Callapiña et al.

1970 [1542/1608], but he did not rely upon its chronology for his own narrative, completed fifteen years later. By attributing the major conquests to Pachakuti and Thupa Inka Yupanki, he may have favored the views of his in-laws, for he had married the widow of Atawallpa, Pachakuti's grandson.⁴

The written record also makes clear that not just the histories were malleable. The social hierarchy at the heart of the Inka aristocracy seems to have been reformed periodically, perhaps with each of the last three major royal successions in the standard king list (see Rowe 1985). Because history is flexible in the hands of the powerful, and because aspects of Inka socio-political order were so alien to the Spaniards, taking the royal narratives as even codified accounts of events in the Western European sense of history is fraught with complications. Under such circumstances, an independent means of establishing the chronology of the Inka expansion would be of great value. For that purpose, we can turn to radiocarbon dating.

The Radiocarbon Evidence

Over the years, scholars have been reluctant to adopt a radiocarbon chronology for the Inka era for four reasons, because 1) the expansion apparently encompassed such a short period; 2) the 1σ error terms of individual assays often bracket more time than the presumed length of the empire; 3) relatively recent dates are involved; and 4) the Spanish chronicles seem to have recorded actual events in Inka history (e.g., Kendall et al. 1992; Schreiber 1992:52). Even so, archaeologists have been reporting radiocarbon assays from Inka-era deposits or architecture since Engel's (1966) pioneering work of the 1950s on the Peruvian coast. Within the last decade especially, enough relatively early dates have been reported that investigators working in Peru and the southern Andes have begun to question seriously the accuracy of the historical chronology (see Fig. 3).

In a study of the emergence of the Inka state, Bauer (1992) published 22 calibrated carbon dates from the Cuzco region, compiled from the work of several researchers.⁵ Collectively, those assays suggested that the Inka pre-imperial era, called either the Late Intermediate Period (generally) or the Killke Period (locally), began about AD 1000. That estimate is about 200 years earlier than the date usually assumed for early state

development in the region. The imperial era dates were also earlier than what would be expected from the historical accounts. Reserving judgment on some anomalously early imperial dates, Bauer suggested that the transition to the imperial era occurred in the heartland at least as early as AD 1400, that is, about four decades before the conventional historical date. His inferences about an early phase of Inka state formation and major expansions in Peru ca. 1400 were later independently affirmed by Adamska and Michczyński (1996), who analyzed 37 radiocarbon dates.⁶ The extension of the imperial era to 130 years or more made it difficult, though not impossible, to accept the notion that the empire endured through the reigns of only three emperors.

In the southern Andes, especially in Argentina and Chile, archaeologists have been compiling carbon and thermoluminescence (TL) dates from Inka sites and artifacts over the last twenty years. Many of those dates fit the historical conception of the imperial expansion as a mid-to-late 15th century phenomenon. However, numerous assays have been reported that antedated the presumed date (AD 1470-80) of the Inka conquest of the region by several decades. As those unexpectedly early dates began to appear for various sites, many of the region's archaeologists became skeptical of the utility of the historical chronology (e.g., Bárcena 1979; Bárcena and Román 1990; Stehberg 1991-92; D'Altroy and Williams 1994; Williams 1996; Pärssinen and Siiriäinen 1997). When viewed together, and when compared with dates from other parts of the Inka empire, as we will illustrate below, the information suggests that the rise of the Inka polity as an expansionist power should be pushed back at least to the end of the 14th century.

Methods

We rely on three principal sources of information to summarize the current state of radiocarbon dating of Inka materials in the Andes. First is an extensive review of the published literature on Inka archaeology. Second, colleagues have made available to us unpublished dates from their research. Third, we report unpublished dates from our own fieldwork in Peru, Bolivia, and Argentina. We have taken a conservative approach to presenting and interpreting the data. In total, 143 samples assigned to the Inka era are listed in

Tables 2a and 2b, many of which have been collected in the past decade. Regrettably, reporting has been inconsistent. Many dates were originally reported without mentioning (1) their laboratory number; (2) the half-life used; (3) whether the dates have been corrected with a lab error term and, if so, what correction factor was used; and (4) whether ^{13}C corrections were included. Where we have been able to obtain missing information, we have included it.

All of the radiocarbon dates discussed here and listed in Tables 2a and 2b were calibrated using Stuiver and Reimer's (1993) calibration program (V. 3.0.3), using the bidecadal calibration option, with adjustments made for individual laboratory correction terms.⁷ The probability plots were prepared using the Oxcal program (Ramsey 1995). Following Stuiver and Reimer's recommendation, a Southern Hemisphere general correction factor of 40 years, based in part on Argentine data, was subtracted from the reported radiocarbon age.⁸ For example, a reported radiocarbon age of 550 ± 30 BP (T. 2a:88) was calibrated as though the age were 510 ± 48 BP. The effect of making that correction is to shift calibrated dates more toward the modern era, since it reduces the estimated length of time that the sample's radiocarbon has been decaying without replacement. Our calibrated dates are therefore somewhat more recent than those reported by Bauer (1992) and Adamska and Michczyński (1996).

