


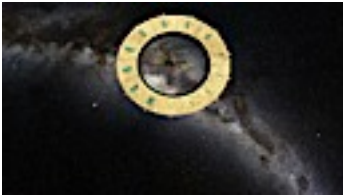
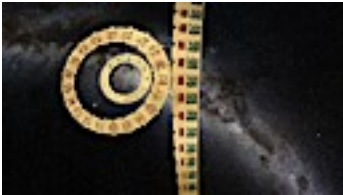
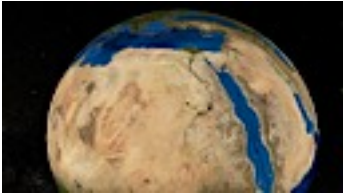















FATE OF THE MAYA







VERSION (SUBTITLES)








REVISED: SEPTEMBER 2, 2013






SCENE	TIME	SCRIPT
INTRO		INTRODUCTION
	00:13	After steamrolling over Jamaica, Hurricane Gilbert churned westward toward Yucatan, homeland of the Maya. On September 14, 1988, this force 5 monster crashed ashore with a storm surge over two stories high, leaving widespread flooding, 200 dead, and more than 60,000 homes destroyed in its wake. Maya astronomers used the stars to predict these storms which brought fear as well as the promise of rain, and perhaps even clues about the fate of the Maya.
	00:54	One of the surviving Maya books, the Dresden Codex, contains tables Maya astronomers use to predict the year's life giving rains. On the last page, a cosmic monster gushes water from its mouth and from sky glyphs on its body. Did the appearance of sky gods determine the future of the Maya?
CREDITS		OPENING CREDITS
	01:22	FATE OF THE MAYA Justin Tomillo, Steve Cooper, Shai Fishman, Julie Amato
	01:40	To record the passage of time, the Maya developed a 260-day ritual cycle, made up of thirteen numbers and twenty names. The Maya kept a second 365 day solar calendar of 18 months, each lasting 20 days, plus 5 extra days to complete the year. This calendar determined the growing season and the annual return of the rains. The Maya combined these two cycles to create a calendar round, lasting 52 solar years.
	02:14	Using these calendars, the Maya recorded dates in books and on markers and buildings such as the Temple of Inscriptions in Palenque. Spanning three tablets, this is the largest classic Maya inscriptions. These glyphs indicate specific dates and cover thousands of years, using a third calendar called the Long Count. All Maya kept the same ritual, solar and long count calendars, using them to describe the past and foretell the future.
	02:48	Civilizations around the world grew around rivers. The Nile river in Egypt, the Tigris and Euphrates rivers in Mesopotamia, the Indus river in India, and the Yellow river in China. All of these great civilizations lie along rivers with access to other advanced cultures. Unlike these, the Maya cities of the Yucatan peninsula reached greatness in relative isolation. In a tropical climate with no large rivers, a land that depended on annual rains for water, classic Maya

