The Astronomical Almanac Online!

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Abstract

The *Astronomical Almanac Online* website (*http://asa.usno.navy.mil/* and *http://asa.hmnao.com/*), a joint project between the Nautical Almanac Office (NAO) at the US Naval Observatory (USNO) and Her Majesty's Nautical Almanac Office (HMNAO) at the UK Hydrographic Office (UKHO), began as a companion to *The Astronomical Almanac* with the intent to provide material best suited for presentation on the Web. This included data in ASCII format for machine parsing as well as pagesets that had been, but no longer were, printed in the book.

For the past few years we have looked at how to build upon the ideas behind *The Astronomical Almanac Online* and add more to the website. Starting with the proof-of-concept observatory search—designed to add a dynamic element to the data from Section J of the *The Astronomical Almanac* while still maintaining the look of printed pages—we have added: maps for lunar occultations of the planets, many minor planets, and bright stars (supplementing Section A); a table on the main page of the website that presents entries from the Diary of Phenomena (Section A) for two weeks into the future; a utility for finding the geocentric coordinates of the planets (supplementing Section E); searches for some tables found in Section H (Stars), allowing users to filter the data and print a subset of the entries for ease-of-use; and a Delta T: Past, Present and Future feature updated multiple times per year.

In the future, we plan to increase the amount of information on the *The Astronomical Almanac Online* by adding more filterable datasets from the book, new ways of visualizing information from the book, and options to download data in machine-friendly XML, while still maintaining the website as a complement to the *The Astronomical Almanac*.

Recent Additions to the Website

We present here a selection of items we have added to *The Astronomical Almanac Online* website over the past few years. Beginning at the top-left and moving counter-clockwise, we have a listing of phenomena upcoming over a period of two weeks. This table is found on the front page of *The Astronomical Almanac Online* and contains infromation from the Diary of Phenomena in Section A of the printed book. It provides visitors to the website with a snapshot of upcoming events involving the Sun, Moon, planets, bright stars, and selected minor planets.

Next, an example of an occultation map showing from where the occultation will be visible as it progresses; maps are available for occultations of the planets, 93 minor planets, and bright stars, and are available for viewing in a browser or as a very nice, downloadable PDF. These occultation maps are not published in *The Astronomical Almanac* and can be found only on our website.

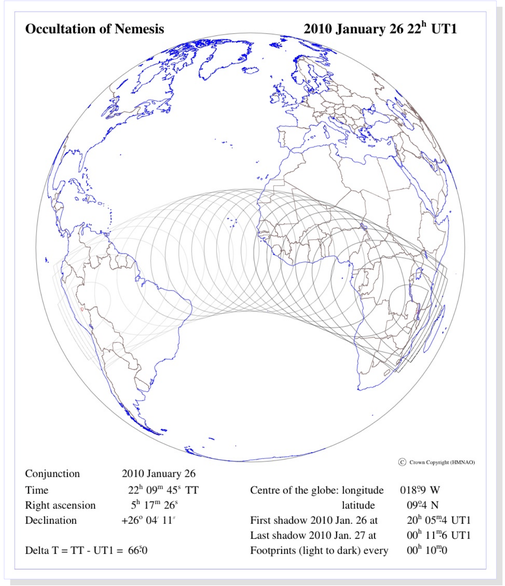
Third, we have a utility that shows the geocentric coordinates for the planets for a selected date. In *The Astronomical Almanac*, geocentric coordinates for each planet are given for an entire year, sorted by planet; this useful utility gives users the coordinates for all of the planets on a chosen date, which is more efficient than looking through the tables for each planet.

Next, two graphs showing short-and-long term predictions for the value of Delta T, the difference between Terrestrial Time and Universal Time that is the result of the gradual slowing of the Earth's rotation. These graphs are updated bimonthly with the latest predictions.

