

Technical Definition of the Ecliptic Calendar

by Damon Scott

The first version of these definitions was created in the summer of AD 2002.
Minor, though still substantial revisions were made in the summer of AD 2005.

Status of the Technical Definitions

Various descriptions of the Ecliptic Calendar are possible, but only one *Definition*. Descriptions are useful to describe the calendar to a general audience, but the Definitions are used to determine exactly how a calendar is to be constructed. *These Technical Definitions therefore supercede anything found in any other description of the Ecliptic Calendar.*

Idea of Heliocentric and Geocentric

In the coming definitions, several points will be described as *Heliocentric* or *Geocentric*. They generally are antipodal, one being where the Earth is as viewed from the Sun, the other where the Sun is when viewed from the Earth. Not only are directions in space denoted heliocentrically and geocentrically, but time as well. Specifically, there is the 8.5 minute difference in Heliocentric and Geocentric time, namely the time it takes light to travel between the Sun and Earth. In order for this time difference *not* to be an issue, Geocentric concepts and Heliocentric concepts are carefully not mixed together when defining anything.

Whenever the adjective *Heliocentric* or *Geocentric* is omitted, it is understood always to be *Heliocentric*.

Idea of Fixed and Precessing

As is well known, the precession of the equinoxes is a process that takes about 25,800 years to complete a revolution. Those points that rotate with this precession are called *precessing*. Those that do not are called *fixed*. (Note: due to the slight changes in the obliquity of the ecliptic, even the fixed coordinates are not absolutely fixed relative to a large enough frame of space and time. They are still called fixed ecliptic coordinates throughout, however.)

Definition of the Galactic Equator

It is with considerable regret that there is dispute exactly where to place the Galactic Equator as of this writing. Until a firm or indisputable definition of the Galactic Equator is possible, editions of the Ecliptic Calendar must simply say what is the convention used for defining the particular edition.

Definition of Fixed Heliocentric Ecliptic Zero

The Galactic Equator intersects the Ecliptic in two fixed points. The crossing between Scorpio and Sagittarius is called *Fixed Heliocentric Ecliptic Zero*. The other, antipodal crossing is called the *Fixed Geocentric Ecliptic Zero*.

As a practical matter, as of this writing Fixed Ecliptic Zero should be placed as follows. From SagA*, which is now the undisputed center of the galaxy, draw a line parallel to the

“B1950” definition of the galactic equator. Where this line crosses the ecliptic is Fixed Ecliptic Zero.

Definition of the Heliocentric Point of the Vernal Equinox

When the phrase “Vernal Equinox” is used, it is understood always to be the Vernal Equinox for the Northern Hemisphere of the Earth. The *Heliocentric Point of the Vernal Equinox* is the point on the Ecliptic formed by the line from the Sun through the Earth at the Moment of the North Vernal Equinox; it is presumed to precess smoothly throughout the year, and not to hop from one year to the next. Notice that this point is the Geocentric Point of the Autumnal Equinox, and shows up as “Autumnal Equinox” in star charts and software. Notice also that this point precesses around the ecliptic and is not fixed with respect to Fixed Ecliptic Zero.

The *Geocentric Point of the Vernal Equinox* is the point antipodal to the Heliocentric Point of the Vernal Equinox, and with a geocentric, rather than heliocentric, conception of time.

Precessing Ecliptic Zero is by definition the same as the Heliocentric Point of the Vernal Equinox.

Definition of Fixed and Precessing Ecliptic Coordinates

The Fixed Ecliptic Coordinates are formed by going along the Ecliptic from Fixed Ecliptic Zero, and marking off degrees, minutes and seconds in the standard fashion. The Precessing Ecliptic Coordinates are formed by going along the Ecliptic from the Precessing Ecliptic Zero.

Definition of the Fixed and Precessing Houses of the Zodiac

The Fixed Houses of the Zodiac formed by going from Fixed Ecliptic Zero and, moving westward in exact thirty-degree intervals, marking along the Ecliptic sections called *Sagittarius, Capricornus, Aquarius, Pisces, Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, and Scorpio*.

The Definition of the Precessing Houses of the Zodiac is a bit more complicated. The Precessing Houses are constructed by taking exact thirty-degree segments of the ecliptic starting at Precessing Ecliptic Zero. When one is not near the change of an age, they are named according to the Fixed House wherein resides the Eastern endpoint of the Precessing House. When one is near the change of an Age, one determines which Age one is in by the definitions to be given later, and names the Precessing Houses accordingly. Notice that the names of the Precessing Houses all remain constant for about 2150 years, and then all the names change by one with the change of an Age.

Definition Geocentric Day

For any place on the earth except the poles, define Daystart to be the moment when the foot of the perpendicular from the center of the Sun to the Celestial Equator crosses the eastern Horizon.

Notice that the Day concept is geocentric and specific to the location of the observer, and the two poles of the earth have no defined time for the start of a day.