		cities like Caracol created cisterns to store water, and developed writing, mathematics and astronomy, to measure the passage of time, and to predict seasonal rains.
	03:39	The homeland of the Maya stretches from Caracol in Belize, northward through Yucatan. Here, other great cities, Uxmal, Chichen Itza, Tikal and Palenque, have buildings designed as observatories where astronomers used the sky to predict the future. 500 years before the Spanish arrived, these Maya cities collapsed, to understand why, we must know how the Maya thrived. and what futures they could not predict.
		UXMAL
	04:11	Our story begins in the parched city of Uxmal at the end of the dry season. Here much of the porous land drains without forming rivers. Natural lakes are rare. For survival, the Maya created great urban centers like Uxmal to store rainwater through the dry season. These cities grew in a rainforest that had never fed so many before. Water became the currency of power, always accompanied by the threat of thirst and famine when the rains failed and the city's great cisterns ran dry.
	04:52	<i>Our city's underground cisterns are almost empty and our fields are ready for rain. Chaac, god of lightning and rain, give us a sign! Your masks cover our buildings: now, we need your rain! Today the afternoon Sun shines on the steps of my great pyramid. Chaac is speaking to me. I must climb these steps to his temple on top of the pyramid, facing the setting Sun. Afternoon shadows climb up the pyramid. Finally the Sun's light enters Chaac's temple. This is the sign! In two 20-day months, the Sun will stand overhead at noon and the rains will come. Until then, I must ration our dwindling supplies of water. Chaac has spoken!</i>
	05:57	<i>Omens of danger appear in the heavens whenever a disaster lurks in our future. Every night I watch stars circling that star - especially the pattern of a cupped hand. When this hand is on the horizon at sunset, the sky gods will no longer protect us from fierce storms bringing floods, and perhaps death.</i>
		CHICHEN ITZA
	06:26	East of Uxmal lies the city of Chichen Itza, once home to over 35,000 people. Here powerful astronomers watched the heavens to set calendar dates for the coming rains and for human sacrifices to honor the sky gods. Natural sinkholes with fresh water, called cenotes, attracted the Maya to this area. A cenote forms when the roof of an under-ground river collapses.
	06:55	The El Castillo pyramid dominates Chichen Itza's main plaza. It is a temple to the feathered serpent god Kukulcan, whose head adorns the bases of the staircase balustrades. Using the steps of this pyramid, the Maya could count all the days of their solar calendar. Each of its 4 staircases has 91 steps, for 364 steps in all, with a top step into the temple - one step for each day of the year.

	07:40	According to legend, Kukulcan returns to his pyramid each spring, descending the staircase in an undulating shadow before the beginning of the rainy season. The Maya believed that the great flying serpent god traveled ahead of the rain god Chaac, preparing for rain as his tail moved the wind and swept the earth clean.
	08:05	The Maya built observatories, like the Caracol at Chichen Itza to watch their serpent god who appeared in the heavens, as the wandering planet Venus. Through motions of the brilliant Venus, they determined the will of Kukulcan. The Maya believed that the feathered serpent was most powerful when Venus appeared near the Pleiades star cluster in spring. This tiny cluster became the rattles adorning his tail.
	08:40	<i>Tonight I must climb to the top of my observatory. This passageway leads to the highest floor above the trees. There I will have a clear view of the horizon and can monitor the position of Kukulcan's star as well as the Sun, Moon, and other stars. Tonight the rattles of the feathered serpent are very close to his body, and he's coiled to strike. Tomorrow we must pay tribute to Kukulcan for the rains he will soon send.</i>
	09:26	<i>Crowds will gather for a great festival. Many must be sacrificed to honor our powerful feathered serpent god with human blood, the most precious gift we have to offer. Our priests have prepared the chac mool altar on the Temple of Many Columns. Those chosen to die are covered in blue paint. Only the sacrifice of their beating hearts can appease Kukulcan and bring rain from the sky. Our fate depends on shedding human blood for rain.</i>
TIKAL		
	10:32	The Maya carved the great city of Tikal out of the rainforest. In this city of up to 100,000, all water came from the sky. The city depended on lakes and cisterns to store rainwater for the dry season. Limestone quarries for skyscrapers also became catch basins for water. Tikal's rulers cleared the rainforest and channeled the water in swamps to grow crops. Tikal's power depended on storing enough water to last until the rains returned.
	11:07	The astronomers of Tikal used these giant pyramids to predict when the rainy season would begin. These ruins were once great temples aligned to the rising Sun, covered in stucco and painted brilliant hues of red, blue, yellow and white. The Maya felled thousands of trees to heat the ovens that turned limestone into stucco for these magnificent buildings and plazas.
	11:41	<i>Our great king Hasaw Chan K'awil designed these new pyramids to reach above the rainforest and become a gigantic solar observatory. Today, we must climb the highest pyramid to watch the rising Sun. This is the year's shortest day and the Sun rises farthest to the south, over the Pyramid of the Jaguar Priest. From this date forward, the Sun will rise a little more to the north each day. In a few months, I will observe sunrise from the Jaguar Priest's pyramid. When the Sun finally rises to the north of the King's Pyramid, the rains will come.</i>

