
Subject: Time Woes

Posted by [David Fanning](#) on Wed, 01 May 2002 19:41:10 GMT

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Folks,

OK, I'm completely lost.

I've been perusing the JHAPL IDL library for days, it seems like, but my eyes are still crossed.

I have a time array that purports to be the number of seconds from 1 Jan 1980. How in the world do I convert that to something I can use with routines I have access to?

Thanks,

David

--

David W. Fanning, Ph.D.

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Coyote's Guide to IDL Programming: <http://www.dfanning.com/>

Toll-Free IDL Book Orders: 1-888-461-0155

Subject: Re: Time Woes

Posted by [Ken Mankoff](#) on Wed, 01 May 2002 20:10:21 GMT

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On Wed, 1 May 2002, David Fanning wrote:

> I have a time array that purports to be the number of seconds from 1
> Jan 1980. How in the world do I convert that to something I can use
> with routines I have access to?

First, before you deal with any conversions, you have to understand exactly what it means to have "seconds since 1980".

What clock system are you on? Is it 365 day years (and leap-years), or 365.25, or something more accurate than that? The clocks here at work have leap-seconds thrown in every few months (I believe this is one of the many subtle distinctions between UTC, GMT, and Zulu, but am not sure).

Then again, depending on the resolution of the data (and x-axis if you are plotting it), does any of these different "times" matter to you?

Beyond that, I am not sure what you want to convert it to... Can't you just start doing division until you have it into "days since 1980"?

The other option is to add 10 years worth of seconds onto the array (again: exactly how many seconds are there in your year calendar?), now you have it as seconds from 1 Jan 1970. This is the same format as UNIX and the IDL SYSTIME() function, so you should be able to handle this array better...

Does this help?

-k.

--

Ken Mankoff <http://lasp.colorado.edu/snoe/>
<http://lasp.colorado.edu/mars/>
<http://lasp.colorado.edu/~mankoff/> <http://lasp.colorado.edu/marsrobot/>

Subject: Re: Time Woes

Posted by [David Fanning](#) on Wed, 01 May 2002 21:00:23 GMT

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Ken Mankoff (mankoff@I.HATE.SPAM.cs.colorado.edu) writes:

> First, before you deal with any conversions, you have to understand
> exactly what it means to have "seconds since 1980".

Well, you see, that's the whole problem with the consulting business. Even when you have it together enough to ask a question like this, the chance that your client might know the answer is about nil. Otherwise, they would be writing the program themselves.

Here is what I know. I have some TRMM data in a particular lat/lon range at a particular time (e.g. 4AM on 7 July 2001). I want to pull out any QSCAT wind data that might overlap my TRMM data by about an hour or two.

What questions would it be helpful for me to know to ask?

Cheers,

David

--

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Subject: Re: Time Woes
Posted by [Paul Van Delst\[1\]](#) on Wed, 01 May 2002 21:24:05 GMT
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David Fanning wrote:

>
> Ken Mankoff (mankoff@I.HATE.SPAM.cs.colorado.edu) writes:
>
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> the program themselves.
>
> Here is what I know. I have some TRMM data in a particular
> lat/lon range at a particular time (e.g. 4AM on 7 July 2001).
> I want to pull out any QSCAT wind data that might overlap my
> TRMM data by about an hour or two.
>
> What questions would it be helpful for me to know to ask?

Is the time "regular" time, or atomic time?

Not that I'm trying to obfuscate the problem.....

paulv

p.s. I always thought the "seconds since 1980" time was a relatively common thing.

--

Paul van Delst Religious and cultural
CIMSS @ NOAA/NCEP/EMC purity is a fundamentalist
Ph: (301)763-8000 x7274 fantasy
Fax:(301)763-8545 V.S.Naipaul

Subject: Re: Time Woes
Posted by [Ken Mankoff](#) on Thu, 02 May 2002 13:07:00 GMT

On Wed, 1 May 2002, Paul Van Delst wrote:

> David Fanning wrote:

>> Ken Mankoff (mankoff@I.HATE.SPAM.cs.colorado.edu) writes:

>>> First, before you deal with any conversions, you have to understand

>>> exactly what it means to have "seconds since 1980".

>>

>> What questions would it be helpful for me to know to ask?

>

> Is the time "regular" time, or atomic time?

I would not ask anything as eloquent as this. I would ask 1 of 2 things. First, "Can I get the data on a different grid", and second would be what I asked you: A long rambling paragraph asking how many seconds are in a year, etc. So I suggest you take Paul's advice.

> p.s. I always thought the "seconds since 1980" time was a relatively

> common thing.

I always thought that "time" was a relatively common/simple thing too... until I started working with satellites and space.