We also take note of the numerous factors cited as confounding for radiocarbon dating, many of which yield dates that are earlier than is accurate for the time frame in which the dated materials were used (see, e.g., Michels 1972; Stuiver and Reimer 1993). Among the factors of principal concern are errors in radiocarbon analytical procedures, in sample collection, and in identification of cultural contexts. Because radiocarbon decay is a probabilistic process, an error term is inherent in the counting itself. Similarly, because of the ways in which the amount of radiocarbon in the atmosphere has varied over time, the calibration procedure often results in multiple intercepts (see, e.g., T. 2a: 5). The authors of this paper cannot control lab errors but, as illustrated below, we may sum multiple dates from controlled contexts to gain a better understanding of the

time frame involved (see, e.g., Fig. 6). In addition, recent technical advances can provide greater measurement precision and thus tighter error terms (see, e.g., T. 2a:88, 94, 100, 109).

Other errors can occur as a result of sampling inappropriate materials or from misidentifying contexts. In the desertic and high elevation environments found in many parts of the Andes, woody plants often grow slowly and are at a premium. Such conditions could result in the dating of Aold wood,⁸ as older architectural materials may have been reused by the Inkas. Lintels or beams provide special problems, because their exterior layers may be trimmed (heartwood problem) or the entire piece reused. A related problem, which we have not been able to control here, lies in the possible misidentification of contexts as belonging to the Inka era. The continued occupation of many Inka sites for at least half a century into the colonial era and the later reuse of sites appears to have mixed Inka and later materials in a number of cases.

We additionally note that it is difficult, if not impossible, to separate early and late imperial-era deposits in most provinces on the basis of ceramic or architectural evidence. Seriations of Inka ceramics or architectural styles based on stratigraphic and carbon-dated deposits from Cuzco would be very useful, but work toward that goal has not yet borne fruit, even though various archaeologists have spent a great deal of effort trying to sort out the sequences. The Killke assemblages of the Cuzco region are now well-distinguished from the classic imperial assemblages (e.g., Rowe 1944, 1946; Dwyer 1971; Bauer and Stanish 1990; Bauer 1992; Kendall 1996). The two types are frequently mixed contextually, however, and few pure Killke contexts have been excavated and dated.

Moreover, the Cuzco polychrome assemblage itself is typically treated as though it appeared largely intact and was not modified through the imperial era. An exception may be found in Julien's (1983) two-stage division of the Inka occupation Hatunqolla, Bolivia, but we do not feel justified in extrapolating her results to the entire empire. Efforts have also been made to assign chronological order to features of the Inka architectural style in the heartland (e.g., Kendall 1974, 1985, 1996; Niles 1980; Hollowell 1987; Kendall et al. 1992; Protzen 1992), but they are not yet sufficiently refined to help the present study. A final confounding

factor is that, at least in parts of the Inka heartland, imperial Inka style and Inka-related ceramics seem to appear in the archaeological record well before the classic architectural style (Kendall 1996:124. As a consequence, archaeologists can not yet systematically distinguish early from late imperial occupations based on ceramic or architectural evidence, the two hallmarks of the Inka presence throughout the Andes.

Chronometric dates therefore stand as our principal source of information on the imperial Inka chronology apart from the Spanish chronicles. In an effort to provide as reliable a suite of dates as possible, we have chosen to discuss the chronology based on dates taken only since 1970. Setting aside earlier assays eliminates most problems of solid carbon counting, assays lacking ^{13}C corrections, and incomplete reporting. For the most part, the assays that we have chosen to set aside come from the Peruvian coast, especially from the Lurin and Chilca Valleys. We have also excluded those dates whose 1σ error terms do not include part of the prehistoric era, that is, before AD 1532 (see T. 2b).

Results

The distribution of calibrated dates from Inka and Inka-related contexts covers a wide range of dates, but nonetheless evinces clear patterning. The four most important findings are as follows. First, the pre-imperial Killke dates end in the 14th century AD, when a transition to imperial style material culture seems to have been underway. Second, imperial-era dates from the Cuzco region begin in the late 14th century. Third, there is a continuous sequence of dates from imperial contexts spanning the 15th century. It is noteworthy that the highest-probability dates from all 15th-century decades are widely distributed across the entire Andes, not just Cuzco and environs. Considering that Cabello's chronology reckoned that most of the Andes were not brought under Inka rule until after 1463, there appears to be a substantial discrepancy between historical and radiometric estimates for the duration of Inka expansionism. Finally, in agreement with historical accounts, occupations of many Inka settlements seem to have continued well after the Spanish invasion, as evidenced by the dates calibrated to the Colonial era. To substantiate these points, we provide a brief description of the dates

according to region. For the purposes of clarity, we sometimes only the highest-probability intercepts in the text, but provide full documentation on intercepts and brackets in Tables 2a and 2b, in a summary graph (Fig. 4), and in graphs of the calibrated dates by region (Figs. 5-14).

Cuzco. In the Cuzco region, the pre-imperial Killke Period and the imperial Inka Period are both of special interest to scholars studying the development and expansion of the Inkas, but the data are still limited for the crucial eras.⁹ Currently, there are 30 dates from the Cuzco region that have been extracted from materials associated with either Killke or imperial Inka materials (Figs. 5, 6). Six dates come from excavations with Killke pottery (T. 2a:1-6). Those samples were used by Bauer (1992:46) to date the pre-expansion period of the Inka to around AD 1000 to 1400. More recently, Kendall (1996) has put the transition to architecturally classic Inka and politically expansionist phase in the mid-14th century or perhaps even decades earlier.

