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Astronomy and World Heritage

Jarita Holbrook

Abstract. This article introduces the United Nations Educational, Scientific and Cultural Organization's (UNESCO) new thematic initiative 'Astronomy & World Heritage' to the broader cultural astronomy community. UNESCO recognized two features of the World Heritage List (WHL) that this new initiative seeks to address: 1) very few sites have a connection to science, and 2) most of the sites are located in Europe. This new initiative specifically focuses on cultural sites related to astronomy. Four new sub-criteria were established for the Initiative in addition to the established traditional criteria leading to 'natural' or 'cultural' property designations. The first part of this paper describes this new initiative and the new sub-criteria. With these multiple layers of criteria, I address whether the goal of diversifying the WHL can be met under this new initiative by looking at the possibility of identifying sites on the African continent where most astronomy is found among local people rather than astronomers. The stakeholders in this initiative are 1) UNESCO, 2) nation states and their representatives called States Parties, 3) astronomers, 4) social scientists, and 5) people living in or near potential properties. I conclude that African sites do exist that appear to fit all the criteria, however identifying sites is only the first step in the long process that ends with entry on the World Heritage List. Surprisingly, very little has been done for United States sites. The initiative appears to be hampered in the USA because of 1) the many USA specific steps to nomination, 2) the concern among astronomers that heritage preservation will interfere with cutting edge science, and because 3) preservation projects of more importance to astronomers have been given priority. This UNESCO Initiative will continue into the future, however, the goal of having the first properties inscribed by 2009 for the International Year of Astronomy proved to be unlikely for either Africa or the United States.

Astronomy and World Heritage

In September 2004, I received an announcement for the new UNESCO thematic initiative 'Astronomy & World Heritage.' As a scholar of the astronomy traditions of Africans, my immediate concern was that properties in Africa be included in this initiative, especially those associated with indigenous astronomy. The distribution of the 812 World Heritage Sites is dominated by 400 properties in Europe, the African

continent has 106 properties, and sub-Saharan Africa has 66 of these. Clearly, sub-Saharan Africa is underrepresented. Immediately, I started a correspondence with the UNESCO staff involved with the Initiative and met with Anna Sidorenko-Dulom and Chris Mallorous at the UNESCO Paris Headquarters in March 2005. In June 2005, I began suggesting sites in Africa for consideration. This paper provides details about the Initiative, focuses on the ways that African properties fit the selection criteria, and provides information about the current status of the Initiative in the United States.

This is a top down initiative starting within the UNESCO World Heritage Center. The UNESCO World Heritage Centre advises States Parties in preparing site nominations. It facilitates assistance to nation states from the World Heritage Fund upon request. It coordinates the reporting on both the condition of sites and the emergency action undertaken when a site is threatened. The Centre organizes technical seminars and workshops, updates the World Heritage List and database, develops teaching materials to raise awareness in young people of the need for heritage preservation, and keeps the public informed of World Heritage issues.

Mrs. Sidorenko-Dulom, coordinator of the Initiative, reported to me that in 1994, The World Heritage Committee adopted the Global Strategy to establish a representative and balanced World Heritage List that fully reflects the cultural and natural diversity of heritage of outstanding universal value. Properties related to science are among the least represented on the World Heritage List. The value of these science properties, found in all the regions of the world, is not sufficiently recognised. A pilot scientific study examined the World Heritage List and the Tentative Lists for the identification, preservation and presentation of the sites related to astronomy. This led to the UNESCO World Heritage Centre, in close consultation with the States Parties and the International Council on Monuments and Sites (ICOMOS), creating the thematic initiative on astronomy and world heritage in 2003. The main objective of this initiative is to establish a link between science and culture through recognising the scientific value of cultural sites linked to astronomy. The program seeks to identify, preserve and promote these properties. The properties identified as being most representative could be nominated and inscribed into the World Heritage List, preserving them from progressive deterioration. The idea of including sites related to science and scientific development was important, but of equal importance was indigenous

knowledge¹. After the previously mentioned study, astronomy emerged as the best example of a worldwide science that includes indigenous and institutional knowledge. In a presentation of the Initiative to the States Parties representatives to the World Heritage Convention, Mrs. Sidorenko-Dulom gives the following reasons for choosing astronomy rather than another science:

1. Astronomy is present in all periods, from ancient to modern, and at all geographical regions;
2. Astronomical knowledge is reflected in the manner of construction of cultural monuments and urban planning;
3. Astronomical applications of cultural properties often interlinked with the different traditions and practices [sic];²

The accuracy of these statements about astronomy and the assumptions behind them were not questioned.³ The proposal of the thematic initiative on Astronomy and World Heritage was finalised during the first meeting of the representatives of the scientific community of twelve countries, ICOMOS and NASA (Venice, Italy, March 2004). Mrs. Sidorenko-Dulom presented the Initiative during the 29th session of the World Heritage Committee (Durban, South-Africa, July 2005) (see Table 1).

