The teaching of astronomy in our colleges and high schools often sidesteps the contributions of cultures outside of Europe and the U.S. white mainstream. Few educators (formal or informal) receive much training in this area, and they therefore tend to stick to people and histories they know from their own training -- even when an increasing number of their students or audiences might be from cultures beyond those familiar to them. Luckily, a wealth of material is becoming available to help celebrate the ideas and contributions of non-European cultures regarding our views of the universe.

This listing of resources about cultures and astronomy makes no claim to be comprehensive, but simply consists of some English-language materials that can be used both by educators and their students or audiences. We include published and web-based materials, plus videos and classroom activities. In this edition, we have made a particular effort to enlarge resources about African-American and Hispanic American astronomers. Note that there’s a separate listing about the role of women in astronomy at: http://bit.ly/astronomywomen

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Appendix A. Reports and Articles on Achieving Greater Diversity in Science
Appendix B. Astronomy of Ancient European Cultures
1. General Resources on the Astronomy of Diverse Cultures

Published Materials:

Aveni, Anthony Conversing with the Planets. 1992, Times Books. Celebrates the traditions of many cultures; emphasizes the importance of seeing them in their own context.

Hadingham, Evan Early Man and the Cosmos. 1984, Walker & Co. A clear primer on the subject of ancient sites and the astronomical thinking of ancient cultures around the world.


Walker, Christopher, ed. Astronomy Before the Telescope. 1996, St. Martin’s Press. 17 essays on how people observed and interpreted the sky before modern instruments.

Websites and Articles on the Web:

Ancient Observatories, Timeless Knowledge from the Stanford Solar Center (An introduction to ancient sites where the movements of celestial objects were tracked over the years, with a special focus on tracking the Sun.): http://solar-center.stanford.edu/AO/
Archaeological sites around the world that have a connection to astronomy:
https://en.wikipedia.org/wiki/List_of_archaeoastronomical_sites_by_country
The Center for Archaeoastronomy at the University of Maryland (Good site to learn more about the serious study of the astronomical relics of ancient cultures; some parts for the public, some for professionals in the field): http://www.wam.umd.edu/~tlaloc/archastro/
Cultural Astronomy Web Exhibit (Modules and resources on many cultures that have an astronomical tradition, created with the assistance of Chicago’s Adler Planetarium):
http://ecuip.lib.uchicago.edu/diglib/science/cultural_astronomy/
An Introduction to Archaeoastronomy (Clive Ruggles’ 2003 Introductory Course Notes and Images at the University of Leicester): http://www.le.ac.uk/archaeology/rua/aa/a3015/index.html
Heritage Sites of Astronomy and Archaeoastronomy in the Context of the World Heritage Convention
Solar Folklore from the Stanford Solar Center (Myths and legends about the Sun from cultures around the world): [http://solar-center.stanford.edu/folklore/](http://solar-center.stanford.edu/folklore/)

Traditions of the Sun (The NASA Sun-Earth Connection Education Forum site offers virtual visits to astronomical sites and Chaco Canyon placed in appropriate historical, cultural, and scientific contexts): [http://www.traditionsofthesun.org/](http://www.traditionsofthesun.org/)

### Classroom Activities:


Using Multicultural Dimensions to Teach Astronomy (newsletter issue by Nalini Chandra and John Percy): [https://astrosociety.org/file_download/inline/36747e3e-0e51-40cc-83d7-0254e46f804a](https://astrosociety.org/file_download/inline/36747e3e-0e51-40cc-83d7-0254e46f804a)

Activities from the Unit “Ancient Observatories”: [http://www.planetarium-activities.org/shows/naa](http://www.planetarium-activities.org/shows/naa)


### Some Technical Volumes:


Batten, Alan, ed. *Astronomy for Developing Countries*. 2001, International Astronomical Union. Published by the Astronomical Society of the Pacific. Describes the many challenges of starting or continuing astronomy programs in countries without an extensive science infrastructure.


### 2. Astronomy of African-American Cultures

#### Published Materials:


**Websites and Articles on the Web:**


Aomawa Shields (U of California Irvine) has started an organization called *Rising Stargirls* to encourage girls of all color and backgrounds to learn science through astronomy:  http://www.risingstargirls.org/

Derrick Pitts: Chief Astronomers, Franklin Institution (interview):  https://solarsystem.nasa.gov/people/1380/derrick-pitts/ Also see:  http://www.myblackhistory.net/Derrick_Pitts.htm


Follow the Drinking Gourd Website:  http://www.followthedrinkinggourd.org/ An amateur music scholar has researched the history of the song about the Big Dipper and its use by escaping slaves and presents his work here. See especially, his teachers’ guide at:  http://www.followthedrinkinggourd.org/Appendix_Teachers_Guide.htm


