**Howell – General comments on Yaskell, de Jager, & Duhau's Grand Solar Minima-Maxima book**

version: initial draft 26Sep2011

The book is quite different from what I expected, and to the previous book “Maunder Minimum”. I didn't have the earlier book on hand during my vacation, and may at times be confusing it with other climate-history-astronomy-geology books. Now that I'm back home I don't have the time to go over the previous book, as I'm digging my way out of a backlog at work and home.

As the book is in early-stage draft, I have made no comments on spelling, syntax, grammar, semantics, or style. I have not provided further detailed comments on Chapter 4, given my previous notes. Additionally, starting with c6p16, I have cut short my comments to get this out and get onto other priorities I have.

I will have to put aside my actions related to the book for a while, as I had stated in past communications. Right now I have to do pre-winter exterior house repairs, my 2010 income tax submission, “Neural Networks” journal paper reviews that are just being dumped on me, and a bunch of other stuff. In relation to the book, I do want to pick up the length Of Day modeling, which will be an important basis for any war or history analysis in the recent past (since 1600). That won't be done before February, if I don't get hit with other demands.

Nomenclature:

c0p1h0.9 - c = chapter 0 (Intro), p = page (1), h = height down page (90% of the way down the page)

# Purpose of the book

It seemed to me that the following themes are central to the book:

* describe the de Jager-Duhau model of solar behaviour, covering Navier-Stokes, magnetohydrodynamics and chaos theory (attractor basin/phase diagram) approaches. However, the distinction (advantages, realms of applicability, etc) between the mathematical toolsets is very unclear in the book.
* provide context for the de Jager-Duhau model, including solar system structure, helio- & geo-magnetic structures
* describe sun-earth interactions and connections (see “What's missing – details on randomly selected points”)
* provide some context related to societal impacts and history (Chapter 4)

# Target audience

If I'm not mistaken, the ?stated? target audience is the general “science-interested” public, especially those interested in climate and the sun. To a lesser extent it will serve those interested in global warming (many of whom “turned off the sun” years ago and aren't very receptive) and history (here I am speaking of the general course of history as opposed to the histories of the sciences which are covered).

To me, the core audience will be non-expert university graduates with a science background and some combination of:

* some degree of skepticism about the global warming issue (small portion of population)
* an interest in astronomy, especially theories of the sun and stars (very narrow group – but this precisely the strongest contribution of the book). Chapters 2,3,5,6 and 7 (implication of de Jager-Duhau model for Earth processes)
* an interest in history, although content is somewhat random and anecdotal (Chapter 4 – I would move this to follow Chapter 7 so as to not confuse the flow of the astronomy-centric chapters)
* an interest in the “philosophy of science”, and where it succeeds and fails as illustrated by science history & personalities, and their actions and beliefs. While Chapter 1 contributes a lot to this theme, the title of the Chapter doesn't convey that (no big deal, just something that sticks out – some who are very interested in this might skip material unknowingly).

If the book had a much broader and deeper coverage of societal impacts of past grand solar [maxima, minima] (as I had initially expected) then I would have thought that it would have a far broader appeal, adding those interested in:

* broad history
* societal shocks-breakdown-adaptation – including periods of revolution/ great change, war-conquest-collaboration, rise & fall of civilisations
* great changes in religion and mythology – eg ancient mythology, sun-&-planet-centric, rise of monotheism, focus on psychology & self-improvement rather than gods (a bit like Eastern philosophies)
* political structure and public policy – especially with respect to great stress and shocks against society
* epidemiology & pandemics – human, pests, crops, game etc
* geological impacts and timing – earthquakes, volcanoes, flooding (… leading of course into climate area)
* markets, financial, economics across history

(i.e. a far greater PEOPLE emphasis – as is evident in your introduction “Only eight light seconds away”).

The implication here is that while the wording and degree of math seems to be best adapted to the “loosely inferred” target audience (i.e. those with a general interest in [general history, climate, science, societal shocks-breakdown-adaptation]), my guess is that it is too low a level to be effective and interesting for science graduates with inquiring minds (i.e. “raising questions in the book to challenge them to think”), for whom the current content is actual better suited. I find that often the “common-day examples” tend to confuse more than clarify, but at other times really help – this may of course be resolved with successive re-writes.