Four additional dates from the site of Pumamarca (T. 2a: 7, 8, 9, 14), located approximately 60 aerial kilometers from Cuzco, are also pertinent (Hollowell 1987). Pumamarca is important because its terminal Late Intermediate (Niles 1980) or proto-imperial through classic imperial architecture (Pardo 1956; Hollowell 1987) should be expected to yield relatively precocious dates (Kendall 1996:126-28). While one assay from a lintel provides an early calibrated intercept date of AD 1263 (1297) 1409 (T. 2a:7), two others yielded bracketed intercept dates of AD 1294 (1335, 1336, 1394) 1424, and 1288 (1315, 1347, 1390) 1421 (T. 2a:8, 9). Hollowell's work at the nearby quarry site of Kachiqhata provides a further assay with an intercept date of AD 1288 (1330, 1346, 1393) 1433 (T. 2a:14). Although those assays may be relatively early because the lintel samples that were dated possibly contained heartwood or reused timber, Hollowell reported that his samples came from materials that belonged to the end of the life span of the plants. The possibility must therefore be considered that the basic canons of imperial Inka style architecture in the Cuzco region were starting to develop more than 100 years earlier than is conventionally thought (Bauer 1992:47).

Four other surprisingly early Inka dates from the Cuzco region come from Machu Picchu and Juchuy Cossco. We have doubts about the utility of the three Machu Picchu dates (T. 2a:10, 11, 13), for several

reasons. They were taken from skeletons excavated by Eaton early in the century, enormous error terms are involved, and the recovery contexts are not clear. The mid-13th century date for Juchuy Cossco (T. 2a:12) is more intriguing, since that site was reputed to have been an estate remodeled for Wiraqocha by his son Pachakuti, precisely at the transition into the imperial era (Betanzos 1996 [1557]:74-80; Kendall et al. 1992; Kendall 1994).

The remaining sequence of Cuzco region dates includes seven centered in the late 14th and 15th centuries (T. 2a: 15-21; Fig. 6) and nine from the Colonial era (T. 2a: 22-30). That patterning may be evidence of the continuing indigenous occupation of the Urubamba Valley, near Cuzco, through the imperial era and well into Colonial times. Overall, the wide range of dates exhibited by the Cuzco materials suggests that more work needs to be done to sort out the developmental sequence in the region. Even so, it may still be noteworthy that dates from the sites attributed to the pre-imperial era end in the 14th century, which is when dates begin for sites attributed architecturally and historically to the transition to the imperial Inka era (Kachiqhata, Juchuy Cossco, and maybe Pumamarca).

Peruvian coast. Of the assays taken since 1970, there are 27 calibrated dates in our sample from the Peruvian coast. The 1 σ probability distributions of two of those fall in the 14th century (T. 2a:31, 32), and 19 span the 15th century and 16th century before 1532 (T. 2a:33-51); six more intercept dates lie within the first 150 years of the Colonial era (T. 2a:52-57). The most notable aspect of this impressive string of dates is that the highest probability dates begin just about AD 1400 and form a virtually continuous sequence through the century (Fig. 7). The coastal series, most of which come from stratigraphic deposits, rather than architecture, suggests that imperial rule began in the region just about the turn of the 15th century and continued throughout the entirety of Tawantinsuyu=s reign.¹⁰

The recent excavations from a Chimu-Inka/Inka context at Túcume, in the Lambayeque Valley, provide an opportunity to sum the probabilities of a suite of dates from a coherent, carefully studied context (Heyerdahl et al. 1995:77). Materials from these excavations include offerings of classic Inka style statuary,

giving the context a secure cultural association. Four of the five samples include 1σ brackets that extend from the early 14th to early 15th centuries, although the highest probability years fall within the early 15th century (T. 2a: 38, 39, 41, 42, 48). The five samples yield a summed 1σ bracket of AD 1310 (0.32) 1360 and 1380 (0.68) 1450 (Fig. 8; see Ramsey 1995). Such an array of dates is about a half-century earlier than might be expected from the historical chronologies.

Sierra north of Cuzco. Few radiocarbon dates from Inka contexts have been reported for the sierra north of Cuzco (Fig. 9). Four of the five dates reported have intercepts or probability distributions that fit comfortably with a view of the imperial occupation as having begun in the early 15th century and continuing into the 16th century. Those dates come from two Inka storehouses in the Huamachuco region, from a local occupation at Patamarca, and from a Late Horizon level at the Xauxa town of Hatunmarca (T. 2a:58-61). The fifth sample, from a storehouse in the Upper Mantaro Valley, yielded a calibrated date well into the Colonial era (T. 2b:138).

The carbon dates from Ecuador taken from sites with Inka materials are problematic (Fig. 10). Several samples from Cashaloma, for example, were taken from contexts that apparently mixed local and Inka materials, resulting in anomalously early dates (e.g., T. 2a:62-64; Scharpenseel and Pietig 1973). The two dates (T. 2a:65, 66) from what appear to be clear Inka contexts have their highest probabilities early in the 15th century. Other samples from Ingapirca also seem to have been taken from deposits with mixed ceramic components (T. 2b:124-128; Cueva 1970; Alcina Franch 1978:129). Some deposits that Alcina Franch (1978) attributed to the Kañari occupation at Ingapirca were complicated by an intrusion of Inka origin in low proportion ... [concentrated] in the habitational complex of Pilaloma.® The calibrated dates are about a half century earlier than the currently accepted historical dates for the Inka incursion into the region. Because of the excavators' concerns over the mixing of the samples and because the earliest assays were measured over 25 years ago, it seems best to reserve judgment on Ecuadorian samples until more data are available.