		PALENQUE
	12:40	In the foothills of Mexico's southern mountains, lies the Maya city of Palenque. A spring feeds a stream flowing under the main palace, cascading to the plain below. Blessed with abundant rain and flowing rivers, the artisans of Palenque had time to create some of the most elaborate and exquisite Mayan art, and the most delicate of buildings, especially the city's central plaza. Yet Palenque with its abundant resources and advanced culture was among the first of the Maya cities to collapse. Its last leaders descended from Pacal the Great.
	13:40	A white throne room centers the palace complex. Within it, lies an oval tablet showing the coronation of Pacal, the Great - the most powerful ruler of Palenque, and the most famous of all Maya kings. Crowning him is his mother, Lady Sak K'uk, perhaps the most powerful woman in Mayan history.
	14:04	<i>To witness the cosmic power of our divine rulers, you must visit the burial chamber of my son, the great Pacal, on the year's shortest day. Watch as the setting Sun enters the temple and lights its inscriptions. Then descend a narrow stone staircase to ground level to my son's tomb. If you open my son's sarcophagus, you will see his body, painted red in preparation for his return.</i>
	15:27	<i>The sarcophagus lid tells of Pacal's cosmic journey after death. At death, following the path of the setting winter Sun, he entered the underworld. There he conquered the monster of darkness, and you can see him rising from the jaws of the underworld. Above his body, rises our sacred ceiba tree, connecting the Earth and sky, reaching toward the heavens in celebration of Pacal's return with the rising Sun.</i>
	16:03	<i>A starry cross stands upright in the predawn sky like a glorious ceiba tree. Along the horizon stretches a hazy white path where the dead walk, and where the glowing body of a cosmic monster waits with jaws open wide, waiting for Pacal. Then Pacal rises as the Sun from the underworld, conquering the cosmic monster. My grandson built three temples to celebrate his father's cosmic journey and the beginning of our time. This temple faces winter's rising Sun and glorifies sacred warfare. The second is an Earth temple, facing sunset on the year's longest day - at the height of our growing season. The tablet within shows another sacred tree, covered in symbols of plants. The tallest is a Sky temple, facing winter sunset. Its tablet has a third sacred tree, and tells the story of the 3 hearthstones of creation around a sacred fire.</i>
	17:22	About 1200 years ago, this thriving and densely populated metropolis with its strong successful leaders was suddenly abandoned. Perhaps Palenque's cosmic monster was earth bound. Archaeologists have found buried layers of ash here. This discovery suggests that Palenque's collapse might have been caused by the nearby volcano, El Chichon.

	17:48	<p>We know El Chichon erupted around 1200 years ago like it did in 1982. The volcano's violent unexpected blast, killed thousands, and left behind a crater over a kilometer wide. In 1982, winds blowing eastward carried ash from the eruption of El Chichon over 150 km to Palenque. Perhaps a similar eruption covered this vibrant Mayan city in ash more than 1000 years ago.</p>
	18:21	<p>El Chichon and other volcanos can also cause global weather changes, affecting both temperature and rainfall. A band of clouds and rain, marking the world's highest temperature, encircles the Earth. When the northern hemisphere has winter, this high temperature band moves south, taking the rain clouds with it. From January through May, much of Yucatan is a desert. By summer, this high temperature cloud band has moved northward bringing the rainy season to Yucatan.</p>
	18:56	<p>From June through December, tropical storms and hurricanes return to the land of the Maya. While watching the position of the Sun Maya astronomers could predict this annual return of the rains. Events like volcanic eruptions can make the northern hemisphere cooler than normal, then the high temperature zone, may not bring rain as far north as Yucatan resulting in life threatening drought.</p>
	19:29	<p>When the astronomer of Tikal looked eastward at sunrise, they saw the Sun above the Maya mountains. Today, we look towards these same mountains for evidence of drought conditions over a 1000 years ago. Rivers flowing from these mountains carry sediment into lagoons off the coast of Belize. Mangroves and sea grass beds filter and clean the river water which protects the reef. More sediment is deposited in years with greater rainfall. Sediment cores drilled here show less deposition, indicating less rainfall at the time of the classic Maya collapse.</p>
	20:15	<p>Farther from the Belize coast, lies an underwater sinkhole, called the Blue Hole. The Blue Hole is a sediment trap with material drifting downward each year from plants and animals near the surface. Cave formations line the sinkholes upper walls. Nothing lives in the oxygen free water at the bottom.</p>
	20:39	<p>Scientists at Rice and Louisiana State Universities have drilled over 5 meters into the sediment at the bottom of the Blue Hole. Let's pretend we could open the drill tube. First we would see the inside of the empty tube. Then the sediment core would appear as it is being extracted.</p>
	21:02	<p>Changes in vegetation in the water above cause the sediment colors to change. Dark and light bands indicate the different seasons each year. Scientists can also detect tropical storms from thicker bands in this core. During the time of the classic Maya collapse, we see little evidence of tropical storms. This is another indicator that there was very little rain at this time in Yucatan.</p>