Mrs. Sidorenko-Dulom went on to say that the UNESCO Secretariat proclaimed 2009 the International Year of Astronomy, which marks the 400th anniversary of the first observations using a telescope by Galileo Galilei. The hope was that the thematic initiative 'Astronomy & World Heritage' would be the cultural heritage activity that could become a focal project supporting the International Year of Astronomy. The World

1 Indigenous: originating in and characteristic of a particular region or country; native. Random House, *Random House Webster's unabridged dictionary*, 2nd ed., (New York: Random House, 1997).

2 Sidorenko-Dulom, A., *Astronomy & World Heritage*, (Paris: UNESCO, 2004), p. 20.

3 No formal definition of science was presented in any of the documents. The term 'scientific' is a term that reflects the ideas of today more than anything. As best I can gather, 'scientific' means that observations are substantiated with theories that rely upon mathematics and physical principles. Observations can be replaced with experiments but repeatability is also important. In the context of the initiative, 'scientific' means mathematically based, theory driven research often connected to technological advances.

Heritage Centre wished to assist the State Parties in the creation of the nomination files of properties linked to astronomy, so that their inscription on the World Heritage List will coincide with the celebration of the Year of Astronomy in 2009. However, 2009 is upon us and the initiative is progressing slowly. Creating a nomination file is one of the final steps in the process of getting a property inscribed onto the World Heritage Site list, usually there are many steps that are required within each nation state before reaching the nomination stage (see my discussion of the USA process below).

The following details of the nomination process are found in the Operational Guidelines:

The nomination document is the primary basis on which the World Heritage Committee considers the inscription of the properties on the World Heritage List.

The typical time required from submission of a complete nomination file of property to the decision of the World Heritage Committee is about two years.

Participation of local people in the nomination process is essential to enable them to have a shared responsibility with the State Party in the maintenance of the property. States Parties are encouraged to prepare nominations with the participation of a wide variety of stakeholders, including site managers, local and regional governments, local communities, non-governmental organizations (NGOs) and other interested parties.

To be included on the World Heritage List, sites must be of outstanding universal value and meet at least one out of ten selection criteria.⁴

4 Intergovernmental Committee for the Protection of the World Cultural and Natural Heritage, *Operational Guidelines for the Implementation of the World Heritage Convention*, (Paris: UNESCO, 2005), p. 151; Unesco., 'Operational Guidelines for the Implementation of the World Heritage Convention', in *World Heritage Commission*, ed. World Heritage Commission, (Paris: UNESCO World Heritage Centre, 2008), p. 173.

Selection criteria:

- a. to represent a masterpiece of human creative genius;
- b. to exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design;
- c. to bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared;
- d. to be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history;
- e. to be an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change;
- f. to be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance. (The Committee considers that this criterion should preferably be used in conjunction with other criteria);
- g. to contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance;
- h. to be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features;
- i. to be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals;
- j. to contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.

The first milestone towards identifying properties within the thematic initiative ‘Astronomy & World Heritage’ was the development of categories of astronomy properties that also met at least one of the World Heritage criteria listed above. The 2004 expert group consisting of historians of astronomy, astronomers, archaeoastronomers, and officials, defined properties associated with astronomy in the following manner:

- i. Properties which by their concept and/or the environmental situation have significance in relation to celestial objects or events;
- ii. Representations of the sky and/or celestial objects or events;
- iii. Observatories and instruments;
- iv. Properties with an important link to the history of astronomy.⁵

The first definition includes built structures such as temples, pyramids, megalithic sites and other monuments. Those aligned to celestial events such as the midwinter sunrise or the annual first appearance of a bright star like Antares in the night sky are appropriate. A familiar example is Stonehenge in the United Kingdom. The second covers the humanistic expression of the sky, such as paintings, murals, and rock art; but also include urban areas that are laid out along celestial ideals. The third definition focuses on observatory buildings and instruments like telescopes, but also includes places and landscapes that are used repeatedly to observe the night sky which may not be in buildings. The fourth definition focuses on properties important to the development of astronomy that do not fit in the previous definitions. This would include locations where scientists viewed celestial events such as the transit of Venus across the face of the Sun, as well as the important monuments such as the houses of famous astronomers.

1.1 The Digital Discussion Space

During the March 2004 meeting, a group of international experts along with the States Parties representatives (second group of stakeholders) and ICOMOS representatives created an implementation strategy for the thematic program ‘Astronomy & World Heritage.’ Included were the third group of stakeholders experts in the areas of astronomy and astrophysics, archaeoastronomy, history of astronomy, and architecture.

⁵ World Heritage Committee, *Report of the World Heritage Centre on its activities and on the implementation of the decisions of the World Heritage Committee*, ed. UNESCO (Durban: UNESCO, 2005), p. 43.