Bolivia. Dates from the Bolivian highlands are of particular interest to the Inka expansion. There is substantial evidence for interaction between the societies of southern Peru and the altiplano in late prehistory (Julien 1993), and some the Inkas' first major ventures outside the Cuzco heartland were often reported to have occurred toward the Titicaca basin. Regrettably, archaeologists have begun to radiocarbon date Bolivian Inka occupations only recently and the results are less clear than those from the Peruvian coast or Argentina (Fig. 11). Pärssinen and Siiriäinen (1997) describe a sequence of four well-defined strata in deposits at the site of Caquiaviri, a settlement with a significant Inka component that is situated about 50 km south of Lake Titicaca. Four dates from the seal and middle layers, which contain pottery with classic Inka motifs mixed with a variety of altiplano types, bracket the 13th through 15th centuries (T. 2a: 67, 68, 69, 72). Most intriguingly, two samples (T. 2a:68, 69) associated with Caquiaviri-Inka pottery correspond temporally with the transition from the Killke to imperial Inka styles of ceramics and architecture around Cuzco, according to Hollowell's samples from Ollantaytambo, Pumamarca, and Kachiqhata. Pärssinen and Siiriäinen infer that pottery with Inka-related motifs was in use in the Caquiaviri area in the mid-14th century.

Observing that the historical and archaeological chronologies do not conform, Pärssinen and Siiriäinen suggest that Inka-style pottery may have initially developed in the Lake Titicaca basin. That suggestion appears to overlook the well-established role of Killke pottery in the Cuzco valley as antecedent to classic Inka pottery (Rowe 1944; Dwyer 1971; Bauer and Stanish 1990; Bauer 1992). Pärssinen and Siiriäinen alternatively suggest that much of the earlier, Inka, pottery in the basin arrived through exchange relationships, rather than through conquest. A major question to be resolved is therefore whether the proposed Cuzco-Titicaca interaction in the mid-14th century was a consequence of exchange (perhaps between the leadership of regional polities) or of a direct takeover by the Inkas. Determining whether the Inkas had truly established an imperial polity and penetrated the south that early is a matter that still needs much work.

Ten other Bolivian dates fit a more conventional viewpoint. Bauer has taken six dates from Inka structures on the Islands of the Sun and the Moon, in Lake Titicaca, which were revered as especially holy

sites. These samples yielded mixed results, as three provide calibrated dates well into the historic period (T. 2b: 141, 142), indicating that Inka facilities on the Islands continued to be used well after the Spanish conquest. Three other samples could potentially belong to the Inka era, based on their 1σ error brackets (T. 2a: 74, 75, 76). Two additional samples (T. 2a: 71, 73), taken by Matthew Seddon from a burned stratum containing Inka ceramics at Chucaripupata on the Island of the Sun, yielded calibrated dates of AD 1402 (1431) 1449 and 1428 (1447) 1613. Two final samples (T. 2a: 70, 77) from the site of Mesadilla in the Cochabamba region yielded calibrated dates of 1286 (1429) 1648 and 1281 (1565, 1565, 1578, 1627) 1955.

The South Andes. An extensive collection of radiocarbon assays, of which 40 are used in the present analysis, has been taken from Inka occupations in northwest Argentina and northern Chile. The large number of measurements reflects the intense concern of archaeologists working in the south Andes with dating the imperial occupations, partly because the historical record for the south is thin. The pattern for the dates is similar to that reviewed for the Peruvian coast. That is, there are four early dates with probability distributions and intercepts in the 13th-14th centuries (T. 2a:78-81), and then a continuous sequence of dates covering the 15th and 16th centuries (Fig. 12). The probability distributions and intercepts of almost half of the dates place them 20-70 years before the conventional historical date (ca. 1470-80) for the region's incorporation. Many of the early dates come from recently excavated contexts in the Quebrada de Humahuaca, Valle Calchaquí, and Bolsón de Andalgalá, which formed the core region for contact-period Inka occupation in Argentina. Nine samples (T. 2a:110-118) have been calibrated to the century after the first Spanish appearance in the region, which occurred in 1535 when an expedition led by Almagro arrived.

Within the south Andean samples, we are especially intrigued by an array of dates taken from the imperial installations at Potrero-Chaquiago and Potrero de Payogasta, in Argentina. Potrero-Chaquiago, an Inka installation erected in the Bolsón de Andalgalá where no prior settlement had existed, has yielded eight samples from contexts with Inka ceramics (Fig. 13). These dates suggest that the Inkas began to build the site soon after AD 1400 and occupied it well into the 16th century (T. 2a: 86, 90, 96, 99, 106, 111; and 108, 112

from the Agua Verde sector). Five dates from two levels of Inka occupation at Potrero de Payogasta, in the northern Valle Calchaquí, produced a comparable pattern (T. 2a: 88, 94, 100, 109, 110; Fig. 14). That is, dates from floors in two state installations suggest that the Inkas occupied northwest Argentina in the early 15th century.