Greene, N. “African-Americans in Astronomy and Space (a concise guide with links to brief biographies of each):  http://space.about.com/od/astronomyspacehistory/tp/Black_History_Month.htm


Interview with Derrick Pitts (Chief Astronomer at the Franklin Institute):  https://solarsystem.nasa.gov/people/1380/derrick-pitts/ (See also this story about him:  https://whyv.org/articles/franklin-institutes-derrick-pitts-visibility-matters-especially-in-science/ )


Moore, Christopher: Interview with him when he won the Beth Brown Memorial Award:  http://astronomyincolor.blogspot.com/2016/03/student-highlight-christopher-moore.html

Profile of Dr. Beth Brown:  https://www.youtube.com/watch?v=KIJMVDjF6dk

Profiles of black astronomers on the *History Makers* website:

Gibor Basri:  http://www.thehistorymakers.com/biography/gibor-basri-41
George Carruthers: http://www.thehistorymakers.com/biography/george-carruthers-41
William Jackson: http://www.thehistorymakers.com/biography/william-jackson
Derrick Pitts: http://www.thehistorymakers.com/biography/derrick-pitts


Tyson, Neil deGrasse: 2004 Interview on the PBS NOVA website, covering not only astronomy but his development as a scientist and facing racism: http://www.pbs.org/wgbh/nova/conversation-with-neil-tyson.html


Touching NY Times story about India Jackson, who couldn’t afford the travel for her NASA internship and was funded through the Web: https://www.nytimes.com/2019/05/15/us/nasa-internship-single-mom-gofundme.html

Profile of and Interview with Ashley Walker at Scientific American: https://www.scientificamerican.com/article/black-astronomers-highlight-achievements-and-obstacles/

Walker, Ashley: Black Astronomers You Should Know (A Twitter thread featuring introductions to 53 young black scientists in fields related to astronomy): https://twitter.com/i/events/1101571329592119297

Who are the Black Astronomers? (website with links): http://www.math.buffalo.edu/mad/physics/astronomy-peeps.html

Committee on the Status of Minorities (AAS) Web site: http://csma.aas.org/ Discussions of and resources about minority issues in the training of professional astronomers in the U.S. See, in particular, their very useful blog: http://astronomyincolor.blogspot.com/

The National Association of Black Physicists has a blog called “Vector” and you can isolate just those posts that are connected with astronomy at: http://vector.nsbp.org/category/astronomy-and-astrophysics-astro/

Astrobites: How can we support black astronomers (June 2020): https://astrobites.org/2020/06/03/how-can-we-support-black-astronomers/

Videos:

Aomawa Shields’ 2015 TED Talk on Finding Other Planets: https://www.ted.com/talks/aomawa_shields_how_we_ll_find_life_on_other_planets

Dara Norman’s moving talk at the June 2020 American Astronomical Society meeting on “The Inclusion Revolution”: https://www.youtube.com/watch?v=rQDzeDuCLLs

George Carruthers’ Career on Everyday Black History: https://www.youtube.com/watch?v=7NK0aVLMxJE (Also see David DeVorkin’s detailed talk on his life and work at: https://www.youtube.com/watch?v=RPqsTD0w0vk)

Hubble’s Diverse Universe (a video about the research of African-American and Hispanic-American astronomers & astrophysicists) [1 hr. 52 min]: Order at https://www.amazon.com/Hubbles-Diverse-Universe/dp/B07843QN6W

Louise Edwards on “Everybody Has a Story”: https://www.youtube.com/watch?v=CGxR-lkVis

Science Stories: Brief Interview with Derrick Pitts: https://www.fi.edu/science-stories/derrick-pitts

Reaching to the Stars: African American Astronomers (in celebration of Black History Month in 2011,
Swarthmore hosted three African-American scientists: Derrick Pitts (Fels Planetarium), Eric Wilcott (U. of Wisconsin) and astronaut Mae Jemison, discussing the future of the field. [90 min]:
http://www.youtube.com/watch?v=q8I3bU68Gw

A Story about Race (Neil deGrasse Tyson reflects on cultural issues that arose during his college and graduate years) [12 min]: https://www.youtube.com/watch?v=eQLtPWPqsjA [Also see his interview with life advice on the program Impact Theory: https://www.youtube.com/watch?v=JtahB1-MNvk ]

Neil deGrasse Tyson on the nature of science and science denial: https://www.youtube.com/watch?v=XxpOyNDudPA
Hakeem Olusey: “Star Search,” an autobiographical talk at the Chicago Humanities Festival in 2014 [56 min]: https://www.youtube.com/watch?v=GRhgNw1siUo
Jarita Holbrook’s TED talk on cultural astronomy & religion: https://www.youtube.com/watch?v=tWEsrhV6wI
Profile of Dr. Beth Brown: https://www.youtube.com/watch?v=KfJMVDjIf6dk
Profile of astronomer and professor Jason Best (2011) on Mountain State Science: https://www.youtube.com/watch?v=jQ992p9G7hA
Interview (2019) with Moiya McTier, a graduate student at Columbia, focusing on her life and career: https://www.youtube.com/watch?v=IKK0FovJ3Dc (See also her poignant interview on Shades of the U.S.: https://www.youtube.com/watch?v=FSS8VOrrQFE (it starts 26 minutes into the video)).