For the most part, the people in this group were academics or were employed at academic institutions such as museums and libraries.

The meeting participants created a multi-step implementation strategy:

1. Production of national inventories of cultural heritage properties relating to astronomy;
2. Establishment and/or revision of the States Parties' tentative lists at a national level;
3. Elaboration of comparative analyses of the States Parties' tentative lists at the regional and global level;
4. Elaboration of nomination files.

To carry out these activities, the World Heritage Centre requested all World Heritage Convention States Parties identify the institution (scientific or cultural) which would be officially in charge of implementing this initiative in each country.⁶ Of course, not all nation states were represented at the meeting.

The astronomy experts had little or no experience with identifying and nominating properties, and no contact with the appropriate nation states representatives. To facilitate the collaboration between different national and international experts the World Heritage Centre created a database on the website of the World Heritage Centre. The database is found online at <http://whc.unesco.org/en/activities/19>. The Royal Astronomical Society of the United Kingdom financially supported the creation of the database. The database provides a means of sharing knowledge with all international and national, cultural and scientific institutions and NGOs involved in the development and implementation of the Initiative. A public web page that is designed to increase the visibility of the cultural World Heritage sites which have links to astronomy provides access to the database. The database along with a discussion board and calendar of events was functional by the end of March 2005. The expert scholars who are working with the UNESCO staff to identify sites have full access to the database and discussions. As a guest, the public page with a timeline of astronomy can be viewed and the links. To have access to the database,

⁶ Sidorenko-Dulom, A., personal communication with J. C. Holbrook, Tucson, 2006, [hereafter: Sidorenko-Dulom, personal communication 2006].

discussions, and documents, one must have an account. By hitting the 'private area' button, anyone can register for an account. Registration is free but not automatic: first, it has to be approved by the World Heritage Centre.

The database was a clever move to encourage stakeholders to communicate with each other in a digital space without the trappings of diplomacy. Ultimately, the database was to provide a list of potential properties for the 'Astronomy & World Heritage' initiative for Nation States to consider and to begin to create a nomination file. The experts were to discuss appropriate sites and upload supporting documents to the database.

2. Properties in Africa

In 2003, a preliminary search of the World Heritage List of cultural and natural sites looked for those sites related to astronomy. About 80 sites were identified according to the following thematic classification:

- I. Sites built/erected according to the nature of the celestial object being observed ;
- II. Architectural Sites and Urban sites constructed in accordance to the astronomical perspectives

There is an interactive map of the world showing these sites that are related to astronomy on the Initiative's website. Accessing the database on October 4, 2005, looking at the continent of Africa, there were thirteen properties suitable for 'Astronomy & World Heritage' that are already on the World Heritage List (Table 2).

Two other sites that are currently on the World Heritage List could be included. The first is Koutammakou, the Land of the Batammariba, in Togo. In the 1970s and 1980s, Blier did an exhaustive study of the Tamberma Batammariba.⁷ The Batammariba build two story houses containing ten rooms each out of mud bricks. The Batammariba have a complex cosmology that includes a celestial origin myth and the deification of certain celestial bodies. Their villages and houses reflect their cosmology. Certain families keep shrines in their homes dedicated to the Sun Deity Kuiye. Their houses are aligned such that the light from the mid-winter sunset will illuminate the shrine. Of the four criteria for

⁷ Blier, S. P., *The Anatomy of Architecture: Ontology and Metaphor in Batammariba Architectural Expression*, (New York: Cambridge University Press, 1987), [hereafter: Blier, *Anatomy of Architecture*].

the Astronomy & World Heritage initiative, the Batammariba fit into criteria i and ii. The Batammariba build their houses and arrange their villages incorporating cosmological celestial principles. And, they also have artwork, shrines, and carvings that reflect and symbolize celestial bodies. For example, the Pleiades star cluster is a mother chicken and her chicks. They symbolize the Pleiades with groups of circles representing chicken eggs. These symbols are found on houses and works of art. The Batammariba are a large ethnic group that may not have consistent traditions throughout the region with respect to astronomy. Togo's officials need to determine if the people of Koutammakou have the same astronomy traditions and if their buildings are aligned to the mid-winter sunset before adding the new designation.

The second site is Carthage in Tunisia. In the 1990s, two archaeoastronomers measured the alignment of Carthage, its acropolis, and its Punic temples.⁸ They found all these ruins are oriented to the winter solstice sunrise. To confirm that these alignments were not limited to Carthage, they measured the orientation of the remains of Punic temples at other North African sites. They found that they are also aligned to the winter solstice sunrise. The alignments may have to do with the Punic solar deity Baal-Hammon. The winter solstice is the shortest day of the year in the Northern Hemisphere and marks the beginning of the Sun's journey northward. The winter solstice, as with the Batammariba, would be an important day for honoring a solar deity. The Roman town of Carthage, built on an originally Punic town, kept the original alignment to the winter solstice sunrise. For Carthage, criteria (i) is met with the overall alignment of the town and the alignment of the temples.

