An excerpt from DISCOVER YOUR UNIVERSE
Rickey Ainsworth © 2018

Production notes

The Sun rises.

Pleasant music. City panorama at dawn. Sun rises, arcing across the clear blue sky.

The Sun sets.

Sun sets, daylight fades. City pan x-fades to night pan, with lights in building windows. Slowly, stars appear.

The Moon glides across the sky, shifting its shape from night to night.

Moon rises, following Sun's path across the sky.

Stars, countless points of light in the darkness, drift overhead, accompanied by mysterious wanderers - the planets.

Stars to full brightness; planets start to glide against the starry background (via annual motion).

This is what our ancestors saw when they looked up thousands of years ago. Early humans took note of the changes happening above, but rarely knew how to explain them. They attached myths to sky objects, in an attempt to make sense of their universe. We still tell some of these stories, but our modern understanding of the cosmos is fundamentally different. Thanks to millennia of scientific observation and technological advancement, we now know much more than our ancestors did about what makes up our universe and "how it works."

City pan fades out.

X-fade through a few primitive asterisms / stick figures, overlaid against star-field.

X-fade to more modern constellations, with Hevelius artwork, overlaid against star-field.

We now know that our home--Earth--is a rocky

Back away from Earth. Rotating Earth appears front and center, then settles into chord-position along horizon.

sphere, floating through space, covered with water, air, and an astounding variety of life. It is one of eight planets that--along with countless smaller bits of ice and rock--orbit an average yellow star called the Sun. Our Solar System is just one of many; other families of planets orbit their own distant stars.

We float in orbit above our home planet, stars still visible all around us.

Earth drops away. Perspective pulls back to orrery-view of Solar System, the Earth now just one of several bright points of light orbiting the Sun. Music swells to match the visual excitement of flying through space.

On an even larger scale, hundreds of billions of the closest stars are held together by gravity to form our spiral galaxy; a giant star city called the Milky Way.

Continue pulling pack, first through the Orion-Cygnus Arm, then revealing the grandeur of the entire Milky Way galaxy.

The universe doesn't stop there. Our galaxy is just one of hundreds of billions, punctuating the darkness of space as far into the distance as our scientific instruments can detect, forming a structure that we are just beginning to truly comprehend.

Still pulling back, we see the neighboring galaxies of our Local Group, then the galactic swarms beyond. Soon it all blends together, and we're left flying through strand-like structures formed by clouds of countless galaxies. At scales barely comprehendible, the universe zips past; a strange tunnel of light taking us to the furthest, loneliest edges of the universe.

But wait a minute. How did we get from there to here; from ancient sky stories to modern space telescopes? How did innovative minds through the ages acquire all the little building blocks of knowledge that make up our current understanding? In other words, how do we know what we know about our universe?

Music swells, then suddenly dies. Backward motion stops, and for a moment we're left floating in the void.

A giant question mark fades up, seemingly made from the same stuff as those strands of countless galaxies.

To find out, let's go back to the beginning...

Question mark fades down. The universe in front of us suddenly shrinks down, smaller and smaller, until it reaches a singularity. As everything converges to a point, a strobe flashes in the darkness, marking the beginning of time.

Darkness. No music.

Okay, not to *the* beginning. But to the beginning of human sky exploration. Before spaceships, before telescopes, to the earliest days of civilization itself.

Once again we sit under the stars. The modern cityscape is gone; we are now sitting outside a small village over five thousand years ago. This is Mesopotamia, known in modern times as Iraq. You are now an ancient sky-watcher; a farmer, looking up from your field.

Stars return. We see the night sky overhead, this time accompanied by an ancient Mesopotamian panorama. We're surrounded by farmland, with a city sprawling in the distance, a giant ziggurat at its center.

Ambient outdoor sounds; breeze, insects. A meteor streaks by, for flavor.

When you explore the sky with just your eyes, your perspective is quite limited. You see points of light, and a whole lot of darkness. The universe is truly a mystery. But... with careful observation and a little creative thinking, you just might be able put together a few of the puzzle pieces.

Let's speed up time a little, just enough to make the celestial motions apparent. Hours now pass in seconds. Let's watch. Do you see anything interesting?

Daily motion starts, moving the stars across the sky at a moderate pace.

Perhaps you've noticed the special way objects appear to move in our sky. The Sun, Moon, and most of the stars always rise on *this* side of the sky - east. As time passes, they drift overhead, setting on *this* side of the sky - west. Directly ahead, there is a circle of stars that neither rises nor sets, and at the very center of that northern circle is a single stationary point, around which the entire sky appears to turn.

Arrow or highlight, marking east.

X-fade to arrow or highlight, marking west.

Circumpolar circle fades up.

Arrow draws attention to the center of that circle; to the pole star.

Congratulations, you've just "discovered" how to use the sky as a compass.

A compass-style ribbon stretches out across the horizon, placing the cardinal points with clear N/S/E/W labels.

[The sky is a COMPASS.]