In part because the early Inka dates from the south Andes have confounded the conventional view of the development of the empire, Chilean archaeologists have also directly dated provincial Inka ceramics using thermoluminescence (TL). TL is a less precise technique than radiocarbon, so that we have less confidence in the results than we do in C-14. Nonetheless, the highest-probability dates of seven samples reported by Stehberg (1991-92) cover a range similar to, although somewhat broader than, the radiocarbon dates: AD 1250-1530. It may be especially noteworthy that mid-bracket dates of AD 1430 and 1440 have been taken from Cerro Grande de la Compañía, Chile, the southernmost Inka-built major site in the empire. In sum, like the samples from the Peruvian coast, the dates from Bolivia, Argentina, and Chile collectively suggest that Inka expansionism outside of the Cuzco heartland began soon after 1400.

Discussion

When considered as a whole, the radiocarbon evidence suggests that Inka rule in much of the Andes may have lasted substantially longer than the standard, historically-based chronology grants. Dates from the Cuzco region suggest that an expansionist Inka polity was forming in the 14th century AD, while evidence from all the Andean republics indicates that the Inkas had established a presence in much of their domain in the first decades of the 15th century. Some evidence also hints that the Inkas may have had considerable interaction with societies in the Lake Titicaca basin by the mid-14th century as well, but resolving the direction and nature of that relationship will require evidence beyond that currently available.

This assessment is at odds with the prevailing view that the Inka state emerged after Pachakuti's ascent to power, ca. AD 1438, and that most of the Andes were incorporated after 1463, when Thupa Inka

Yupanki assumed titular military leadership. We make these statements cautiously, noting that there is a lot of noise in the chronometric sample and that some dates are implausibly early. Even so, it no longer seems sound to accept the idea that much of the empire was under Inka rule for only 50-70 years.

The possibility that the Inkas expanded their sphere of influence from their heartland earlier than is conventionally accepted raises important issues about the socio-political conditions found in the Late Intermediate Period (ca. AD 1000-1400). For example, the Inkas are thought to have been only one of many small, often bellicose, societies that inhabited the Andes in the 13th through 15th centuries AD. Following the collapse of the great highland states of Wari and Tiwanaku, many communities lived in high-elevation, fortified settlements. How much of that defensive posture arose from local conflicts or from a concern over imperial invasion may now become an open question. If the transformation of the Inka polity from a southern highland power to a full-blown empire took a century or more, rather than a few decades, then our understanding of political processes throughout the central Andes needs have to be reconsidered.

The implications are equally meaningful for readings of the historical record, although the present paper is not intended to explore them in detail. At a minimum, it may no longer be tenable to accept the notion that a sequence of just three rulers--Pachakuti, Thupa Inka Yupanki, and Wayna Qhapaq--ruled through the entire imperial era. More broadly, we may now be able to rethink some comparative questions about the formation of early or non-industrial empires. Tawantinsuyu and its constituent societies are justifiably considered to be unusual in many ways among the early empires. The region's isolation; its general lack of market economies, writing, and wheeled transportation; and the unusual social conventions at the heart of power converged to give Tawantinsuyu a distinctive character. Previously, the dynamics of empire formation have been thought to be essentially inaccessible through archaeology, because of the limited time frame involved. The radiocarbon evidence now indicates, however, that by paying close attention to the chronometry of Inka occupations, we may be able to refine our understanding of the creation and consolidation of the largest polity of the indigenous Americas and thus improve comparative explanations of imperial formation.

Despite the doubts raised by the radiocarbon dates, denying any chronological value to the narratives seems inappropriate, since the radiocarbon evidence is compatible with key elements of the historical treatises. Most importantly, the empire was a late prehistoric phenomenon in much of Andes, although not quite so late as many of the chroniclers estimated. In addition, the early series of dates related to Inka ceramics from the Lake Titicaca region meshes with the historical accounts of a precocious Inka interest there. Of equal importance for the dynamics of empire formation, there also appears to have been a roughly contemporaneous extension of imperial occupation throughout the empire, in the early 1400s, as might be expected from a polity that was being formed quickly. Beyond those broad conclusions, however, the data are not yet sufficiently detailed to permit to us to model the order or timing of the regions brought under Inka rule.

We would like to suggest several ways in which the carbon dates and documentary sources can be at least partially reconciled, some of which partially echo the work of other scholars noted above. One possibility is that Pachakuti, Thupa Inka, and Wayna Qhapaq lived to unusual ages, averaging about 40 years each for their reigns. Such a scenario seems implausible, not least because the last two of those rulers reportedly died middle-aged in a society in which 50 years was an advanced age. An alternative is that the periodic reworking of Inka history effectively erased the accomplishments of a number of rulers, by folding their achievements into the regimes of the three emperors described in most chronicles. As noted above, such an act seems to have occurred in 1569, when royal litigants in Cuzco ascribed almost all imperial conquests to their ancestors Thupa Inka Yupanki and Wayna Qhapaq, conveniently disregarding Pachakuti's exploits (Rowe 1985) and those said to have been attributed in 1542 to earlier rulers (Callapiña 1974 [1542/1608]).