3. Astronomy of Hispanic-American Cultures

Website and Articles on the Web

France Cordova: My Hero Project: (includes biographical information and interview):
Jose Francisco Salgado: profile of the astronomer and educator, born in Puerto Rico:
http://nbclatino.com/2012/07/03/an-astronomer-who-urges-not-to-have-limits/
Profile and Interview of Enrico Ramirez-Ruiz (at the U. of California Santa Cruz):
Lawrence, Star “Hispanic Astrophysicist and Educator Boosts Women in Science” (a 2005 profile of Tania Ruiz):
http://sciencecareers.scienmag.org/career_magazine/previous_issues/articles/2005_03_04/nodid.3021632384592204282
Ramon Lopez (autobiographical page): https://www.sacnas.org/team-details/ramon-e-lopez-phd/ (see also his Wikipedia page: https://en.wikipedia.org/wiki/Ram%C3%B3n_E._L%C3%B3pez)
Sokol, J. “Why the Universe Needs More Black and Latino Astronomers” (from the Smithsonian):
Article about the Bridge Program that Mexican-American astronomer Keivan Stassun is leading to increase the number of Latino PhDs: http://nbclatino.com/2012/07/24/vanderbilt-university-program-bridges-latinos-to-phd-degrees/
Astrophysics Circle of Puerto Rico (highlights the life and work of a number of Puerto Rican astronomers): http://astrocircle.org/
Rivera-Valentin, Edgard & Zambrano-Marín, Luisa “Celebrating Hispanic Heritage: The Arecibo Observatory Space Academy” (on the lack of Latino scientists and a project to interest kids in Puerto Rico in space science): http://womeninastronomy.blogspot.com/2016/10/celebrating-national-hispanic-heritage.html
Spanish and Hispanic Astronomers:

**Videos**

France Cordova: Video Interview about her career: [https://www.youtube.com/watch?v=_0eHAIh2o0Q](https://www.youtube.com/watch?v=_0eHAIh2o0Q)


Enrico Ramirez-Ruiz TED Talk on “Your Body was Forged in the Spectacular Deaths of Stars” (2019): [https://www.youtube.com/watch?v=7QPgarhiWg](https://www.youtube.com/watch?v=7QPgarhiWg)

Hubble’s Diverse Universe (a video about the research of African-American and Hispanic-American astronomers & astrophysicists) [1 hr. 52 min]: Order at [https://www.amazon.com/Hubbles-Diverse-Universe/dp/B07843QN6W](https://www.amazon.com/Hubbles-Diverse-Universe/dp/B07843QN6W)

Interview with astronomer Bryan Mendez about diversity in the movies and inspiration to become a scientist: [https://www.youtube.com/watch?v=Qeivn3b05fk](https://www.youtube.com/watch?v=Qeivn3b05fk)

Jose Hernandez: A Latino Astronaut’s Journey to Space (Interview): [https://www.youtube.com/watch?v=yOz32hpCcjo](https://www.youtube.com/watch?v=yOz32hpCcjo)

Keivan Stassun (Vanderbilt U) interview: [https://www.youtube.com/watch?v=XRTwK5jggIs](https://www.youtube.com/watch?v=XRTwK5jggIs) (See also the 6-minute profile of him at: [https://www.youtube.com/watch?v=ECRpvNIGggI](https://www.youtube.com/watch?v=ECRpvNIGggI))

Nicole Cabrera Salazar’s 2015 TED Talk: The Future of STEM Depends on Diversity: [https://www.youtube.com/watch?v=-v8aDo4dV3Q](https://www.youtube.com/watch?v=-v8aDo4dV3Q)

NOVA 2018 Interview with astronomer Antonio Paris: [https://www.youtube.com/watch?v=VYJAhyCm1TM](https://www.youtube.com/watch?v=VYJAhyCm1TM)

Partnering with Latino Audiences for the 2017 Eclipse and Beyond (A Night Sky Network webinar with Latino scientists and educators): [https://www.youtube.com/watch?v=U0hiOvJmoD0](https://www.youtube.com/watch?v=U0hiOvJmoD0)

Women in Science and Tech: Interview with astronomer Isabel Hawkins: [https://www.youtube.com/watch?v=NVoRTEFSN_g](https://www.youtube.com/watch?v=NVoRTEFSN_g) (See also this short video on how she chose astronomy as a career: [https://www.youtube.com/watch?v=7lNuYf9Ccdw](https://www.youtube.com/watch?v=7lNuYf9Ccdw))

4. **Astronomy of Native North American Cultures**

*Published Materials:*


Carlson, J. “America’s Ancient Skywatchers” in *National Geographic*, vol. 177, #3, Mar 1990, p. 76.