Despite my concerns that the 'Astronomy & World Heritage' initiative would exclude Africa, there are many new suitable properties in Africa and here are examples for each of the four criteria of the Initiative:

8 Belmonte, J. A., C. Esteban, J. Juan and J. Gonzales, 'Mediterranean Archaeoastronomy and Archaeotopography: Pre-Roman Tombs of Africa Proconsularis', *Archaeoastronomy*, (1998): 23, S7-S24; Esteban, C., Temple and Astronomy in Carthage, in *Calendars, Symbols, and Orientations: Legacies of Astronomy in Culture*, eds. M. Blomberg, P. E. Blomberg, & G. Henriksson, (Uppsala: University Printers, 2003), p. 135, [hereafter: Esteban, *Temple and Astronomy in Carthage*].

- i. Kim Malville has been active in an archaeoastronomy study of the Nabta Playa in southern Egypt.⁹ He identified a ring of standing stones at the site as being both a calendar and a temple. The site is dated at 1000 years older than Stonehenge, and is on a much smaller scale than Stonehenge. There are two major lines-of-sight for the ring, one is towards the north. Today, North is found by finding the Pole Star, Polaris. At the time of the Nabta Playa occupation, no star marked North. Yet, North would have been important for navigating across the Sahara. The other line-of-sight is to the summer solstice sunrise. As opposed to the winter solstice, the summer solstice is the longest day of the year. The days start getting shorter from summer solstice to winter solstice. Thus, the summer solstice marks the imminent change of season to cooler weather. The research at this archaeological site is ongoing. But, thus far, the scientists have not hypothesized a relationship between the solstice alignment and the worship of a solar deity. The ring of stones and alignment markers should be considered for the Astronomy & World Heritage Initiative.
- ii. The Ngas people of Nigeria follow a calendar based on regular observations of the moon. They look for the first crescent moon to appear on the western horizon every month. Their monthly activities and agricultural activities are based on this lunar calendar. The moon is important to the Ngas and their largest festival is based on observing the first crescent moon of the new year. The week-long festival activities include ritually cleaning, gift giving, and drinking 'the moon's beer.' A ceremony with the 'sons of the moon', young boys whose faces are decorated with the full moon involves them shooting arrows into the sky to kill the old moon.¹⁰ The timing of their shooting the moon is precise, the first crescent moon must be sighted the next evening. If the timing is off, the villagers will fall ill. In addition to focusing on the moon to establish their calendar, they look at the tilt of the first crescent moon each month to determine the strength of the seasonal rains. Though there is no physical explanation, there is an apparent correlation between the

⁹ Malville, J. M., F. Wendorf, A. A. Mazar and R. Schild, 'Megaliths and Neolithic astronomy in southern Egypt', *Nature*, Vol. 392, no. 6675, (1998): 488.

¹⁰ Lapin, D. A., *Moon Science and Symbolism on the Bauchi Plateau*, c. 1982, unpublished.

local rainfall pattern for the Ngas and the tilt of the moon.¹¹ It is the representations of the moon that are found throughout Ngas society including those painted annually on the face of the young boys that fit criteria ii. I think that the Ngas villages have to be studied to find a representative village for nomination.

- iii. The first telescope facility built in Africa was in the 1820s in Cape Town, South Africa. South Africa continues its astronomy tradition with the building of the 11 meter Southern African Large Telescope (SALT) at the South African Astronomical Observatory (SAAO). SALT is the largest telescope in Africa. SALT saw first light in Fall 2005, e.g. when astronomers used the telescope for the first time. The official opening on November 10, 2005, was attended by dignitaries from around the world. I had the opportunity to attend and was impressed with the program that included politicians, academics, and indigenous storytellers. SALT is symbolic of South Africa's commitment to being at the forefront of scientific research in Africa. SALT which is located in Sutherland, South Africa, can be nominated under criteria iii .
- iv. Arthur Eddington took the photographic images of the Sun during the total solar eclipse of May 29, 1919, that proved Einstein's theory of relativity on the island of Principe off the west coast of Africa.¹² Eddington took several images of the Sun with an interest in the location of stars in the background. Upon developing the images, he compared the positions of stars close to the Sun with their normal positions. He found that the Sun had bent the light of the stars such that their positions had shifted. Those closest to the Sun in the image had shifted the most. This proved Einstein's theory. Sir Eddington was actually on top of one of the colonial administration's buildings at the time of the eclipse where he took the images. I do not know if that building is still standing or if another has been built in its place. If the site can be located and nominated, it would be the first World Heritage Site for Sao Tome & Principe.