A way to address both crowds is to keep the main part fairly general (still targeting “science friendly” public – who aren't afraid of some detail as with the descriptions of the de Jager-Duhau model), but to add Appendices with much more meat and an overall description of the concepts and the mathematical tools.

It might be a good idea to define the targeted readership in the book description/ book cover comments. (eg in c0p1h0.9 where c0 = introduction)

# What's missing – details on randomly selected points

**Cosmic rays & SEPs - A very key point is the not-so-directly-stated result that SEPs have a dominant role in isotope (C14, Be10) formation in the upper “atmosphere” (ionosphere) through CME interactions with bow shock fronts (Chapter 6, page 11, height 50% down page = c6p11h0.5) NOTE: this contrasts (but does not necessarily contradict) with the typical assumption that higher energy galactic-cosmic rays (particles) do this, with the extent being moderated by a stronger or weaker helio-magnetosphere. I think you do mention in the book, but this new distinction isn't emphasized enough!!! It is also a longstanding conclusion of the “Electric Universe” theory for a long time, which includes the “termination shock” of the solar wind, AND the “PNP transistor effect of the corona, as well as the de Jager – Duhau planetary shock fronts. However, the INVERSE relation between [solar activity, cosmic rays] is not explained (that I can remember – I should check this) for the NON-extra-galactic (solar shock fronts) explanations for the source of the high-energy “rays or particles”.**

C5p4h1.0 “... according to Svensmark or Nature in general ...”

c7p16h0.05 “... if the evidence from the superconductor at CERN is conclusive ...”

I STRONGLY object to ANY inference that CERN has had anything to do with developing the galactic ray concept. CERN's role has exclusively been as backstabbers, inadvertent confirmers of the concept, and thiefs of someone else's work. This is entirely consistent with CERN and other major institutes' behaviour with several other issues that I've followed. Their only role was to reluctantly confirm what Svensmark had thoroughly established long before them. CERN results flew against CERN intentions.

Energy levels of the SEPs (Solar Energetic Particles) and galactic/cosmic rays - are NOT defined, making it difficult to get a feel for what de Jager and Duhau are saying, and how that might differ from the work of others.

Societal impacts and history (Chapter 4) - I was expecting this to be MUCH broader, addressing each grand solar minimum/ maximum, and intervening period in the context of “societal & historical measures”), with the intent of looking for similarities and contrasts for similar periods across history (the “Maunder Minimum” book did this for one grand minimum only).

c2p5h0.0 Sun-Earth connections – Electrical processes

This tantalizing reference to Sun-Earth connections doesn't go far enough, and in my view needs to be elaborated. Perhaps de Jager and Duhau feel that this is still speculative, but their insights may be quite valuable even if they tend to date the book as issues develop. This also brings out the “Electric Universe” perspective that is missing entirely in the book so far, as it is with ALL conventional astronomy (sort of, see below).

Electric Universe, Electric Sun perspectives

Magnetic phenomena BEGIN with electrical process and do not arise without them (unless one refers to permanent magnets on a macro scale, glossing over details) – and of course this is present at the basis of . Describing astronomy, and especially the sun, without electrical processes is anomolous.

??????? more to add later ???????

c5p3h0.1 magnetohydrodynamics – EU adherents comment that MHD is NOT a general nor adequate framework of thinking about the behaviour of plasmas. My own uninformed impression is that MHD uses the standard relations, but ignores the complex behaviours of plasmas (especially dilute plasmas), and somehow is restricted in emphasis to the surface/interior of the sun. What I'm saying here isn't true – as geomagnetics, atmospheric physics etc apply it, but perhaps another way of saying it is that, as a general principle, complex behaviour of systems does not EMERGE from the fundamental “laws or models” - it is observed, then the models are iteratively adapted to produce the observed effects. It is therefore a mistake to assume that “... a correct basic model provides the answer ...”, or something like that.