Krupp, E. “Whiter Shade of Pale” in *Sky & Telescope*, July 2000, p. 86. A rock that looks like the Milky Way and was used in ceremonies by Native Americans in California.

interpretations of the aurora.


Maryboy, Nancy & David Begay *Sharing the Skies: Navajo and Western Cosmos*. 2006, Indigenous Education Institute & World Hope Foundation (available from Amazon.com). An authoritative compilation by Navajo and Western astronomers of illustrations, stories, and observations of Navajo constellations coupled with stories from corresponding Greek constellations and Hubble Space Telescope images of objects found in that part of the sky. This is a kit that includes an audio CD, a small poster of the Diné Universe, and learning activities.

Maryboy, Nancy & David Begay *Sharing the Skies: Navajo and Western Cosmos*. 2006, Indigenous Education Institute & World Hope Foundation (available from Amazon.com). An authoritative compilation by Navajo and Western astronomers of illustrations, stories, and observations of Navajo constellations coupled with stories from corresponding Greek constellations and Hubble Space Telescope images of objects found in that part of the sky. This is a kit that includes an audio CD, a small poster of the Diné Universe, and learning activities.


**Websites and Articles on the Web:**

Aboriginal Star Knowledge: Native American Astronomy: [http://www.kstrom.net/isk/stars/starmenu.html](http://www.kstrom.net/isk/stars/starmenu.html)


Astronomy and Mythology in Native American Culture: [https://www.legendsofamerica.com/na-astronomyculture/](https://www.legendsofamerica.com/na-astronomyculture/)

Exploratorium Chaco Canyon Site: [http://www.exploratorium.edu/chaco/index.html](http://www.exploratorium.edu/chaco/index.html)

Garmany, Catharine Resources for Astronomy Outreach Providers and Teachers of Native Americans (helpful ideas and materials, from the National Optical Astronomy Observatories): [http://www.noao.edu/education/nativeamerican/](http://www.noao.edu/education/nativeamerican/)


Solar Astronomy in the Pre-historic Southwest (P. Charbonneau, et al): [https://www2.hao.ucar.edu/Education/SolarAstronomy](https://www2.hao.ucar.edu/Education/SolarAstronomy)

Star Map and Sky Lore of the Ojibwe Native American People (compiled by Annette Lee): [http://web.stcloudstate.edu/aslee/OJIBWEMAP/home.html](http://web.stcloudstate.edu/aslee/OJIBWEMAP/home.html) (Note: sometimes in the US the Ojibwe were referred to as Chippewa.)

**Videos:**

Animated story of “Coyote and Eagle Steal the Sun and Moon” (from Zuni tradition) [~2 min]: [http://www.youtube.com/watch?v=EwyVDadt7QE](http://www.youtube.com/watch?v=EwyVDadt7QE)

Annette Lee (a Native American astronomer discusses her personal development and work in the astronomy of native cultures in this brief video; hers is not the first one you come to, but just go down the page): [http://www.northstarstem.org/about](http://www.northstarstem.org/about)

“Grandmother Spider Brings the Sun to the Earth” (from the Cherokee tradition, told by Elaine Cohen)
[~9 min]: http://www.youtube.com/watch?v=rBNGL9uLCI  (A shorter version is at: http://www.youtube.com/watch?v=rbTkP0gbNGQ )
NASA Connect: Indigenous Astronomers (a segment of NASA Connect’s Ancient Observatories episode follows Native American educators Nancy Maryboy and David Begay as they show examples of structures used to track the sun in the sky) [~7 min]: http://archive.org/details/NasaConnect-Ao-IndigenousAstronomers

**Classroom Activities:**

Ancient Eyes Looked to the Skies: Sunwatchers of the Southwest (Activities in Archaeoastronomy for the Classroom, Grades 4-8, from the Chabot Science Center): http://multiverse.ssl.berkeley.edu/Portals/0/CalendarInTheSky/Resources/Lesson%20Plans/SunwatchersOfTheSouthwest.pdf