Finally, we have an example of output from our bright stars search utility. This allows a user to filter our extensive list of bright stars and select a subset by using right ascension and declination ranges as well as a visual magnitude cutoff. The output is presented in a similar format to that printed in *The Astronomical Almanac*, thus maintaining a common style between the website and book; however, colored highlighting may be introduced in the web output for easier readability. In addition to the bright star search, we also currently offer a similar filter for Landolt *UBVRI* standard stars and worldwide observatory locations.

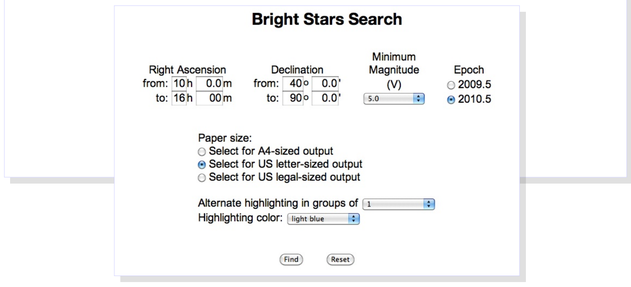
Upcoming Phenomena (UT)

Wed,	Jan 06,	19h	Saturn 8° N. of Moon
Thu,	Jan 07,	11h	LAST QUARTER
Thu,	Jan 07,	21h	Vesta stationary
Mon,	Jan 11,	13h	Antares 1°.1 S. of Moon, Occn.
Mon,	Jan 11,	21h	Venus in superior conjunction
Wed,	Jan 13,	16h	Mercury 5° N. of Moon
Thu,	Jan 14,	19h	Saturn stationary
Fri,	Jan 15,	07h	NEW MOON, Eclipse
Fri,	Jan 15,	16h	Mercury stationary
Sun,	Jan 17,	02h	Moon at apogee
Sun,	Jan 17,	23h	Neptune 4° S. of Moon
Mon,	Jan 18,	10h	Jupiter 5° S. of Moon