I think "seconds since 19X0 (where X is 7 or 8)" is common in computers, and that the computer community assumes 60s*60m*24h*365d seconds in a year, unless its a leap-year. I would guess this is what Davids time-scale is, but if its not, the errors between the above equation and whatever his time is on will add up (especially if you add up 20 years of errors, and stop right before a leap-year when the errors "reset" a bit), that he will not be looking at data within 2 hours of each other.

-k.

--

Ken Mankoff <http://lasp.colorado.edu/snoe/>

<http://lasp.colorado.edu/mars/>

<http://lasp.colorado.edu/~mankoff/> <http://lasp.colorado.edu/marsrobot/>

Subject: Re: Time Woes

Posted by [btupper](#) on Thu, 02 May 2002 13:11:14 GMT

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On Wed, 1 May 2002 13:41:10 -0600, David Fanning <david@dfanning.com> wrote:

> I have a time array that purports to be the number of seconds
> from 1 Jan 1980. How in the world do I convert that to something
> I can use with routines I have access to?
>

Howdy,

Do you mean that you want to know a Julian time stamp or Calendar date
for the time array values? I don't have IDL in front of me right now
so I can't check this, and I can't clearly recall the syntax.

(The following supposes the 'seconds' are just the run-of-the-mill
kind of seconds...)

```
; start time in seconds
t0 = JulDay( 0,1 1980, 0, 0, 0)
; add the elapsed time since t0
t[i] = t0 + timeArray[i]
;convert to calendar values
CalDat, t[i], month, day, year, hour, min, sec
```

I have a sneaky feeling that your problem is more complicated than
this solution will bridge. The only thing I do well with time (in
IDL) is squander it, but I hope it helps anyway.

Ben

Subject: Re: Time Woes

Posted by [David Fanning](#) on Thu, 02 May 2002 13:38:41 GMT

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Ben Tupper (btupper@bigelow.REMOVE.org) writes:

> Do you mean that you want to know a Julian time stamp or Calendar date
> for the time array values? I don't have IDL in front of me right now
> so I can't check this, and I can't clearly recall the syntax.
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> ;convert to calendar values
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>

- > I have a sneaky feeling that your problem is more complicated than
- > this solution will bridge. The only thing I do well with time (in
- > IDL) is squander it, but I hope it helps anyway.

I think what I want is something about as simple as this. I was in a panic yesterday because I had bid on that job as a project, rather than on an hourly basis, and it suddenly occurred to me that I was earning less as an IDL programmer than I was earning as a tennis coach. The idea of explaining *that* to my wife left me in a cold sweat. Sorry for taking it out on the newsgroup. :-(

Cheers,

David

--

David W. Fanning, Ph.D.

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Subject: Re: Time Woes

Posted by [Struan Gray](#) on Thu, 02 May 2002 15:34:38 GMT

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David Fanning, david@dfanning.com writes:

- > it suddenly occurred to me that I was earning
- > less as an IDL programmer than I was earning as a tennis
- > coach. The idea of explaining *that* to my wife left me
- > in a cold sweat.

It can help to talk. When I was once complaining about IDL time functions my wife gave me the old Monty Python "you were looky..." rant. She deals with time series in the sixteenth century. The year number changes on different dates in different countries. Within the same country it can change on different dates for different types of record, and the different levels and types of law court all used different days too. Best of all, the switch to the Gregorian calender was in mid-swing, so weeks and days disappear whilly nilly from various months of the year, and at different times in all the different countries, palatinates and free republican cities. The Swedes - bless 'em - not only made the switch last, they spread it over several years, catching up one day at a time.

Compared to that, a relativistic correction for the orbital

velocity of a satellite is child's play.

Struan

Subject: CDF_EPOCH (was Re: Time Woes)
Posted by [Brian Jackel](#) on Thu, 02 May 2002 19:05:42 GMT
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Hi

I've found the CDF_EPOCH routine to be very useful for this kind of thing. For your example

```
CDF_EPOCH,epoch0,1980,1,1,0,0,0,/COMPUTE  
CDF_EPOCH,today,2002,05,02,12,50,30,/COMPUTE  
dt= (today-epoch0)/1.0d3 ;difference in seconds
```

This doesn't directly address the tricky question of leap-seconds, but the CDF source code is available (http://nssdc.gsfc.nasa.gov/cdf/cdf_home.html) so in theory you could check it to see what goes on inside.

Brian

David Fanning wrote:

```
>  
> Folks,  
>  
> OK, I'm completely lost.  
>  
> I've been perusing the JHAPL IDL library for days, it seems like,  
> but my eyes are still crossed.  
>  
> I have a time array that purports to be the number of seconds  
> from 1 Jan 1980. How in the world do I convert that to something  
> I can use with routines I have access to?  
>  
> Thanks,  
>  
> David
```

Subject: Re: Time Woes

Posted by [thompson](#) on Thu, 02 May 2002 21:51:20 GMT

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btupper@bigelow.REMOVE.org (Ben Tupper) writes:

> On Wed, 1 May 2002 13:41:10 -0600, David Fanning <david@dfanning.com>
> wrote:

>> I have a time array that purports to be the number of seconds
>> from 1 Jan 1980. How in the world do I convert that to something
>> I can use with routines I have access to?
>>

> Howdy,

> Do you mean that you want to know a Julian time stamp or Calendar date
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> I have a sneaky feeling that your problem is more complicated than
> this solution will bridge. The only thing I do well with time (in
> IDL) is squander it, but I hope it helps anyway.