### 5. Astronomy of African Cultures

**Published Materials:**


**Websites and Articles on the Web:**

The Dogon Tribe and the so-called “Sirius Mystery”: http://www.ramtops.co.uk/dogon.html and http://chandra.harvard.edu/chronicle/0400/sirius_part2.html


Urama, J., and Holbrook, J. “The African Cultural Astronomy Project” from the IAU, 2009: https://www.cambridge.org/core/services/aop-cambridge-core/content/view/S1743921311002134


**Videos:**

Ancient Astronomers of Timbuktu (a video to preserve the papers and knowledge of this Saharan city.) See it at: https://www.reelhouse.org/doggedfilms/the-ancient-astronomers-of-timbuktu

Classroom Activities:

Lawrence Hall of Science African Mythology Curriculum Guide (although originally developed for the STARLAB portable planetarium, some of these activities can be adapted for classroom use): https://www.raritanval.edu/sites/default/files/aa_PDF%20Files/6.x%20Community%20Resources/6.4_5_SD.7.AfricanMythology.pdf

6. Astronomy of Islamic Cultures

Published Materials:

Ahmad, I. & Khalid Shaukat, S. “Muslim Moon Sightings” in Mercury (the magazine of the Astronomical Society of the Pacific), May/June 1995, p. 38. The Muslim calendar and sighting the first crescent moon.


Web Sites and Web Articles:

Arab and Islamic Astronomy (Leslie Welser): http://www.starteachastronomy.com/arab.html


The Role of Astronomy in Islam (Dr. Shirin Haque-Copilah): http://moonsighting.com/articles/roleofislam.html


The Islamic Calendar: http://www.webexhibits.org/calendars/calendar-islamic.html or https://www.timeanddate.com/calendar/islamic-calendar.html


Predicting the First Visibility of a Lunar Crescent Site (not specifically about Islamic astronomy, but more about the techniques and practice of sighting the crucial astronomical signal of a month’s beginning for the Islamic calendar; some of these are a bit technical): http://www.staff.science.uu.nl/~gent0113/islam/islam_lunvis.htm Also see https://moonsighting.com/ and http://www.icoproject.org/?&l=en (scroll down)

Shuttleworth, Martyn: Islamic Astronomy: https://explorable.com/islamic-astronomy

UNESCO: “Islamic Astronomy” (part of the Portal to the Heritage of Astronomy Site): http://www2.astronomicalheritage.net/index.php/show-theme?idtheme=15

Peter Ifland: The History of the Sextant (in which Arabic astronomers played a major role):
Video:

Video of a talk by Dr. George Saliba on the role of Arabic/Islamic astronomy in medieval and Renaissance culture (1 hr. 25 min): [http://www.youtube.com/watch?v=ZsJ4Zrf8miA](http://www.youtube.com/watch?v=ZsJ4Zrf8miA)

Great Astronomers from the Medieval Islamic World (with physicist Jim Al-Khalili): [https://www.youtube.com/watch?v=i6lDhRW3R2Y](https://www.youtube.com/watch?v=i6lDhRW3R2Y)

Islamic Contributions to Astronomy and Navigation (13 min): [https://www.youtube.com/watch?v=r-T5yxZWXzs](https://www.youtube.com/watch?v=r-T5yxZWXzs)

Latest Cosmic Discoveries and the State of Arab Astronomy by Prof. Nidhal Gessoum (the discussion of the state of Arab astronomy starts 40 min in): [https://www.youtube.com/watch?v=9oRglJN1Wdw](https://www.youtube.com/watch?v=9oRglJN1Wdw)

7. Astronomy of Central and South American Cultures

Published Materials:


Aveni, Anthony *Skywatchers*. 2001, U. of Texas Press. An updated version of Skywatchers of Ancient Mexico, this is an introduction to the astronomy of the Maya.


(See also some of the books by Aveni in section 1 of this guide.)


Van Stone, Mark *Science and Prophecy of the Ancient Maya*. This self-published book by a Maya expert addressed the issue of whether the Maya predicted Doomsday in 2012, but also has material on their astronomical and calendar systems, See: [http://markvanstone.com/books/](http://markvanstone.com/books/)

Websites and Articles on the Web:


Maya Exploration Center (Dr. Edwin Barnhart): [http://www.mayaexploration.org/](http://www.mayaexploration.org/) Includes tours of sites, resources, interviews, etc.