The scenario that seems most plausible to us at present is that the roles of early Inka rulers were telescoped forward in the oral traditions. That is, the retelling of the royal narratives in the context of Cuzco's volatile politics compressed history over the generations, or undistinguished reigns were expunged, or both. What was eventually conveyed to the Spaniards was a variety of histories that drew at times from real events, but that were modified according to the shifting political landscape of the sixteenth century. The Spanish

authors did their part as well, selecting, emphasizing, and synthesizing what they were told, and transforming Inka history in the process.

In closing, we would like to emphasize that our central point here has been to use archaeological evidence to help set the context for re-examining the documentary sources and for thinking more broadly about the emergence of one of the great empires of antiquity. We by no means consider the issue to have been closed with this paper. As has been suggested by a number of our colleagues in discussions, refining the chronology of the emergence of the empire will require considerably more work. Radiocarbon analyses on short-lived or annual plants, from carefully considered contexts across the Andes, analyzed through very precise techniques (e.g., AMS), may provide the kinds of data that we will need to take the discussion beyond the point currently possible. We consider that such work will be worth the effort in that, to the degree that we can approach a realistic time frame for Inka rule, we will be in a far better position to evaluate the dynamics of the empire.

Notes.

1. We would like to acknowledge the information provided by our colleagues Roberto Bárcena, Beatriz Cremonte, Tom Dillehay, Mercedes Garay de Fumagali, Ann Kendall, Norma Ratto, Dan Sandweiss, Matthew Seddon, and Roberto Stehberg. Chad Gifford and Kirsten Olson provided commentary on earlier versions of this paper. While all may not fully agree with the conclusions drawn here, their input was crucial to the paper's presentation. Funding was provided by the National Science Foundation, La Fundación Antorchas, and Dow Chemical.
2. Structural scholars such as Duviols and Zuidema have argued that the Inka royal narratives are better understood as models of sociopolitical relations than as linear accounts of historical events (Duviols 1979; Zuidema 1983; Urton 1990). They have proposed, for example, that there were actually two simultaneous Inka kings, one at the head of each moiety at the heart of Inka sociopolitical structure. Their view, however, is not widely shared and will not be pursued here (see Gose 1996).

3. A... y si entre los reyes alguno salía remisión, cobarde, dado a vicios y amigo de hogar sin acrescentar el señorío de su imperio, mandaban que déstos tales hobiese poca memoria o casi ninguna= y tanto miraban ésto que si alguna se hallaba era por no olvidar el nombre suyo y la sucesión; pero en los demás se callaba; sin cantar los cantares de otros que de los buenos y valientes@ (Cieza de León 1967 [1554]: II, ch. 11, p. 32).
4. Alternatively, because the Pacariqtambo account did not appear until after Betanzos= death, his name may have been invoked to provide it credibility. We are not in a position here to make a judgment on the authenticity of that manuscript, which is at issue among historians.
5. A series of 19 dates make up the largest set of imperial-period measurements from Cuzco region (Kendall 1985:347). Regrettably, if those samples yielding modern or Colonial dates and those without reported error terms are set aside, only 7 dates remain.
6. The authors of this paper have been working on the problem of carbon-dating the Inka empire for the last five years. Although we were aware of the Polish efforts to compile radiocarbon assays from Peru for the entirety of prehistory (Ziółkowski 1994), our work on the Inka chronology was carried out independently of and without knowledge of Adamska and Michczyński's (1996) analyses, who apparently conducted their analyses unaware of Bauer's (1990, 1992) prior work. The sample used for this paper contains about three times the number of dates used in their work and excludes 6 assays that we have judged to be potentially unreliable for reasons cited in the text. The present sample of 118 dates thus overlaps with theirs by 37 dates and 81 are in addition. At a more technical level, readers may note that we have also applied the 40-year Southern Hemisphere correction factor and a laboratory correction factor (T. 2a, 2b only), both of which lend themselves to a more conservative interpretation of the data. Thus, some dates that Adamska and Michczyński have calibrated to fall within the prehispanic era (e.g., UGa-4661) fall in the Colonial period in our analysis.
7. The University of Washington Quaternary Isotope Laboratory correction factor is 1.6. For all other samples a factor of 2.0 was used.

8. More geographically specific correction factors are in preparation, but are not currently available (Stuiver and Reimer, pers. comm. 1994).
9. See Bauer (1992:36-48) for additional discussion of late prehistoric radiocarbon dates from the Cuzco region.
10. It is worth observing that the central Peruvian coast is the location in which archaeologists first took a real interest in carbon-dating Inka occupation. Frederic Engel (e.g., 1966) especially took many Inka-context dates from the major centers of Pachacamac and La Centinela, as well as from smaller villages along the coast in the 1950s and 1960s. Table 2b (130-137) lists eight of those pre-1970 radiocarbon assays that we have not included in the present estimates of the empire's chronology, because of concerns over both accuracy and precision of the measurements; the samples are listed here in the interests of comprehensiveness.

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Table 1.

Chronologies of the Inka rulers, according to the chronicles of the Quipucamayos of Vaca de Castro (Callapiña et al. 1974 [1542/1608]), the Toledan inspections (1940 [1571]), Sarmiento (1960 [1572]), and Cabello Valboa (1951 [1586]). All dates are AD. Dates of reigns in brackets are estimated from length of reign given by the source.

