

## Argelander Naming Scheme and other Absurdities in Astronomy

The early history of astronomy is intimately tied to the history of variable stars. The pioneering astronomers made a number of absurd mistakes and these can be excused owing to lack of prior history. However, as will become clear from the observations below later astronomers continue the excellent tradition of absurdities well into the twenty first century.

In 1844, there were only 14 known variable stars. Argelander believing that variable stars were rare suggested the following scheme (item 1 below). As the number of variable stars grew, there were appendages (items 2, 3, 4). Finally, when even this was exhausted, astronomers switched to V nnn approach with V 335 being the first in this series (item 5).

1. First variable star is R Constellation. Next one is S Constellation. Thus we get 9 stars (R, S, T, U, V, W, X, Y, Z). Examples include “S Andromeda” (supernova of 1855 in the Andromeda galaxy) and “T Tauri” (the archetypical pre-main sequence star).
2. The next series is RR to RZ. This yields another 9 stars. Examples include “RR Lyrae” (the exemplar of a class of pulsating variables) and “RS CVn” (a model star defining a class of stars with activity driven owing to binarity).
3. Then next series is SS to SZ, TT to TZ, ..., ZZ. This yields a total of  $8+7+6+5+4+3+2+1$  stars. An example is the famous seismological pulsator “ZZ Ceti”. (SS 433 refers to the Stephenson and Sanduleak catalogue and has nothing to do with the Argelander scheme.)
4. We then jump to AA through AZ, BB to BZ and end with QQ to QZ. However, the letter “J” was excluded.<sup>1</sup> This scheme yields  $25 + 24 + \dots + 9$ . Thus the grand total is

$$n_{max} = 9 + 26 \times 25/2 = 334; \quad (1)$$

here, we have used the well known result from Gauss<sup>2</sup> that  $1 + 2 + 3 \dots + n = n \times (n + 1)/2$ .

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<sup>1</sup>Argelander’s ghost still haunts us. The entire “I” column is excluded in airplane seat names. Check it out next time you fly.

<sup>2</sup>Gauss deduced this formula in first grade. The teacher asked the children to sum up 1 through 50 (to keep them busy for the rest of the day). Gauss inverted the series and noted that each pair adds up to the same value. This elegant trick yields the above formula.

5. However, the advent of photography vastly increased the number of variable stars. When more than 334 variables in the constellation the scheme switched to the “modern” V (for variable) numbering scheme. This starts from “V 335” and marches up. Fortunately, integer theory informs us that we have an infinite set. Example: the variable after “QZ Cyg” (an “irregular” variable) is “V 335 Cyg” (an M1 variable star). “V 404 Cyg” is a famous black hole binary.

## Supernovae

Fast forward by another hundred years. Astronomers continued the development of absurd naming schemes for a specific class of variables: supernovae (SNe). The convention is SNyyyy[A] where A=A-Z. One you run out of these 26 slots you switch to “aa-az”, “ba-bz” and so on. The SNe convention is not case sensitive (since most SNe astronomers never learnt anything beyond Fortran) and has no prohibitions against anti-hierarchical combinations (e.g. “2004 fa” is a valid SN name). Also no airplane prohibitions (e.g. “2004 ia” is a valid SN name as is “2004 ja”). Finally, the slots are given on a first come, first serve basis. Let us say that I identified an SN in an obscure galaxy and took a few months to report it. Meanwhile, a young amateur reports an SN. In this case, the second SN gets a slot ahead of the first one (the slot assignment is made by the IAU Circular folks who have vested in themselves the power to name SNe).

I guess once we find more than  $26 + 26 \times 26 = 702$  SNe we will switch to “aaa” through “aaz” and so on. The SN rate in the Universe is inferred to be 1 per second or  $3 \times 26^5$  per year. Thus we should be preparing ourselves to a blizzard of alphabets once PanStarrs & LSST turns on.

## Gamma-ray Bursts

Fast forward another 50 years. GRB astronomers not wanting to be left behind in this entire *l'affair absurd* are continuing with 050219, 050219b *ad nauseam*. (Note the inconsistency in which 051219 = 051219a). Recently three GRBs were observed and immediately got the designation of *yymmdd*, *yymmddb* and *yymmddc*. The second event was found to be spurious and thus the second event was dropped leaving GRB*yymmdd* and GRB*yymmddc*. A diligent student would probably spend a day looking for the lost “b” GRB.

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Gauss went on subsequently to make great strides in the theory of prime numbers and the theory of distribution of errors (which he developed in the course of determining the orbit of the asteroid *Ceres*).

Let us not repeat the mistakes of Argelander and assume that the GRB rate is well below one per day. It is not.