Calendar in the Sky (connects Maya knowledge to modern astronomy; produced by the education group at the Berkeley Space Sciences Lab): [http://multiverse.ssl.berkeley.edu/CalendarInTheSky](http://multiverse.ssl.berkeley.edu/CalendarInTheSky)


Looking at the Sky through the Eyes of the Inca (if you can ignore the tour sales pitch, there is good information here): [https://www.peruforless.com/blog/ancient-astronomy-looking-sky-eyes-inca/](https://www.peruforless.com/blog/ancient-astronomy-looking-sky-eyes-inca/)

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Malville, J. McKim: The Astronomy of the Inca Royal Estates in the Sacred Valley (Peru):  
https://www.academia.edu/27481227/Astronomy_of_Inca_Royal_Estates_I_The_Sacred_Valley

“Tales of Wandering Stars” (A tale from Inca Mythology, about the planets, by Germán Puerta Restrepo):  
http://unawe.org/resources/education/tales_of_the_wandering_star_eng/

The Birth of Venus (A traditional Aztec story, by Marcos Carías):  
http://unawe.org/resources/education/birth_of_venus_eng/

Traditions of the Sun: Explore the World’s Ancient Observatories (includes tours of Maya sites and traditions):  
http://www.traditionsofthesun.org/

Video:

Anthony Aveni on “The End of Time” at Marlboro College (on the Mayan calendar and why the world will not end in 2012; delivered 9/13/2010; 1 hr 2 min):  
http://www.youtube.com/watch?v=exQGTvZ5aKw

Maya Astronomy and Mathematics (from NASA Connect, with Sten Odenwald) [8 min]:  
http://www.youtube.com/watch?v=5W9gFwBQb6c

History Channels’ Where Did it Come From on Mayan Astronomy (starts at Kitt Peak and then moves to Central America; features interviews with Anthony Aveni and others):  
https://www.youtube.com/watch?v=r7VATSg0ag

“Why We Will Still Be Here on Dec. 21 [2012]” (a panel on the predictions of Doomsday 2012, with information on the Maya calendar by E.C. Krupp; recorded in 2012 at the SETI Institute):  
http://www.youtube.com/watch?v=WA5FC0in6U8

The Secrets of the Incas (with William Sullivan, a sometimes controversial scholar who has devoted his career to understanding the Incas in terms of their astronomy and cosmology):  
https://www.youtube.com/watch?v=dbk5xDyPp6k (part 1)

Classroom Activities:

Calendar in the Sky Lesson Plans:  
http://multiverse.ssl.berkeley.edu/Calendar-in-the-Sky/Lesson-Plans

Activity from NOVA to figure out your birthday in the Maya calendar (if you were born 1980 or after):  

8. Astronomy of Hawaiian, Polynesian, and Native Australian Cultures

Published Materials:


Kyselka, Will & Ray Lanterman North Star to Southern Cross. 1976, University of Hawai’i Press. A geologist and planetarium educator recounts how he became part of the project to rediscover the ancient art of navigating by the stars and a voyage to see how it was done.

Makemson, Maud The Morning Star Rises: An Account of Polynesian Astronomy. 1941, Yale University Press.

Norris, Ray & Cilia Emu Dreaming: An Introduction to Australian Aboriginal Astronomy. 2014, brief

**Websites and Articles on the Web:**


Guide to Aboriginal Astronomy (brief, from *Australian Geographic*):

Johnson, Rubellite “Hawaiian Astronomy” (chapter from the *History of Science... in Non-western Cultures*):
[http://www.hawaiifreepress.com/Portals/0/Article%20Attachments/Astronomy%20in%20Hawaii%20RKJ.pdf](http://www.hawaiifreepress.com/Portals/0/Article%20Attachments/Astronomy%20in%20Hawaii%20RKJ.pdf)

Kamāi, B.: Resources for Discussion of the Controversy about Putting the Thirty-meter Telescope on Mauna Kea: [https://drive.google.com/file/d/1bk39SuN8RBhhdDgjeHACILg629c8AKav/view](https://drive.google.com/file/d/1bk39SuN8RBhhdDgjeHACILg629c8AKav/view)


Society for Maori Astronomy Research and Traditions: [https://www.maoriastronomy.co.nz/](https://www.maoriastronomy.co.nz/)

Maori Lunar Calendar: [http://www.pixieplots.co.nz/Maori-Lunar-Calendar](http://www.pixieplots.co.nz/Maori-Lunar-Calendar)


Never Lost: Web Pages on Polynesian Navigation from the Exploratorium: [http://annex.exploratorium.edu/neverlost/#/home](http://annex.exploratorium.edu/neverlost/#/home)

Polynesian Voyaging Society (tries to keep the tradition of navigating by the stars alive; has profile of the people who have duplicated some of the ancient voyages, navigating by the stars): [http://www.hokulea.com/](http://www.hokulea.com/)

Steiger, Walter “Origins of Astronomy in Hawaii”:
[https://www.ifa.hawaii.edu/users/steiger/introduction.html](https://www.ifa.hawaii.edu/users/steiger/introduction.html)