Inka ruler	Callapiña [1542]	Toledo [1571]	Sarmiento [1572]	Cabello Valboa [1586]
	duration of reign	age at death	dates of reign	dates of reign
Manqo Qhapaq	-		565- 665	945-1006
Zinchi Roq'a	>70 years		665- 675	1006-1083
Lloq'e Yupanki	>50 years		675- 786	1083-1161
Mayta Qhapaq	50 years		786- 895	1161-1226
Qhapaq Yupanki	>60 years		895- 986	1226-1306
Inka Roq'a	>80 years		986-1088	1306-1356
Yawar Waqaq	>40 years		1088-[1184]	1356-1386
Wiraqocha Inka	>70 years		[1184]-[1285]	1386-1438
Pachakuti Inka	>80 years	100	[1285]-1191[1388]	1438-1471

Yupanki				
Thupa Inka Yupanki	>80 years	58-60	[1388]-1258	1471-1493
Wayna Qhapaq	>50 years	70	1455-1524	1493-1526
Waskhar	2 years, 4 months		1524-1533	[1526-1533]
Atawallpa	-		1524-1533	[1526-1533]
Total	>632 years		868 years	527 years

N#	Location	Site	Lab ID	Uncalibrated Age (BP)	Published Calendar Date (AD)	Calibrated Calendar Date (AD)	Material analyzed, if specified
1	Cochabamba. Bolivia	Mesadilla	Tx-1819A	540+/-110 BP	cal AD 1302-1457	1288 (1431)1647	human bone
2	Cochabamba. Bolivia	Mesadilla	Tx-1819b	380+/-200 BP		1284(1520,1569,1627)1955	human bone
3	Guayas. Ecuador	Yumes RF-1A	AA-1760	290+/-80 BP	AD 1480 (1648) 1690	1461(1657)1955	charcoal
4	Guayas. Ecuador	Yumes RF-5	AA-1765	280+/-150	cal AD 1460 (1651) 1690	1408(1657)1955	charcoal
5	Cañar. Ecuador	Cashaloma	Bonn-1553	690+/-60 BP	cal AD 1246-1402	1279(1307,1360,1379)1421	coal
6	Cañar. Ecuador	Cashaloma	Bonn-1554	750+/-70 BP	cal AD1160-1339	1218(1290)1403	charcoal
7	Cañar. Ecuador	Cashaloma	Bonn-1555	700+/-60	cal AD 1235-1399	1275(1302)1410	charcoal
8	Lambayeque. Peru	Batán Grande	Beta-2591	450+/-60 BP	cal AD 1545-1634 cal AD1401-1529	1405(1446)1635	charcoal
9	La Libertad. Peru	Pacatnamú	Beta-10740	680+/-110 BP	cal AD 1157-1448	1214(1307,1360,1379)1454	bone
10	La Libertad. Peru	Pacatnamú	Beta-12282	630+/-70 BP	cal AD 1281-1428	1286(1398)1444	textile
11	Moquegua. Peru	Estuquina	Beta-19326	430+/-60 BP	cal AD 1426 (1445) 1481	1425(1478)1651	

12	Cusco. Peru	Choquepukio	BM-924	674+/-58 BP	cal AD 1265-1405	1281(1309,1356,1383)1422	wood
13	Cusco. Peru	Canarraccay	BM-925	413+/-59 BP	cal AD 1427-1635	1433(1486)1655	wood
14	Cusco. Peru	Cuzco	BM-926	231+/-71 BP		1523(1675,1777,1798,1944,1954)1955	bone (charred)
15	Cusco. Peru	Keannbamba	BM-927	217+/-67		1637(1678,1770,1802,1940,1954)1955	plant fragments identified as grass and wood
16	Cusco. Peru	Urco	BM-928	203+/-63		1644(1682,1746,1806,1934,1954)1955	plant fragments identified as grass and wood
17	Cusco. Peru	Urco	BM-929	298+/-40	cal AD 1487-1664	1521(1654)1954	wood
18	Cusco. Peru	Cuzco	BM-930	460+/-89	cal AD 1385-1644	1329(1454)1659	charcoal
19	Cusco. Peru	Cuzco	BM-931	286+/-52		1516(1658)1954	wood
20	Lima. Peru	Aymara	Bonn-1146	420+/-50 BP	cal AD 1546-1634 cal AD 1422-1528	1436(1483)1647	wood identified as r
21	Arequipa. Peru	Puyenca	Bonn-1147	660+/-50 BP	cal AD 1284-1400	1288(1315,1347,1390)1421	charcoal
22	Tacna. Peru	Tocuco Alto	Bonn-1151	710+/-60 BP	cal AD 1228-1396	1262(1300)1408	charcoal
23	Tacna. Peru	Tocuco Alto	Bonn-1560	730+/-60 BP	cal AD 1331-1396 cal AD 1213-1329	1242(1295)1444	dung
24	Tacna. Peru	Lluta	Bonn-1566	390+/-70 BP	cal AD 1431-1647	1295(1415)1611	wood (pole of house entrance)
25	Tacna. Peru	Lluta	Bonn-1664	570+/-80 BP	cal AD 1285-1471	1295(1415)1611	wood (pole)
26	Lambayeque. Peru	Huaca Chotuna	Bonn-1958	590+/-70 BP	cal AD1292-1437	1295(1408)1651	wood
27	Cusco. Peru	Sacsahuaman	Gak-2958	770+/-140 BP	cal AD 101-1430	1020(1286)1444	charcoal
28	Cusco. Peru	Pucara Pantillijilla PCz3-9	Gak-2959	310+/-100 BP		1438(1651)1955	charcoal
29	La Libertad. Peru	Farfán Compound II	GX-6829	450+/-120 BP		1305(1462)1954	wood
30	La Libertad. Peru	Farfán Compound II	GX-6830	420+/-115 BP		1321(1483)1954	wood
31	Lima. Peru	Chancay	Hv-350	740+/-50 BP	Cal AD 1344-1391 Cal AD1213-1317	1252(1293)1431	textile (woven material)
32	Junin. Peru	Patamarca	MC-2352	480 +/-70 BP	Cal AD 1552-1633 Cal AD 1381-1527 Cal AD 1309-1357	1400(1446)1641	unknown