There is an ambiguity in the problem. It isn't obvious whether the seconds in timeArray include leapseconds or not. In other words, is it a UTC-based time, or a TAI-based time? The difference in the two between 1-Jan-1980 and today is 13 seconds. Depending on your point of view that could be negligible or a major mistake.

My gut feeling is that your data is UTC-based. This would make it comparable to Unix time, which is the number of (non-leap) seconds since 1-Jan-1970, and which in IDL is returned with SYSTIME(1). In that case, using the JulDay and CalDat procedures would give you exactly the correct answers.

If on the other hand, the data you have is TAI-based, and you care about the distinction, you might want to check out my routines utc2tai.pro and tai2utc.pro, which are available at

<ftp://sohoftp.nascom.nasa.gov/solarsoft/gen/idl/time/>

William Thompson

P.S. By the way, wouldn't that be

```
; start time in seconds
```

```
t0 = JulDay( 1,1, 1980, 0, 0, 0) * 86400.D0
```

```
;^)
```

Subject: Re: Time Woes

Posted by [Craig Markwardt](#) on Thu, 02 May 2002 22:26:01 GMT

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David Fanning <david@dfanning.com> writes:

>

> Here is what I know. I have some TRMM data in a particular

> lat/lon range at a particular time (e.g. 4AM on 7 July 2001).

> I want to pull out any QSCAT wind data that might overlap my

> TRMM data by about an hour or two.

>

> What questions would it be helpful for me to know to ask?

Hey David--

Everybody is bothering you about TAI, UTC, leap seconds, you must be going crazy! If you are just interested in precisions of overlaps of "an hour or so" then you really don't care about leap seconds, so you can probably forget about most of it. (just wait until you get to TT, TDT, TDB, TCG and TCB!)

For doing overlaps the real necessity is to get the times of your TRMM data and QSCAT data into the same format, doesn't matter what format that is. One easy one is to use Julian days as Ben, et al have been describing. You have a "seconds-since-epoch" format, so you would indeed take:

```
t_trmm = .... ;; Seconds since 1980
```

```
;; Convert to Julian days (86400 seconds per day)
```

```
jd_trmm = julday(0,1,1980, 0,0,0) + t_trmm/86400
```

and then you probably have to do something similar to the QuikScat times, right?

Craig

--

Craig B. Markwardt, Ph.D. EMAIL: craigmnet@cow.physics.wisc.edu
Astrophysics, IDL, Finance, Derivatives | Remove "net" for better response

Subject: Re: Time Woes
Posted by [Robert Stockwell](#) on Mon, 06 May 2002 13:14:18 GMT
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David Fanning wrote:

...
> Here is what I know. I have some TRMM data in a particular
> lat/lon range at a particular time (e.g. 4AM on 7 July 2001).
> I want to pull out any QSCAT wind data that might overlap my
> TRMM data by about an hour or two.
>
> What questions would it be helpful for me to know to ask?
>
> Cheers,
>
> David
>
>

qscat? cool! I work on qscat data, as well as a couple other
folks here at CoRA. I haven't done any TRMM comparisons, but can ask
a colleague who is focused on equatorial bands. I'll send him an email.
Off hand I'd mention that qscat sees rain very well (if you check
out the rain flag). So you can compare your TRMM data with that to
verify that the time is correct.

Cheers,
bob stockwell
colorado research associates
boulder co usa

PS I focus on southern latitudes and the cirmumpolar ocean, and
do a data adaptive 3D Loess interpolation scheme to make nice
windmaps (constant time images).

Subject: Re: Time Woes
Posted by [btupper](#) on Thu, 09 May 2002 14:21:54 GMT

On 2 May 2002 21:51:20 GMT, thompson@orpheus.nascom.nasa.gov (William Thompson) wrote:

```
>  
>> ; start time in seconds  
>> t0 = JulDay( 0,1 1980, 0, 0, 0)  
>> ; add the elapsed time since t0  
>> t[i] = t0 + timeArray[i]  
>> ;convert to calendar values  
>> CalDat, t[i], month, day, year, hour, min, sec  
>
```

```
>  
> P.S. By the way, wouldn't that be  
>  
> ; start time in seconds  
> t0 = JulDay( 1,1, 1980, 0, 0, 0) * 86400.D0  
>
```

Oo, right! That would make a teeny difference... on the other hand, that's nothing that David couldn't convincingly arm wave about.

Ben