11 Aveni, A., *Ancient Astronomers*, (Montreal: St. Remy Press, 1993), p. 90.

12 Thompson, J., F. Dyson, A. C. Crommelin and A. S. Eddington, 'The Reflection of Light by Gravitation and the Einstein Theory of Relativity', *The Scientific Monthly*, (1920): 10, 79.

In addition to cultural, natural, and mixed properties for the World Heritage List, there is the 'Intangible Heritage' category and related listing. The UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage (2003) defines intangible heritage as follows:

- oral traditions and expressions, including language as a vehicle of the intangible cultural heritage;
- performing arts;
- social practices, rituals and festive events;
- knowledge and practices concerning nature and the universe;
- traditional craftsmanship.

These definitions are the creation of a multidisciplinary network resulting from two UNESCO Conventions: the World Heritage Convention (1972) and the Convention for the Safeguarding of the Intangible Cultural Heritage (2003). These offer more possibilities to recognize the African heritage. An example of intangible heritage would be the Tyi Wara (Ciwara) dance of the Bamana of Mali. The Bamana people of Mali have six initiation societies including the Tyi Wara society, which is associated with agriculture. The Tyi Wara society members have a complex knowledge of the annual motions of the Sun and its relationship to the seasons, which is important for agriculture. The Tyi Wara dance ceremony involves two masked dancers, one with a male antelope mask symbolizing the Sun, and the other wearing a female antelope mask symbolizing the Earth. The ceremony is traditionally danced in the fields by individuals considered to be the best farmers.¹³ The anthropologist Dominique Zahan (1974) reported that members of the Tyi Wara agricultural society observed the location of certain constellations and understood their relationship to the rainy and dry seasons.¹⁴ The dance is said to reconnect the dancers to the cosmos: 'the Sun, the land, the rain and the seasons'.¹⁵ The masks and the dance are used to convey information to the audience about the relationship

13 Imperato, P. J., 'The dance of the Tyi Wara', *African Arts*, (1970): 4, 8, [hereafter: Imperato, *Tyi Wara*].

14 Zahan, D., *The Bambara*, Section VII, (Leiden: E. J. Brill, 1974).

15 Imperato, *Tyi Wara*, p. 72.

between the Sun, the Earth, the stars, and the seasons. During the dance no person is allowed to come between the Sun and the Earth.¹⁶ This would be an example of intangible heritage because there are multiple locations where the dance takes place, and the dance is only danced at the beginning and end of the agricultural season. The masks associated with the dance are movable objects and thus not tied to a particular property. In addition to representing the Sun and the Moon, the zig-zag motif represents the north-south motion of the Sun on the horizon over the course of the year. The Tyi Wara masks and dance should be considered as our intangible heritage of Astronomy & World Heritage. The Ngas of Nigeria, mentioned as fitting criteria ii of the Initiative, could also fit the Intangible Heritage category. The New Year festival and activities fit this criteria because of their focus on the moon.

Table 3 provides a list of additional properties in Africa on the World Heritage List that are also related to astronomy, with appropriate references. For all of Africa, of those properties currently on the World Heritage List, fifteen properties could be considered as related to astronomy (see Table 2 and 3). In this paper I suggest five new properties for consideration. In January 2008, Clive Ruggles of the Leicester University circulated an email requesting a list of potential sites for the Initiative to international scholars. In addition to the five properties detailed in this paper, I suggested that the Sahara salt trade cultural landscape might be reclassified because of the numerous mentions of the Tuaregs and other Saharan people using the stars for navigation and that they align their tents cosmologically following N-S, E-W, symbolizing the four pillars of Islam and the square of the constellation Pegasus.¹⁷ A last suggestion for the intangible heritage is the Swazi new year ceremony in Swaziland. An elaborate ceremony takes place after the December solstice and during the waxing moon. There is much celestial symbolism included in the ritual. Including the warrior changing dance/ritual formation from crescent to full (circle) moon, and the 'king' who is the center of the ceremony performs several actions east to west.

16 Zahan, *The Bambara*; Zahan, D., *Antilopes du soleil: arts et rites agraires d'Afrique noire*, (Wien: Edition A. Schendl, 1980).

17 Casajus, D., *La tente dans la solitude: la societae et les morts chez les Touaregs Kel Ferwan*, Ire aed. ed., Editions de la Maison des sciences de l'homme, (Cambridge, New York, Paris: Cambridge University Press, 1987); Louis, A., *Nomades D'hier et D'aujourd'hui dans le Sud Tunisien*, (Aix-en-Provence: Edisud, 1979).