Website to accompany the PBS documentary *Wayfinders: A Pacific Odyssey*:
[https://www.pbs.org/wayfinders/index.html](https://www.pbs.org/wayfinders/index.html)


**Videos:**

Polynesian Wayfinders (a nice introduction to the ancient voyages and navigation by the stars) [10 min]: [https://www.youtube.com/watch?v=_1ibG0Fj7oE](https://www.youtube.com/watch?v=_1ibG0Fj7oE)

The Light at the Edge of the World: Polynesian Wayfarers (a *National Geographic* video): [https://www.youtube.com/watch?v=DWp5MiIVR1k](https://www.youtube.com/watch?v=DWp5MiIVR1k)

Australian Indigenous Astronomy (10 min introduction): [https://www.youtube.com/watch?v=kkj0hCKOCE](https://www.youtube.com/watch?v=kkj0hCKOCE) (a full lecture on the topic is at: [https://www.youtube.com/watch?v=JCho0SHKcU](https://www.youtube.com/watch?v=JCho0SHKcU))

Report on the PBS News Hour on the clash between building telescopes and native claims on Mauna Kea in Hawaii (9 min; 2016): [https://www.youtube.com/watch?v=onERw0-ixLA](https://www.youtube.com/watch?v=onERw0-ixLA)

**Classroom Materials:**


Hawaiian Voyaging Society classroom activities in many areas:
9. Astronomy of Asian Cultures (A Sampling)

Published Materials:


Pankenier, David Astrology and Cosmology in Early China: Conforming Earth to Heaven. 2013. Cambridge University Press. Shows how astronomy profoundly influenced every aspect of culture in the formative period, from art and architecture, to city planning, to political and military decision-making.


Peng, Eric “China’s Race to Study the Cosmos” in Astronomy, Mar. 2013, p. 44. Modern astronomical instruments China plans to build and projects it is joining with other countries to do.


Sun, Xiaochun and Jacob Kistemaker The Chinese Sky During the Han: Constellating Stars and Society. 1997, Brill. Reconstructs the appearance and understanding of the sky in Han time (206 BC – AD 220). Technical in parts (chapter on the dating of positional observations) but excellent introduction to the history of mapping the sky in China (and East Asia).


Websites and Articles on the Web:

History of Chinese Astronomy: [http://idp.bl.uk/4DCGI/education/astronomy/history.html](http://idp.bl.uk/4DCGI/education/astronomy/history.html) (click on the next pages for more)


Copernicus in China (on the spread of Copernican ideas by Nathan Sivin of the University of Pennsylvania): [http://ccat.sas.upenn.edu/~nsivin/cop.pdf](http://ccat.sas.upenn.edu/~nsivin/cop.pdf)

The Lunar Calendar in Japan: [http://www.renshaworks.com/jastro/calendar.htm](http://www.renshaworks.com/jastro/calendar.htm)

Nha, I.-S. “Korean Astronomy” from a 1997 volume in the *ASP Conference Series*:
[http://adsabs.harvard.edu/full/1997ASPC..130..313N](http://adsabs.harvard.edu/full/1997ASPC..130..313N)

Bibliography of Korean Astronomy: [http://www.hawaii.edu/korea/biblio/sci_astronomy.html](http://www.hawaii.edu/korea/biblio/sci_astronomy.html) (This is a nice list of articles, but mostly in scholarly journals.)


Aspects of Prehistoric Astronomy in India (a somewhat technical article by N.K. Rao):
[http://bulletin.astron-soc.in/05December/3305499-511.pdf](http://bulletin.astron-soc.in/05December/3305499-511.pdf)


Chandrasekhar, S.: Obituary by W. McCrea:
[http://articles.adsabs.harvard.edu//full/1996Obs...116..121M/0000122.000.html](http://articles.adsabs.harvard.edu//full/1996Obs...116..121M/0000122.000.html) (See also his biographical essay at the Nobel Prize site:

Hayashi, Chushiro: Obituary in *Astronomy & Geophysics*:


Luu, Jane: Biography and Autobiography at the time of winning the 2012 Shaw Prize:
[https://www.shawprize.org/laureates/astronomy/2012](https://www.shawprize.org/laureates/astronomy/2012)

Ma, Chung-Pei: Discussion of Supermassive Black Holes on the BBC Newshour:
[https://www.bbc.co.uk/programmes/p03qbn75](https://www.bbc.co.uk/programmes/p03qbn75)

Saeko, Hayashi: Three Decades of Pushing the Limits (story about her life and work):

Shu, Frank: Biography and Autobiography at the time of winning the 2009 Shaw Prize:

Videos:

Brief Explanation of Ancient Chinese Astronomy (6 min): [https://www.youtube.com/watch?v=2u-6fIg8DvU](https://www.youtube.com/watch?v=2u-6fIg8DvU)

Conversation with Prof RN Iyengar : Ancient indian astronomy and engineering (Recorded July 2017): [https://www.youtube.com/watch?v=UeaXs1O9qGw](https://www.youtube.com/watch?v=UeaXs1O9qGw)

*The Science of Heaven* (49-min, 2017 documentary on astronomy in China from early days through today; in Chinese with English subtitles:
[http://english.cas.cn/bcas/2012_4/201411/P0201411215315393572.pdf](http://english.cas.cn/bcas/2012_4/201411/P0201411215315393572.pdf)

Chung-Pei Ma Talk on Monster Black Holes: [https://www.youtube.com/watch?v=LN9oYiNKBm8&t=6s](https://www.youtube.com/watch?v=LN9oYiNKBm8&t=6s)

Five (Autobiographical) Questions with Frank Shu: [https://www.youtube.com/watch?v=sor4Cx071A8](https://www.youtube.com/watch?v=sor4Cx071A8)

Jane Luu Shaw Prize Lecture on Discovering the Kuiper Belt (starts 10 min in):
[https://www.youtube.com/watch?v=l0rGulPvDFU](https://www.youtube.com/watch?v=l0rGulPvDFU)

Edupedia World: Greatest Scientists of the 20th Century: S. Chandrasekhar (6 min biography):
[https://www.youtube.com/watch?v=9f31wI6fClo](https://www.youtube.com/watch?v=9f31wI6fClo)

Appendix A: Reports and Articles on Achieving Greater Diversity in Astronomy (and Science in General)

Final Report of the 2018 AAS Task Force on Diversity and Inclusion in Astronomy Graduate Education:
[https://aasarchives.blob.core.windows.net/files/aas_diversity_and_inclusion_task_force_final_report.pdf](https://aasarchives.blob.core.windows.net/files/aas_diversity_and_inclusion_task_force_final_report.pdf)


Inclusive Astronomy Conference 2015 Recommendations: https://docs.google.com/document/d/1JipEb7xz7kAh8SH4wsG59CHEaAJSJTAWRIVA1MfYGM8/edit


Lee, Okhee & Buxton, Cory Diversity and Equity in Science Education: Research, Policy, and Practice. 2010, Teacher’s College Press.


Norman, Dara “Can Big Data Lead to an Inclusion Revolution” in Astronomy Beat, July 2018: https://astrosociety.org/file_download/inline/12fa89-b5f4-4e59-aa62-ce7ad5add47c


Sakimoto, Phil & Rosendhal, Jeff “Obliterating Myths about Minority Institutions” in Physics Today, vol. 98, #9, pp. 49-53 (September 2005). The authors, formerly the heads of NASA’s space science education and public outreach program, offer some frank comments about the task of developing space science programs at minority colleges and universities.

Stassun, Keivan Building Bridges to Diversity” in Mercury, May/June 2005, p. 20. The Chair of the Committee on the Status on Minorities in Astronomy for the American Astronomical Society discusses what could be done to increase the number of minority astronomers.


Appendix B: Astronomy of Ancient European Cultures

Selected Published Materials:

Burl, Aubrey The Stone Circles of Britain, Ireland, and Brittany. 2000, Yale University Press. Detailed guide to Stonehenge and other ancient stone monuments.

Cunningham, Clifford “The Scottish Moon” in Mercury (the magazine of the Astronomical Society of the Pacific), Jul/Aug. 2006, p. 10. On the Callanish stones off the coast of Scotland their alignments with the motion of the Moon in the sky.

Gingerich, Owen “The Basic Astronomy of Stonehenge” in The Great Copernicus Chase. 1992, Cambridge U. Press. Uses a wonderful Coca-Cola can model to explain how the builders thought of the sky.


In addition, see appropriate sections of many of the books suggested in section 1 of this Guide.

Selected Websites and Articles on the Web:

Archaeoastronomy at Stonehenge: http://witcombe.sbc.edu/sacredplaces/stonehenge.html (an art historian examines Stonehenge from many perspectives, including the astronomical)

Stone Pages: http://www.stonepages.com/ (Mammoth web catalog about European stone circles and monuments, including Stonehenge and others with astronomy connections.)

News report on a pre-Stonehenge megalith that is astronomically aligned (2016): https://astronomynow.com/2016/08/19/britains-pre-stonehenge-megaliths-were-aligned-by-astronomers/

D. Heggie: Highlights and Problems in Megalithic Astronomy (1981 review article): http://adsabs.harvard.edu/full/1981JHAS...12...17H

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