	21:29	During this extreme drought many Maya cities collapsed. In centuries with abundant rainfall, they had flourished, expanding to the carrying capacity of Yucatan. The Maya did not know that they were living on the edge of disaster, by stretching their resources to the limit.
	21:48	For over a millennium, the major cities of the Maya had stood abandoned, deserted by their citizens, conquered by weather, and reclaimed by the rainforest. At their culture's height, many of the Maya faced the worst drought in thousands of years. It devastated a civilization that had cut down the rainforest to grow crops and destroyed urban centers that could not store enough water for their people.
	22:14	We can imagine astronomers watching heavens and predicting rain, and rulers bleeding for water. But year after year the rains did not come, and drought turned into famine. Soon the rainforest claimed its monumental architecture and exquisite artwork.
	22:34	In less than 100 years, over 100,000 Maya disappeared, abandoning their astronomers who no longer talked to the sky gods, and their priests, who demanded human blood for the promise of rain that never came. They left their parched cities and their withered fields rejecting the divine right and earthly power of their kings. By the thousands, they returned to the rainforests and mountains to a sustainable population and way of life.
	23:10	Their monuments, temples and observatories, now lie in ruins, silent sentinels - witnesses of the lost astronomy, agriculture, and architecture of the classic Maya, and a warning to any civilization that stretches its resources to the limit. Like other cultures, the fate of the Maya was sealed by unexpected volcanic eruptions and by a climate change they could not predict from the stars.
CREDITS		ENDING CREDITS
Written and Directed by	23:45	Carolyn Sumners
Director of Animation		Adam Barnes
Audio Production		Fish-I Studios
Photography		Tony Butterfield Patricia Reiff Gary Young
Architectural Modeling		Maya 3D Martin Gruhn
Character Animation		Mathias Kohlschmidt
Sky Form Animation		Tom Casey Home Run Pictures
Content Review		Anthony Aveni

		Dirk Van Tuerenhout
Glyph Translation		David S. Stuart
Cast		Narrator: Justin Tomillo Astronomers: Steve Cooper, Shai Fishman Lady Sak K'uk: Julie Amato
Promotional Assistance		Consulate General of Mexico in Houston
Production Assistance		TLC2 Visualization Laboratory University of Houston Joseph Eakin Ho Tung Visualization Laboratory & Planetarium Colgate University
Earth/Sky Imagery		Jonathan Fey World Wide Telescope Microsoft Corporation, Inc.
Technical Support		LadyBug3 Point Grey Research, Inc.
Production Review		Clare Parker James Talmage
Research Staff		Zac Tavlin Lauren Stevens Lin Boynton Destiny Davis Corey Ross Kim Tran Xinyi Wang
Photographed On Location		National Park of Palenque Chiapas, Mexico Uxmal Archaeological Site Yucatan, Mexico Chichen Itza Archaeological Site Yucatan, Mexico Ik Kil Eco-Archaeological Park Yucatan, Mexico Tikal National Park El Peten, Guatemala
Copyright		2011, 2015
Produced by		The Houston Museum of Natural Science
	25:38	