The ritual lasts four days with the king required to do several actions each day.¹⁸

3. The United States

Clive Ruggles contacting individuals by email reflected a flaw in the implementation plan of this Initiative: the database is not being used. There are very few posting on the discussion list - on average one post a year, the documents that are loaded are from the UNESCO staff, the calendar only has entries that I made about upcoming conferences. To explore why the database is not being used more, I contacted those experts listed as partners in the Initiatives, which are listed on the website, to ask about the database usage, and to identify if and where discussions about potential properties were taking place. Interestingly, nearly every respondent went over the steps of getting a property nominated and how the astronomy experts really do not have the ability to nominate properties, it is up to the nation states. I was not sure if this multiple restatement reflected their frustration, their perception of my ignorance, or something else. One response suggested that to facilitate discussions in his country that someone within the Ministry of Culture needed to be appointed as the local person in charge of the Initiative. (This issue was discussed in the 2004 Venice meeting, see above.) A few indicated that a couple of group meetings in their region had been attended but nothing had emerged.

The 2007 joint European Society for Astronomy in Culture (SEAC)/Oxford International Society for Archaeoastronomy and Astronomy in Culture (ISAAC) meeting included a session about the Initiative. It was decided that members would work to identify properties that were already on the World Heritage Site list that fit the criteria of the Initiative. With this new list, UNESCO and Nation States could work to have these existing sites reclassified to include the astronomy initiative designation. The SEAC website includes pages about the initiative and a photogallery of objects and sites under the heading of Archaeoastronomy Heritage (see www.archeoastronomy.org). At the 2008 American Astronomical Society's (AAS) Historical Astronomy Division (HAD) meeting I discussed the initiative with a few members and got a lukewarm if not tepid response. The AAS does have a Working Group on the Preservation of Astronomical Heritage (WGPAH) that was created in 2007, so I was confused about this response. Tracing the history of the

18 Beidelman, T. O., 'Swazi Royal Ritual', *Africa*, (1966): 373.

initiative within the AAS and phone calls to WGRAH members helped me better understand why the initiative is not well known, which connects to why American astronomers and historians of astronomy are not more involved in the Initiative including not using the database.

The United States Park Service is responsible for the National Historic Landmark Register which can be thought of as the US equivalent to the UNESCO World Heritage List. The Register is the list of National Historic Landmarks. Potential Landmarks are nominated through the National Park Service. There are six selection criteria and eight exceptions, these can be found in the Code of Federal Regulations, Title 36, Part 65.4 [a and b] summarized in

Table 1: Timeline Summarizing the Establishment of the Initiative

Date	Activity
August 2003	Project Proposal of the UNESCO World Heritage Centre ‘Archaeoastronomical Sites and Observatories’
March 17-19, 2004	‘World Heritage & Monuments of Astronomy’ UNESCO International Meeting
March 31, 2005	Astronomy & World Heritage Database Up and Working
July 10 – 17, 2005	29 th Session of the World Heritage Committee <i>World Heritage Committee requests to further explore the thematic initiative ‘Astronomy and World Heritage’ as a means to promote, in particular, nominations which recognize and celebrate achievements in science.</i>

Table 2: African Properties Related to Astronomy currently on the World Heritage List Identified by UNESCO.

Nation State	Property	Current Designation
Botswana	Tsodilo	Cultural
Egypt	Memphis and its Necropolis – the Pyramid Fields from Giza to Dahsur	Cultural
Egypt	Ancient Thebes with its Necropolis	Cultural

Egypt	Nubian Monuments from Abu Simbel to Philae	Cultural
Sudan	Gebel Barkal and the Sites of the Napatan Region	Cultural
Ethiopia	Aksum	Cultural
Ethiopia	Tiya	Cultural
Kenya	Lake Turkana National Parks	Natural
Mali	Timbuktu	Cultural
Mali	Cliff of Bandiagara	Natural and Cultural
South Africa	Ukhahlamba / Drakensberg Park	Natural and Cultural
Zimbabwe	Matobo Hills	Cultural
Zimbabwe	Great Zimbabwe National Monument	Cultural

Table 3: Suggestions of WHS properties that can be reclassified to include the Astronomy & World Heritage designation.

Nation State	Property	Current Designation / Astronomy & World Heritage Criteria	References
Togo	Koutammakou, the Land of the Batammariba	Cultural / i., ii.	Blier ¹⁹
Tunisia	Site of Carthage	Cultural / i.	Esteban ²⁰

19 Blier, *Anatomy of Architecture*; Blier, S. P., 'Imagines-Mundi - Narrative Ritual and Architectural Exemplars of Batammaliba Cosmology', *Archaeoastronomy Bull. Ctr Arch.*, V. 10, P. 36, (1988): 10, 36.