Definition of the Adjusted Equinoxes and Solstices

The Moment of Greenwich Midnight occurs when the Sun, as viewed at Greenwich, passes the prime meridian below the horizon. A *Greenwich Midnight-to-Midnight Day* is the duration from one Moment of Greenwich Midnight to the next. Notice that days do not always begin at 00h00'00" Greenwich Mean Time, but with respect to Greenwich *Local Solar Time*.

Once each year is a moment when the Sun, as viewed from Greenwich, crosses the geocentric Point of the Vernal Equinox. This moment will fall into one, and only one, Greenwich Midnight-to-Midnight Day. The Geocentric Greenwich Day whose Daystart is in this same Midnight-to-Midnight day is by definition *the Day of the Vernal Equinox*. Because this method of reckoning is slightly different from that usually adopted (the difference between Greenwich Mean Time and Greenwich Local Solar Time), on occasions this day will differ by one day from what is printed as the Vernal Equinox in almanacs and newspapers.

Note: This definition is chosen so as to preserve, as much as possible, the phenomenon that the equinox is the day on which the sun rises, or sets, most exactly due east or west along the Horizon. Thus is the definition centered at solar noon on a day, rather than at any other time.

This day concept is then spread around the Earth from Greenwich, in the manner now customary, and so is defined the *Adjusted Day of the Vernal Equinox* for all locations. It may differ by one day from what would be computed for a location if the observations were taken locally.

In a similar manner are defined the *Adjusted Day of the Summer Solstice*, *Autumnal Equinox*, and *Winter Solstice*. That is, one always uses a Greenwich Midnight-to-Midnight day for the computations, even though days, even at Greenwich, start at 6:00 *a.m.* Local Solar Time.

Definition of New Years Day

Ecliptic New Years Day is by definition the Adjusted Day of the (Boreal) Vernal Equinox.

Definition of the Adjusted Seasons

The set of days from, and including, the Vernal Equinox to, but not including, the Summer Solstice is called *Adjusted Spring*, and similarly is defined *Adjusted Summer*, *Adjusted Autumn* and *Adjusted Winter* for every year.

Notice that these adjusted seasons have the same number of days in them for all places on the Earth. Also, these seasons, unless an asteroid hits the earth into a different orbit, will never have fewer than 87, nor more than 95, days in them.

Definition of the Heliocentric Adjusted Point of the Perihelion

For each point in time, go the moment when last Saturn crossed Fixed Ecliptic Zero, dropping a perpendicular from Saturn to the Ecliptic as needed. At that moment, locate the Point of the Perihelion for Earth as viewed from the Sun. This is by definition the Heliocentric Adjusted Point of the Perihelion.

Notice that the Adjusted Point of the Perihelion simply stays in one place for 29.454 years or so, and then jumps to another point as Saturn crosses Fixed Ecliptic Zero.

Definition of Heliocentric Unadjusted Months

Going from Precessing Ecliptic Zero, mark of exact 30° segments, and so, by the position of the Earth, as viewed from the sun, obtain Heliocentric Unadjusted Months. They are numbered rather than named: first month (beginning of Boreal Spring), to twelfth month (end of Boreal Winter).

Definition of the Adjusted Months

The following definition is slightly complicated, but it works beautifully to assign define months so that their lengths wax and wane due to the eccentricity of the Earth's orbit. Taking a definition such as the Hindu Solar Calendar does for month-lengths gives results that sometimes have annoying "flutters" in them; the month-lengths do not smoothly wax and wane, but sometimes jitter.

Each season will have a month-length between 87 and 95 days (and the definition is so robust that it will work even outside this range.) For each season, assign *unordered month lengths* so that no two numbers in the set differ by more than one. In particular, the unordered month-lengths may be read from this chart:

Season Length	Unordered Month Lengths	Season Length	Unordered Month Lengths	Season Length	Unordered Month Lengths
87	{29, 29, 29}	90	{30, 30, 30}	93	{31, 31, 31}
88	{29, 29, 30}	91	{30, 30, 31}	94	{31, 31, 32}
89	{29, 30, 30}	92	{30, 31, 31}	95	{31, 32, 32}

Also, locate the unadjusted month of the Adjusted Point of the Perihelion, and in particular know which half of the month is this point if it is in the second month of a season.

Now, within each Adjusted Season, simply order the month-lengths so that the shorter month-lengths are nearer the Adjusted Point of the Perihelion, and the longer month-lengths are further away. Thus, within each season, when the Earth is nearer the sun and having a larger angular velocity, the months are shorter, and when further away the months are longer.

In this way, one can state a rule for assigning month-lengths from season-lengths and the rule be good across a saturnium. There is a change of rule only at a change of saturnium.

Thus are defined the lengths of the first month of the year, second month, and so forth, starting from the Boreal Vernal Equinox and moving forward. In this way, also, the four cardinal days of equinoxes and solstices always fall on the first day of a month.

Definition of the Unadjusted and Adjusted Geocentric Year

The span of time from one Geocentric Moment of the Vernal Equinox to another is an *Unadjusted Geocentric Year*. An *Adjusted Geocentric Year* begins with the Adjusted Month whose defining Moment was the occurrence of the Vernal Equinox.