BRIGHT STARS, J2010.5

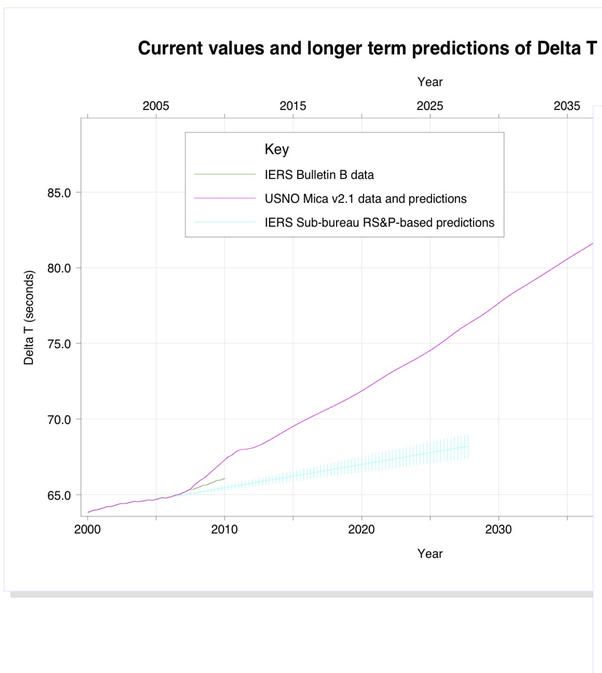
Flamsteed/Bayer Designation			BS=HR No.	Right Ascension	Declination	Notes	*V*	*U–B*	*B–V*	Spectral Type
				h m s	° ′ ″					
33	λ	UMa	4033	10 17 43.6	+42 51 42	s	3.45	+0.06	+0.03	A1 IV
34	μ	UMa	4069	10 22 57.1	+41 26 47	6	3.05	+1.89	+1.59	M0 III
			4072	10 24 52.6	+65 30 46	6	4.97	–0.13	–0.06	A0p Hg
36		UMa	4112	10 31 17.5	+55 55 35	d	4.83	–0.01	+0.52	F8 V
			4126	10 35 57.4	+75 39 30		4.84	+0.72	+0.96	G8 III
			4181	10 43 48.3	+69 01 15		5.00	+1.54	+1.38	K3 III
48	β	UMa	4295	11 02 28.1	+56 19 33	6	2.37	+0.01	–0.02	A0m A1 IV–V
50	α	UMa	4301	11 04 22.1	+61 41 39	d6	1.80	+0.90	+1.07	K0 IIIa
52	ψ	UMa	4335	11 10 15.0	+44 26 29		3.01	+1.11	+1.14	K1 III
1	λ	Dra	4434	11 32 01.0	+69 16 23		3.84	+1.97	+1.62	M0 III Ca–1
63	χ	UMa	4518	11 46 36.1	+47 43 16		3.71	+1.16	+1.18	K0.5 IIIb
64	γ	UMa	4554	11 54 22.8	+53 38 11	a6	2.44	+0.02		A0 Van
69	δ	UMa	4660	12 15 56.5	+56 58 28	d	3.31	+0.07	+0.08	A2 Van
5	κ	Dra	4787	12 33 55.5	+69 43 50	v6	3.87	–0.57	–0.13	B6 IIIpe
8	β	CVn	4785	12 34 14.4	+41 18 02	ads6	4.26	+0.05	+0.59	G0 V
	γ	CVn	4846	12 45 37.3	+45 22 59		4.99	+6.33	+2.54	C5.5
77	ε	UMa	4905	12 54 29.3	+55 54 11	dv6	1.77	+0.02	–0.02	A0p Cr
78		UMa	4931	13 01 10.6	+56 18 36	asd7	4.93	+0.01	+0.36	F2 V
20	*AO*	CVn	5017	13 18 00.7	+40 31 03	sv	4.73	+0.21	+0.30	F2 III (str. met.)
79	ζ	UMa	5054	13 24 20.8	+54 52 15	d6	2.27	+0.03	+0.02	A1 Va' (Si)
80		UMa	5062	13 25 38.7	+54 56 01	6	4.01	+0.08	+0.16	A5 Vn
85	η	UMa	5191	13 47 57.2	+49 15 40	a6	1.86	–0.67	–0.19	B3 V
10	*CU*	Dra	5226	13 51 44.3	+64 40 18	d	4.65	+1.89	+1.58	M3.5 III
11	α	Dra	5291	14 04 40.4	+64 19 33	a6	3.65	–0.08	–0.05	A0 III
4		UMi	5321	14 08 49.3	+77 29 53	d6	4.82	+1.39	+1.36	K3 IIIb Fe–0.5
21	ι	Boo	5350	14 16 32.2	+51 19 09	d6	4.75	+0.06	+0.20	A7 IV
19	λ	Boo	5351	14 16 46.9	+46 02 25		4.18	+0.05	+0.08	A0 Va (λ-Boo)
23	θ	Boo	5404	14 25 33.2	+51 48 09	d	4.05	+0.01	+0.50	F7 V
5		UMi	5430	14 27 30.9	+75 38 57	d	4.25	+1.70	+1.44	K4 III
7	β	UMi	5563	14 50 41.1	+74 06 45	d	2.08	+1.78	+1.47	K4 III
	RR	UMi	5589	14 57 45.2	+65 53 27	6	4.60	+1.59	+1.59	M4.5 III
42	β	Boo	5602	15 02 20.5	+40 20 58		3.50	+0.72	+0.97	G8 IIIa Fe–0.5
13	γ	UMi	5735	15 20 43.2	+71 47 48		3.05	+0.12	+0.05	A3 III
12	ι	Dra	5744	15 25 09.9	+58 55 46	d	3.29	+1.22	+1.16	K2 III
16	ζ	UMi	5903	15 43 42.2	+77 45 42		4.32	+0.05	+0.04	A2 III–IVn
1	χ	Her	5914	15 53 02.3	+42 25 21		4.62		+0.56	F8 V Fe–2 Hδ–1
	CL	Dra	5960	15 58 02.5	+54 43 13	6	4.95	+0.05	+0.26	F0 IV