20 Esteban, *Temple and Astronomy in Carthage*.

Table 4: National Historic Landmarks Criteria, (from <http://www.nps.gov/history/nr/publications/bulletins/nhl/text1.htm>)

National Historic Landmarks Criteria	
<p>The quality of national significance is ascribed to districts, sites, buildings, structures, and objects that possess exceptional value or quality in illustrating or interpreting the heritage of the United States in history, architecture, archeology, engineering, and culture and that possess a high degree of integrity of location, design, setting, materials, workmanship, feeling, and association, and:</p>	<p>Ordinarily, cemeteries, birthplaces, graves of historical figures, properties owned by religious institutions or used for religious purposes, structures have been moved from their original locations, reconstructed historic buildings and properties that have achieved significance within the past fifty years are not eligible for designation. If such properties fall within the following categories they may, nevertheless, be found to qualify:</p>
<p>Criterion 1 That are associated with events that have made a significant contribution to, and are identified with, or that outstandingly represent, the broad national patterns of United States history and from which an understanding and appreciation of those patterns may be gained; or</p>	<p>Exception 1 A religious property deriving its primary national significance from architectural or artistic distinction or historical importance; or</p>
<p>Criterion 2 That are associated importantly with the lives of persons nationally significant in the history of the United States; or</p>	<p>Exception 2 A building removed from its original location but which is nationally significant primarily for its architectural merit, or for association with persons or events of transcendent importance in the nation's history and the association consequential; or</p>

<p>Criterion 3 That represent some great idea or ideal of the American people; or</p>	<p>Exception 3 A site of a building or structure no longer standing but the person or event associated with it is of transcendent importance in the nation's history and the association consequential; or</p>
<p>Criterion 4 That embody the distinguishing characteristics or an architectural type specimen exceptionally valuable for the study of a period, style, or method of construction, or that represent a significant, distinctive, and exceptional entity whose components may lack individual distinction; or</p>	<p>Exception 4 A birthplace, grave or burial if it is of a historical figure of transcendent national significance and no other appropriate site, building, or structure directly associated with the productive life of that person exists; or</p>
<p>Criterion 5 That are composed of integral parts of the environment not sufficiently significant by reason of historical association or artistic merit to warrant individual recognition but collectively compose an entity or exceptional historical or artistic significance, or outstandingly commemorate or illustrate a way of life or culture; or</p>	<p>Exception 5 A cemetery that derives its primary national significance from graves of persons of transcendent importance, or from an exceptionally distinctive design or an exceptionally significant event; or</p>
<p>Criterion 6 That have yielded or may be likely to yield information of major scientific importance by revealing new cultures, or by shedding light upon periods of occupation of large areas of the United States. Such sites are those which have yielded, or which may reasonably be expected to yield, data affecting</p>	<p>Exception 6 A reconstructed building or ensemble of buildings of extraordinary national significance when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other buildings or structures with the same association have</p>

theories, concepts, and ideas to a major degree.	survived; or
	Exception 7 A property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own national historical significance; or
	Exception 8 A property achieving national significance within the past 50 years if it is of extraordinary national importance.

Only after being designated a National Historic Landmark can a property be nominated to the UNESCO World Heritage Site List. The process of having to nominate a property twice might have been deterrent enough for those interested in nominating astronomy sites, however, there was more.

In 1989 a report on a study of astronomy and astrophysics sites that could be nominated for National Landmark status was published by the National Park Service.²¹ In his report, Butowsky explains a new theme of sites related to astronomy and astrophysics and identified sites that were already on the Register that could be included in the theme. See the following list:

1. Old Observatory, Alabama
2. Harquahala Peak Observatory, Arizona
3. Hale Solar Laboratory, California
4. Chamberlain Observatory, Colorado
5. Georgetown University Astronomical Observatory, District of Columbia
6. Old Naval Observatory, District of Columbia

²¹ Butowsky, H., *Astronomy and astrophysics national historic landmark theme study*, (Washington, DC: Dept. of the Interior, National Park Service, 1989).

7. University of Illinois Astronomical Observatory, Illinois
8. Earlham College Observatory, Indiana
9. McKim Observatory, Indiana
10. Portland Observatory, Maine
11. Gaithersburg Latitude Observatory, Maryland
12. Blue Hill Meteorological Observatory, Massachusetts
13. Harvard College Observatory, Massachusetts
14. Detroit Observatory, Michigan
15. Goodsell Observatory (New Observatory) , Minnesota
16. Barnard Observatory, Mississippi
17. Weston Observatory, New Hampshire
18. Cincinnati Observatory, Ohio
19. Ohio Wesleyan University Student Observatory, Ohio
20. Allegheny Observatory, Pennsylvania
21. Stellafane Observatory, Vermont
22. Reber Radio Telescope, West Virginia
23. Buckstaff Observatory, Wisconsin
24. Washburn Observatory, Wisconsin

Butowsky goes on to propose new sites that he feels are appropriate. In his report are full nomination documents including photographs, maps, references for each of these sites. Those that are not already National Historic Landmarks are listed below:

1. Lick Observatory Building, Lick Observatory, California
2. Crossley 36 inch Reflector, Lick Observatory, California
3. Mount Wilson Observatory, California
4. Palomar Hale 200 inch Reflector, Palomar Observatory, California
5. Palomar Observatory 48 inch Telescope, California
6. Horn Antenna, New Jersey
7. Cincinnati Observatory, Ohio
8. Yerkes Observatory, Wisconsin.