Donald Scott “The Electric Sky”, Mikamar Publishing 2006 - It appears to me that the de Jager-Duhau model (toroidal and poloidal coils) is a simplified and incomplete version of David Scott's “Electric Sun” model, which in turn is (if I remember correctly) based on Hanns Alfen's model of the sun (as appears to be the case with de Jager and Duhau as well). As de Jager and Duhau heavily emphasize magnetic components, it is as if they are missing the basic component, electricity, as well as being missing descriptions of real plasma behaviour and energy potentials at the photosphere/chromosphere/corona – including the granular structure of the photosphere, and Scott's pnp transistor behaviour for “regulating/smoothing” solar output. Donald Scott also points out persistent errors of consensus scientists regarding plasmas, electric and magnetic fields.

* C6p9h0.5 “... reconnecting flux tubes ...” - this appears to be one of Scott's pet peeves of where scientists mis-understand, or use inaccurate simplifications of, basic processes.
* C6p10h0.2 “... Archimedean spiral magnetic currents ...” - sounds like you are referring to Birlkeland currents. Don't worry, seems that essentially all conventional astronomers have been dropping that ball for 100 years plus or minus.

C7p1 It is to the advantage to de Jager & Duhau to mention similar and contrasting models. The Electric Universe view is more of a complement to the de Jager & Duhau model.

Futhermore, don't forget to include a data-driven perspective. Blinding the reader to a model-only perspective blinds them to reality and the limitations of our current understanding.

Non-stationary behaviour – states, phases: This isn't well covered, and is a fundamental limitation of the de Jager & Duhau hypothesis, which is based on only 1 major cycle! The literature is riddled with great correlations (such as geomag) that fall apart for the next phase/state. It is highly likely that that is the case today – in my own view, the last 15 ky of C14 data is highly suggestive that we should not expect similar behaviour in the next little while. That's a hunch, not a modeled result.

c2p7h0.45 Missing concept of “quasi- or pseudo-” periodicities (introduction of “grand solar episodes”)

Scientists seem to immediately think of sinusoidal curves when periodicities are brought up, then criticize concepts wrongly when the amplitudes, periodicities, and waveforms vary, as is usually the case with complex dead systems. This is a huge failure at the most simple, introductory level, and it would help if your book would contribute to stomping this out (as has happened with the “correlation does not guarantee causation” mantra, which has actually swung too far!).

C5p9h0.35 “... you could say there are no particles up there ...”

M understanding is that this is the old view – and is completely wrong. Space within the solar system is anything but a complete vacuum!!! The interplanetary content is very important.

C5p13h0.1 CO2 is NOT the main driver of recent warming trends...

Good points, but add:

* ALL GCMs predict a mid-latitude tropospheric warming that is an ESSENTIAL FEATURE of so-called GHG warming, but that does not exist. On this basis alone, the GHG dominance concept is a complete failure.
* All predictions have failed miserably after only a few years – the models are essentially USELESS. The UN-IPCC has wisely decided to no long show predicted versus actual, a wise decision for fools. Again, on this basis alone the models can be completely rejected as a basis for 100 year forecasts.
* GCM assumptions for cloud cover have been shown to be completely wrong – trends are in the OPPOSITE direction! Minor changes in cloud cover are far more important than CO2 changes above 60-90 ppm level.

C6p2 etc - acceleration of solar wind (+ve) away from sun, electrons twoards sun not mentioned (huge electric field gradients within solar system!)

Dimensionality reduction effects - Here I want to emphasize a “back-of-the-envelope” approach to the DIRECT effect of the TSI on temperature. This approach is a vast simplification, and wrong in essence, but perhaps no worse than a century plus of of huge mistakes with the GHG models. Much attention is paid to the T^4 blackbody radiation relationship. However, in most room-temperature engineering examples, the order of importance of heat transfer mechanisms is:

 convection >> conduction >> radiation

Phase synchrony and phase locking are not discussed. I really like those concepts, and suspect it would add to the application of he de Jager & Duhau mode (to Earth Sciences etc0

c7p11 The more chaotic a system, often the more sensitive it is to third or fourth order minor (miniscule) influences. I suspect that de Jager & Duhau would have great comments on that.