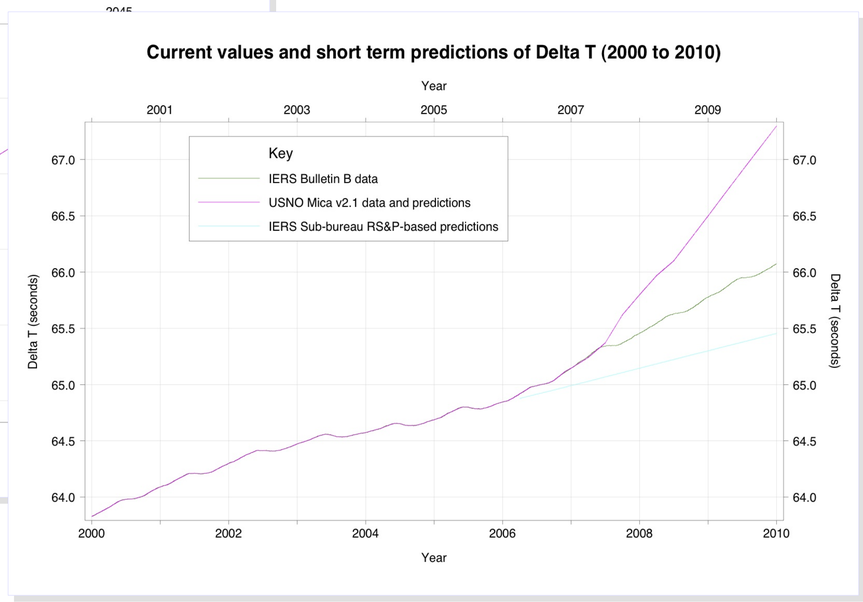


Geocentric Planetary Coordinates

Planet	*Apparent RA (hms)*	*Apparent Declination (dms)*	*True Geocentric Distance (au)*
Mercury	18 53 59.671	–19 53 58.90	0.6718658
Venus	19 01 42.065	–23 18 24.04	1.7101129
Mars	09 26 23.922	+19 14 08.35	0.7147940
Jupiter	21 59 39.111	–13 15 12.37	5.6914264
Saturn	12 20 33.049	+0 17 40.19	9.2406548
Uranus	23 36 17.881	–3 22 18.30	20.4496820
Neptune	21 48 40.128	–13 40 18.57	30.7800630

Geocentric coordinates for 0h TT on
2010 January 6 (Wednesday)





Other Features of *The Astronomical Almanac Online*

The new items shown above are not the only features offered by *The Astronomical Almanac Online*. We also have the Glossary, Section M of *The Astronomical Almanac*, viewable as html or downloadable as a PDF file; a link to HMNAO's excellent *Eclipses Online Portal* (*http://www.eclipse.org.uk/*), which provides diagrams and animations of eclipse visibility paths; data on the satellites of the planets and Pluto, and the rings of Saturn; and tables of selected double stars, X–ray sources, and gamma ray sources, among other data.

In addition, *The Astronomical Almanac Online* hosts material which in the past was given in the book but has since been removed from new editions, such as lunar polynomial coefficients, heliocentric osculating orbital elements of the planets, and Johnson *UBVRI* standard stars.

Finally, we also provide errata, and in some instances corrected pages, for past editions of *The Astronomical Almanac* in the rare cases where a change to the printed material is necessary after publication.

Future Work

We would like to continue the expansion of *The Astronomical Almanac Online* website by adding more data from the printed book and offering better machine-readable output options for data on the website. We currently offer some data in plain-text format, but that is not an optimal format for situations where users may want to use our data in their own applications. Formats such as XML and JSON (Javascript Object Notation) are much more suitable for that purpose, and we are looking into adding options for retrieving data in those formats. We would also like to better tie the different sections of the website together; for example, use the table of upcoming phenomena to send visitors directly to the occultations or eclipses the table references. We always welcome and consider suggestions from our users on how we can improve *The Astronomical Almanac Online*; a means to contact us is available on the website.

http://asa.usno.navy.mil/ ***http://asa.hmnao.com/***