33	Arequipa. Peru	Quebrada Honda	P-1846	630+/-40 BP	cal AD 1297-1401	1300(1398)1426	charcoal
34	Lima. Peru	Ancón. Tank site	TK-93	530+/-80 BP	cal AD 1591-1621 cal AD 1291-1515	1305(1433)1631	textile
35	Lima. Peru	Huancayo Alto PV46-2	Tx-2006	580+/-100 BP	cal AD1591-1621 cal AD 1245-1515	1284(1410)1627	charcoal
36	Lima. Peru	Huancayo Alto PV 46-2	Tx-2009	620+/-60 BP	cal AD 1289-1430	1293(1400)1441	charcoal
37	Cusco. Peru	Canamarca	UCLA-676D	475+/-60 BP	cal AD 1559-1631 cal AD 1391-1524 cal AD 1316-1346	1406(1447)1636	wood from niche di
38	Cusco. Peru	Patallacta	UCLA-1676A	365+/-60 BP	cal AD 1444-1647	1445(1527,1553,1633)1953	wood
39	Cusco. Peru	Tunasmocco	UCLA-1676B	415+/-60 BP	cal AD1425-1635	1432(1485)1655	wood from dintel

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2. Structural scholars such as Duviols and Zuidema have argued that the Inka royal narratives are better understood as models of sociopolitical relations than as linear accounts of historical events (Duviols 1979; Zuidema 1983; Urton 1990). They have proposed, for example, that there were actually two simultaneous Inka kings, one at the head of each moiety at the heart of Inka sociopolitical structure. Their view, however, is not widely shared and will not be pursued here (see Gose 1996).
3. A... y si entre los reyes alguno salía remisión, cobarde, dado a vicios y amigo de hogar sin acrescentar el señorío de su imperio, mandaban que déstos tales hobiese poca memoria o casi ninguna= y tanto

miraban ésto que si alguna se hallaba era por no olvidar el nombre suyo y la sucesión; pero en los demás se callaba; sin cantar los cantares de otros que de los buenos y valientes@ (Cieza de León 1967 [1554]: II, ch. 11, p. 32).

4. Alternatively, because the Pacariqtambo account did not appear until after Betanzos= death, his name may have been invoked to provide it credibility. We are not in a position here to make a judgment on the authenticity of that manuscript, which is at issue among historians.
5. A series of 19 dates make up the largest set of imperial-period measurements from Cuzco region (Kendall 1985:347). Regrettably, if those samples yielding modern or Colonial dates and those without reported error terms are set aside, only 7 dates remain.
6. The authors of this paper have been working on the problem of carbon-dating the Inka empire for the last five years. Although we were aware of the Polish efforts to compile radiocarbon assays from Peru for the entirety of prehistory (Ziółkowski 1994), our work on the Inka chronology was carried out independently of and without knowledge of Adamska and Michczyński=s (1996) analyses, who apparently conducted their analyses unaware of Bauer=s (1990, 1992) prior work. The sample used for this paper contains about three times the number of dates used in their work and excludes 6 assays that we have judged to be potentially unreliable for reasons cited in the text. The present sample of 118 dates thus overlaps with theirs by 37 dates and 81 are in addition. At a more technical level, readers may note that we have also applied the 40-year Southern Hemisphere correction factor and a laboratory correction factor (T. 2a, 2b only), both of which lend themselves to a more conservative interpretation of the data. Thus, some dates that Adamska and Michczyński have calibrated to fall within the prehispanic era (e.g., UGa-4661) fall in the Colonial period in our analysis.
7. The University of Washington Quaternary Isotope Laboratory correction factor is 1.6. For all other

samples a factor of 2.0 was used.

8. More geographically specific correction factors are in preparation, but are not currently available (Stuiver and Reimer, pers. comm. 1994).
9. See Bauer (1992:36-48) for additional discussion of late prehistoric radiocarbon dates from the Cuzco region.
10. It is worth observing that the central Peruvian coast is the location in which archaeologists first took a real interest in carbon-dating Inka occupation. Frederic Engel (e.g., 1966) especially took many Inka-context dates from the major centers of Pachacamac and La Centinela, as well as from smaller villages along the coast in the 1950s and 1960s. Table 2b (130-137) lists eight of those pre-1970 radiocarbon assays that we have not included in the present estimates of the empire=s chronology, because of concerns over both accuracy and precision of the measurements; the samples are listed here in the interests of comprehensiveness.