"The sky is a..." circular logo fades up, with "COMPASS" at the center. This line of narration is whispered by a different, ethereal voice (or cut altogether if audio doesn't mesh well).

In any era, the sky can help you find your way from place to place, whether you're walking to a neighbor's house, trekking across a continent, or sailing across an ocean.

Themed walking/sailing silhouettes fade in and out with narration.

What if, as you're traveling, you want to know the time? The sky can help with that, too.

Daylight; stars down. Farm/city panorama x-fades to daytime version. Once again, the sun rises.

[The sky is a CLOCK.]

"The sky is a..." circular logo fades up, with "CLOCK" at the center. Once again, this line of narration come from a different, ethereal voice.

You may already be familiar with the sundial, a simple instrument to measure time

using the Sun's light. Sundials were already ancient five thousand years ago, and remained popular until the widespread adoption of mechanical clocks and watches just a few hundred years ago. As the day passes, and the Sun creeps across the sky, you can tell time by tracking changes in the direction of shadows.

Sundial visual sequence. Giant sundial render with changing shadow at horizon, reacting to migrating sun overhead.

X-fade historical images x3; sundial development across cultures.

Sun sets, daylight fades. Pan fades out completely. Modern stars fade up.

Similarly, time can be measured by the movements of the stars. Using tonight's sky, you can easily make your own simple star clock. Look north to find this group of seven stars, commonly known as the Big Dipper. A line drawn through these two stars here--at the end of the bowl of the dipper--will lead you to a very special star called Polaris, the North Star. In modern times, Polaris is at the very center of our northern sky, and appears to stand still as the rest of the sky turns around it. The Big Dipper takes almost exactly one day to circle Polaris, so it moves just like the hour hand on a twenty-four hour clock. Ancient astronomers perfected this method, and also learned how to tell time using the rising and setting of certain bright stars.

Circumpolar circle-sized clock face fades up (Digistar effect), with ticks but no numbers. Ticking SFX.

Big Dipper asterism fades up. Arrow through pointer stars points to Polaris.

Daily motion continues.

Time display fades up. Hour hand graphic over handle of Big Dipper.

Dipper goes away. Circumpolar circle remains; daily motion still on. Full-dome, 360º version of decans fades up.

[The sky is a CALENDAR.]

"The sky is a..." circular logo fades up, with "CALENDAR" at the center. Yet again, this line of narration come from a different, ethereal voice.

For societies that needed to plant and harvest crops, predict rainy and dry seasons, or prepare for the deadly cold of winter, developing an accurate calendar was a matter of survival.

X-fade through seasonal panoramas, ending at white winter scene w/ Digistar snowfall.

Music fades out.

From what you've observed so far, how do you think ancient civilizations might have used the sky as a calendar? Take a guess. Do you think they used… the Moon, the Sun, or the stars?

Quiz music fades in.

Question/answer text onscreen, quiz-show style.

If you picked A, you're right. If you picked B or C… well, you're right too. Throughout history, civilizations have used *all* of these objects to measure months, seasons, and years.

Brightness emphasis on each answer as narrated.

The Moon doesn't just move in our sky; it also appears to change shape as it reflects the Sun's light. This cycle of phases--from New Moon, to Full Moon, and back again--takes about 28 days. This predictable pattern led some cultures to create a Moon-based calendar, dividing up the year into 28-day months... or "moonths."

Moon phase sequence across entire sky, filling dome.

Moon / "moonth" text morph.

Over time, astronomers learned that they could use the Sun and stars to create more accurate long-term calendars. The Sun's path across our sky changes throughout the

Sun path sequence, inc. ecliptic changes throughout entire year.

year. During the summer, it travels high overhead. The days are long, and, consequently, warmer. During the winter, the Sun takes a lower path, giving us shorter and colder days.

Ecliptic high.

Ecliptic low.

Early sky-watchers didn't know that seasons were caused by the Earth's tilt, in combination with its revolution around the Sun. But, around the world, they built wood and stone observatories to track the Sun's movement, and the annual migration of constellations across our night sky. The earliest calendars were far from perfect, but gave observers enough vital information about the seasons to offer a better chance at survival in a harsh world.

Earth tilt / revolution sequence. Axial highlight and seasons labeled.

Ancient observatories montage (Europe, Americas, Asia).

Monthly movement star sequence.

The names and faces of the individuals who made these early observations have been lost to the annals of history. But we know that they must have been creative thinkers, innovators, problem-solvers, for they looked up at the sky in search of knowledge, and dared to see the universe in ways that their predecessors had not. In doing so, they boldly changed the way future generations and civilizations would perceive and study the sky.

Innovator all-sky sequence. Advent calendar-style; a jigsaw puzzle, opening up bit by bit to reveal a sky filled with depictions of ancient astronomers and their tools.

Visuals / music down for scene break. Prepare for nautical navigation interlude, followed by Arawak/Carib segment.

[END OF EXCERPT] [FULL SCRIPT LENGTH: 32 PGS.] [RUNTIME: 38 MINS.]