He goes on to list sites that were less than fifty years old at the time and should be considered in the future. These are:

1. Kitt Peak National Observatory, Arizona

2. U.S. Naval Observatory, Arizona
3. National Research Laboratory, Washington, D.C.
4. Sacramento Peak Solar Observatory, New Mexico
5. Kraus Reflector Radio Telescope, Ohio
6. Arecibo Telescope, Puerto Rico
7. National Radio Astronomy Observatory (NRAO), West Virginia

The response to Butowsky's report from the astronomy community was hostile.²² Observatory directors from Palomar and Lick observatories expressed fears that National Historic Landmark status would interfere with their scientific mission and everyday operations of their facilities, such as delaying the installment of new scientific equipment. The astronomy division of the National Science Foundation worked with observatory representatives to push for operating observatories to be exempt from becoming National Historic Landmarks. Their request was considered by the United States House of Representatives resulting in a 1991 report stating that observatories are not exempt from becoming National Historic Landmarks.²³ Of the eight new sites suggested by Butowsky, the Horn Antenna was designated in 1989, and the Cincinnati Observatory in 1997. The astronomers remained resistant and it was this climate that the UNESCO Astronomy & World Heritage initiative had to confront.

When the Initiative was brought to the attention of the American Astronomical Society, they organized a session titled 'Preserving Astronomy's Assets' which took place in 2005 at the Biennial History of Astronomy Workshop at the University of Notre Dame and provided a major impetus for the establishment of the AAS working group (WGPAH). However, since its formation the working group has focused on preserving astronomical data recorded on astronomical photographic plates, the archives of astronomical journals, the papers of prominent astronomers, and not on the Initiative. Currently of the seventeen World Heritage Sites in the United States, no observatories are included and Chaco Canyon is the only list member known to be associated with Native American astronomy.

22 McDonald, K. A., 'Park-Service plan for observatories upsets scientists', in *The Chronicle of Higher Education*, Vol. 36, no. 5, (1989): A8(1).

23 Advisory Council on Historic Preservation, *Balancing Historic Preservation Needs with the Operations of Highly Technical or Scientific Facilities*, (Washington, D.C.: U.S. House of Representatives, 1991), p. 93.

4. Conclusions:

It is not easy for States Parties to evaluate the importance of astronomical heritage. Nor for States Parties to evaluate their benefits in terms of enrichment of the history and science of humanity, the promotion of cultural diversity and the development of exchanges. Taking into account the Global Strategy for a credible, balanced and representative World Heritage List adopted by the World Heritage Committee in 1994, and the broadening concept of World Heritage, resulting in the inscription of new categories of properties to the World Heritage List, the United Nations Educational, Scientific and Cultural Organization's (UNESCO) thematic initiative 'Astronomy & World Heritage' aims to assist State Parties to nominate more properties related to science.²⁴

The new Astronomy & World Heritage Initiative offers the possibility of recognising astronomy heritage in particular, which is considered to be 'universal' and worldwide. This paper shows that Africa, one of the regions that is underrepresented on the World Heritage Site List, has several potential sites under this initiative; thus, not providing proof that the assumptions of the Initiative are sound, but certainly supportive of the goal of adding both diversity and science to the List being attainable.

The UNESCO goal for this initiative is for Nation States to submit to the World Heritage Committee a complete nomination document of a group of properties under the Astronomy & World Heritage initiative by the United Nations Year of Astronomy – 2009. Their original goal was to have new properties inscribed by 2009, but nomination packages would have to have been submitted in 2007 at the latest. The creation and implementation of this initiative has been from the top-down, in that UNESCO staff conceived of the idea, created the database as a means of communication, and have been pushing the Initiative. However, the database is underused, some discussions of the Initiative are occurring in other venues but government officials have yet to be identified to interface with the expert community. Timewise, the nomination processes within Nation States was not taken into account when the 2009 goal was proposed. A good example is the process for a USA property to be nominated: the estimated time needed for a property to be designated a National Historic Landmark is five to ten years, additional time is needed

²⁴ Sidorenko-Dulom, personal communication 2006.

to prepare the UNESCO nomination file, and an additional two years for UNESCO to decide. For the potential sites in the United States, this initiative was dead in the water from the start given the time required and because of the political climate within the astronomy community. Nonetheless, African nations and other Nation States may be better positioned to take advantage of this new initiative which may result in their sites being inscribed long before those in the United States and hopefully by 2009.