I circulated a suggestion to some well known GRB astronomers that GRBs be given the designation *yymmdd.fff* where *fff* refers to the fraction of the UT day. Two or three decimal digits is sufficient carry us well into this decade (even if a large population of SN 1998bw/GRB 980425 was to be discovered). While we are at it I suggested that we switch to Y2K compliance: *yyyymmdd.fff*.

I realize that *yymmdd.fff* or *yyyymmdd.fff* are impersonal. We can of course use the integer part if that is the only burst for the UT day. If there are two bursts we could use 1 decimal number (much like 3C catalogue).

Finally (in anticipation of objections) I noted that such impersonal approach is a necessary part of maturity of the subject. We should simply adapt to it. As an example the first brown dwarf had a “real” name (Gliese 229B). Discoveries during the next few years had colorful (even if contrived) names like Tiede 1 and Kelu 1. However, once 2MASS and SDSS started functioning brown dwarf names became impersonal (e.g. SDSS 1624143+002915, 2MASS J0559191–140448).

## Moody’s Rating Scheme

Moody’s is the world’s best known financial rating company<sup>3</sup> The adjective “best known” is simply a statement about the perceived standing of Moody’s and not necessarily a statement of whether they deserve this honor. The fortunes of companies and even countries are tied to the Moody’s rating. If you come down a notch in the Moody’s rating then you could be losing say a few billion to a few trillion dollars of perceived wealth.

Given the burden carried by Moody’s one would expect great financial and mathematical sophistication on their part. However, one glance at their rating terminology should keep you wondering whether the next global financial meltdown is round the corner.

1. **A series: Aaa, Aa1, Aa2, Aa3, A1, A2, A3.** These ratings include the preferred stocks and bonds ranging from “gilt edged” to favorable investments.
2. **Baa1, Baa2, Baa3, Ba1, Ba2, Ba3 B1, B2, B3.** These range from adequate investments to investments with some risks.

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<sup>3</sup>See <http://www.moodys.com>.

3. Caa1, Cass2, Caa3, Ca, C. Poor prospects.

It is one thing for astronomers to revel in SN 2002azq but another thing for the world to trust Moody's (arcane) ratings.

## Names of Hurricanes and Tropical Storms

In contrast to the above discussion, there appears to have some thought given to naming hurricanes. "Experience shows that the use of short, distinctive given names in written as well as spoken communications is quicker and less subject to error than the older more cumbersome latitude-longitude identification methods." (from the National Hurricane Center, <http://www.nhc.noaa.gov/aboutnames.shtml>).

The Center maintains six lists of 21 names (which featured only names of women until 1979) and these are recycled every six years. When the number of hurricanes exceeds 21 the greek alphabets are invoked ( $\alpha$ ,  $\beta$ , ...). Given the correlation length of hurricanes there must be an upper limit to the number of hurricanes per season. Hopefully we will not have to start appealing to Sanskrit, Hebrew and Cyrillic alphabets.

## Postscript

### GRBs.

My suggestion of GRB naming was rejected by a coterie of pundits in the field. One particularly feeble-minded astronomer was heard of complaining that the naming scheme undermined the rich history of GRB astronomy. (Okay, this cheap shot is not necessary but so juicy...). It is my observation that astronomers who have accomplished modestly in their professional life but suffering from a strong sense of insecurity love this sort of (useless) history. Under the guise of "rich" history of astronomy these people like to preserve such mind bending notation (mainly to keep non-guild members out, I suppose).

### Palomar Transient Factory.

The Palomar Transient Factory is now finding a new transient every 15 minutes (under normal observing conditions). We had a furious debate (it is characteristic that naming opportunities elicit more debate than any other

topic) with some proponents arguing for an ISO convention (the RA, DEC, epoch) and others for personal names (such as Spot, Spock, Shamu).

Based on the experience of the field of hurricane studies we decided to settle on the convention PTFyy[abc] where yy is the year and [abc] is the supernova convention: {a, b, ..., z, aa, bb, ..., zz}. This convention allows for rapid naming and the names are short enough for verbal discussions.

### **The Great Financial Scam of the 21st Century.**

This little note was written circa early 2007, well before the great financial meltdown (which started in summer of 2008). It turned out that almost every one in the financial industry: banks ordinary, investment and otherwise, the captains of industry, CEOs, Wall Street and perhaps even regulatory bodies were either plain old fashioned thieves, some more competent and some marginally innocent.

The reader should perhaps not be surprised to learn that the financial rating companies were perhaps the worst thieves. The obscure naming convention allowed them a degree of murkiness that allowed them to go public, collect money, issue rosy ratings and make a tidy sum of money.

In real life (hurricanes and financial world – as opposed to astronomy) names are clearly important. When you see a highly convoluted naming convention assume that foul play is at work.