## How to Read This Poster

The diagrams in this poster are assembled in such a way as to create a narrative about our time and place in the universe. We have done our best to represent them accurately at scale and still forge relationships that reveal the interconnectivity between disparate areas of study.

## The Universal Timeline

In the bottom left corner is the beginning of time. Moving to the right, a rapid expansion of matter formed the stars and our galaxy. At 9,231,800,00 years our Sun formed and then Earth – the blue water drop represents the early bombardment by icy meteors that formed our oceans.

Our time on Earth appears between the two blue water drops – at 14,790,000,000 the sun will sufficiently expand to evaporate the oceans and life will no longer be possible. Current theories predict the sun will eventually consume the Earth before collapsing into a White Dwarf Star long before the universe itself ends when the energy released during the initial expansion will dissipate into nothingness.

The white marker in the middle of the Earth's timeline is the present day.

## Our Timeline

Above the Universal Timeline is an expanded view of our time on Earth, projected across the oceans, land and atmosphere extending upwards. From left to right, time walks through the origins of life at 10,232,800,000 years with single-celled organisms followed by multicellular organisms at 13,032,800,000 years and more complex organisms shortly after arriving at the present day denoted by the second white marker at 13,790,000,000 years.

## The Oceans

The Oceans are the cradle of life and are defined by five layers of varying temperature and depth. From the top they are the Epipelagic, the Mesopelagic, the Bathypelagic, the Abyssopelagic (where light ceases to penetrate) and the Hadopelagic where only the hardiest coral and microorganisms survive. On the left is the composition of the ocean – mostly hydrogen and oxygen with about 3% salinity from sodium and chlorine.

## The Atmosphere

The Atmosphere creates a buffer between the Earth and outer space – it is defined by five layers of varying temperature and height, four of which are shown on the poster, which stops at 100 km above the Earth's surface – a point called the Kármán Line, which is commonly referred to as the border between the Earth and outer space. On the left is the composition of the atmosphere – mostly nitrogen and oxygen with concentration diminishing towards outer space.

The Troposphere is the bottommost layer where the temperature averages 15C though fluctuates between 58C (the deserts of Africa) and -88C (the interior of Antarctica). Electromagnetic radiation (transparent white diagonals) originates from the sun and penetrates into the Troposphere, transferring energy we experience as light and heat. Visible light (the 'eye' icon) as well as some infrared (IR) and ultraviolet (UV) light is absorbed at the surface, evaporating water and forming clouds which serve to deflect some of the radiation and distribute rain across the globe. It is this cycle of energy transfer that creates the Earth's "energy budget" wherein the amount of incoming radiation is approximately equal to the amount of heat that is released from that cycle and the natural heat that escapes from the Earth's core. This balance is a key component in making life on Earth possible.

The Stratosphere is the next layer where planes fly to escape the turbulence of weather. In the Stratosphere, harmful ultraviolet radiation collides with oxygen, splitting oxygen molecules into single atoms which then recombine as Ozone (O3). This collision prevents harmful radiation from reaching the surface and in the process, the scattered light creates the blue sky we see.

Above the Stratosphere is the Mesosphere where incoming objects like meteors generally burn up before they impact the surface.

At the very top is the Thermosphere which extends far above the Kármán Line to about 700 km in which space the International Space Station orbits the Earth, and where the electromagnetic radiation from the sun collides with the atmosphere to create the northern and southern auroras.

Beyond the reach of the poster is the Exosphere where many of the Earth's satellites orbit and where, even farther, the Earth's Magnetosphere further serves to protect the Earth from harmful electromagnetic radiation emitted by the Sun. The Magnetosphere is shown as the oval line extending outwards from the globe, center-right.

## The Globe

Seen from outer space, the earth is a sphere composed of layers of varying temperatures, distances and composition (seen on the right half or, “night side”). On the left half is the “day side” which shows the ocean and continents and rotating currents of atmosphere which are affected by the rotating blue (cold) and red (warm) atmospheric “cells”, which are the result of both the Earth’s rotation and its “energy budget.” These weather patterns, along with the cold (blue) and warm (red) ocean currents balance the budget across the globe which has created the areas of desert and forest which we experience today.

The line between the Earth and the Sun visualizes the Ecliptic – the direct point where the sun is exactly aligned with the Earth at a 90 degree angle. The Ecliptic defines the phenomenon of day and night, dividing the Earth vertically into a light and dark side. The Ecliptic is not the “middle” of the Earth – that is the “Equator” which divides the Earth into equal halves, north and south. The Equator is rotated 23 degrees away from the Ecliptic such that the north leans towards the sun for part of the year and leans away for the other half.

The Earth rotates counterclockwise and one full rotation includes a cycle of day and night for each part of the globe. Over the course of 365 rotations (1 year), the Earth will travel in a counterclockwise orbit around the sun and in that period,  the “leaning” of the Earth creates our seasons. When the north leans towards the sun it is summer in the north and winter in the south – as the Earth continues its orbit, eventually the south will leans towards the sun and the reverse is true.

It is the cycle of 1 year by which we measure time so that we can say the universe has existed for as long as it would have taken our planet to orbit the sun more than 13 billion times.

## The Solar System and Beyond

The distance between the Earth and Sun is an Astronomical Unit (au) by which we measure distance between planets in our solar system and other objects in our galaxy. And just as the Earth rotates around the Sun, so does our solar system rotate around the galaxy – 230 million trips around the Sun equals one trip around the galaxy.