Definition of the Unadjusted Heliocentric Year; Definition of Nearly Identical

The span of time from one Heliocentric Boreal Vernal Equinox to another is an *Unadjusted Heliocentric Year*. This Unadjusted Heliocentric Year differs from an Unadjusted Geocentric Year by no more than nine minutes, and it differs from an Adjusted Geocentric Year by no more than a day or two. These three kinds of years— the Unadjusted Geocentric Year and

the Unadjusted Heliocentric Year, and the Adjusted Geocentric Year— are called *nearly identical* to one another when they differ by no more than a day or two; otherwise, they are clearly separate.

Note: It is by means of the definition immediately above that the Ecliptic Calendar is able to move from Geocentric definitions for days, months and years to Heliocentric definitions for saturnia, ages and cycles while rigorously negotiating the 8.5 minute time difference between Earth and Sun.

Definition of the Unadjusted and Adjusted Heliocentric Saturnium

The *Point of Saturn* is the foot of the perpendicular from Saturn to the Ecliptic. The *Heliocentric Moment of the Change of a Saturnium* occurs when the Point of Saturn, as viewed from the Sun, crosses Heliocentric Fixed Ecliptic Zero. An *Unadjusted Saturnium* is the span of time from one such Moment to the next.

The Adjusted Year whose nearly identical Unadjusted Heliocentric Year contains the Moment of the Change of a Saturnium is by definition the first Year of an *Adjusted Saturnium*.

Each Adjusted Saturnium therefore has either 29 or 30 years. Notice that the number of (adjusted or unadjusted) years in a saturnium depends strictly on the “interference pattern” of two celestial cycles: (1) the Heliocentric Orbit of Earth in Precessing Coordinates and (2) the Heliocentric Orbit of Saturn in Fixed Coordinates. There are not three or more cycles “in the act” of determining the length of an adjusted saturnium. Notice also that there is no Geocentric concept of a saturnium used in the Ecliptic Calendar.

Note: the word “saturnium” is a neologism; it will not be found in even the most copious English or Latin dictionary.

Definition of an Unadjusted and Adjusted Era or Age

The *Unadjusted Moment of the Change of an Age* occurs when the Heliocentric Point of the Vernal Equinox enters a new Fixed House of the Zodiac. The Saturnium whose nearly identical *Unadjusted Saturnium* contains this Moment is by definition the first Saturnium of a new Age.

As before, there are only two cycles involved in determining the length of an Age: (1) the Heliocentric Orbit of Saturn in Fixed Ecliptic Coordinates, and (2) the Point of the Vernal Equinox in Fixed Ecliptic Coordinates.

In order to maintain historical continuity, Ages are given both geocentric and heliocentric names. The *Heliocentric Name* is the name of the constellation into which the Heliocentric Point of the Vernal Equinox is entering. The synonym *Era* (Latin *era*) is used to denote the Heliocentric Name. The *Geocentric Name* is of the constellation into which the Geocentric Point of the Vernal Equinox is entering. The synonym *Age* (Latin *Aevum*) is used to denote the Geocentric Name. Notice that the names of Eras and Ages are antipodal to one another.

Definition of the Zodiacal Names of the Months for the Various Ages

For any Year of any Age, the first month is given the same Zodiacal name as the Heliocentric Name of the Age. For example, the Age of Aquarius is synonymously the Era of Leo. Therefore, each of the 2000 or more years of this Age has its first month bear the name

Leo. Other months in the year are named in succession, going westward in constellation names in the Zodiac.

During an Adjusted Change of Age, the Zodiacal Name of the last month of the old age will be the same as the zodiacal name of the first month of the new age. For example, when the Age of Aquarius began there were two months names Leo in a row. When months are numbered, rather than zodiacally named, there is no irregularity: the twelfth month of the last year is still succeeded by the first month of the next year, and each year has exactly twelve months, even across the change of an Age.

Notice that months bear both number-names and constellation names. If one becomes confused over names, one is advised to take the number name as the “real” identity of the month, and the constellation-name as a convenient label somewhat superficially attached to the Month. Thus, the idea of “the fourth month of the year” will be a more stable concept than the idea of “the month of Scorpio”. When an Age changes, for example from Pisces to Aquarius, it is more convenient to think that there are two months *named* Leo in a row, than to think there are two months *of* Leo in a row.

Definition of an Unadjusted and Adjusted Cycle

The *Unadjusted Moment of the Change of a Cycle* occurs when the Heliocentric Point of the Vernal Equinox crosses Fixed Heliocentric Ecliptic Zero. The Adjusted Age whose defining Moment was this same Moment is by definition the first Age of a new Cycle. The Cycle we are now in, as of this writing, is called *Saeculum Nostrum* or *Our Cycle*. Cycles are not numbers, but simply named. The Cycle prior to the current one is called simply *Prior Cycle* (Latin: *Saeculum Prius*) and the one after the current cycle is called *Next Cycle* (Latin: *Saeculum Posterius*). There is no larger period of time than a Cycle contemplated in the Ecliptic Calendar.

— Here End the Technical Definitions of the Ecliptic Calendar —