C7p13h0.0 Name of coming grand solar minimum (hibernation)

I've already stated that I think this clearly belongs to Abdussamotov or Charvatova – with my preference the latter.

## Trivia comments

c2p10h0.15 - Timing of grand episodes

Here, I think your thrust would be vastly more credible if it showed 7 to 10 ky of grand episodes!!

c2p10h0.7 - Beyond Fourier series

Wet the reader's appetite! (wavelets, high dimensional kernels, etc etc)

c5p2h0.15 - “... about 12,500 miles per second ...”

With respect to what – tangential (important to state!) - This is stated two lines later. Strange reference, as I would have thought the centre of the Milky Way would be more informative in a general sense, but nearest constellations OK as well.

C5p4h0.1 - It seems to me that it is usually stated that very high energy cosmic rays get through no matter what – mid-to-low-energy cosmic rays (30 to 70 %???) are the ones most affected, dependign on the strengths of the helio- and magneto-spheres.

C5p4h0.5 “... Personally, we don't feel a thing ...”

Perhaps we don't, or perhaps we are accustomed to 2 or 3 rays causing damage throughout our bodies each second. But the effects on neurons, DNA etc have force evolutionary adaptations to systems to be tolerant of this, to a limit.

C5p4h0.7 Cloud effects

A particularly powerful illustration is the widening of the “tropical cloud belt” as cloud cover (eg cosmic ray effects) increase or decrease (I don't have the video reference hyperlink on hand, but it's worthwhile considering putting a link to that in the book)

C6p19h0.45 “... sunspot record, which (only!) goes back to 1610 ...”

INTERESING POINT – look at my comments for chapter 4 (or maybe my “framework for thinking) where I refer to ?Eric Chan's ? very long sunspot proxy from 600 My ago!! One could check this over most of the last 570 My, as a basis for extendign and verifying the de Jager & Duhau model!!!!

c7p14h0.9 phase lags and time delays are not discussed much, and seem to be a gap in the thinking.

# Stylistic

I realize that you will be re-writing everything, but one or two comments might help. I've commented elsewhere how I liked the content, approach and style in many places of the book. Here I've listed a few things that struck me.

Hyperlinks - Even though books are printed, I think it's important to follow the modern paper and book trend of having a website with supplemental material, and links to outside links!! You yourself lead into this:

* c5p8h0.5 Figure ??? of atmosphere - Although it would make the figure “busy”, I think that a graph of temperature profile would help greatly if alongside the layers of the atmosphere! By he way, several labels are hard to read...

Chapter 5 - The “poetic” writing style was sometimes ambiguous and distracting.

C5p11 - particularly confusing page

c6p2h0.3 – logic seems mixed up in the paragraph, jumps to a conclusion... (eg “TSI, the fourth” what?)

c5p2h0.45 - I think that the use of the phrase Tellus, Tellurian etc is distracting...

c6p5h0.75 more confusion than light

c5p6h0.5, c5p7h0.4, c5p9h0.0 etc etc “SEPs”

Provide the definition of SEPs with first usage (perhaps for each chapter)!

Cycle nomenclature - I flopped around in my previous notes on nomenclture for the solar episodes and quasi-cycles of history and climate. I think the best idea is to use BOTH a common name AND period (eg Maunder minimum (~1615-1710).

# Great points in the book - randomly selected

There are a lot of good points in the book, so I will only list a few here that struck me.

c0 Introduction - you will probably do this anyways, but providing an overview of the book's content, direct up front might help the reader. (Perhaps just in a Foreword) Given the importance an profile of the de Jager-Duhau solar model, that theory is important to mention up front (and why).

c0 Introduction - Has a strong, haunting quality to it, very effectively using personal experiences to “break the mindset” of the reader to consider “impossible-to-imagine” scenarios.

In a lucky stroke of weird timing, on 26Sep2011 I picked up a copy of the New book by Harry S. Dent Jr. (see details below). His concluding comments echo yours in an uncanny way, and could be not only a nice quote, but a great cross-over to the same sort of issues from a financial perspective. For almost two years I've planned to write a review of Dent's previous book (“The next Great Depression”), but I'll do it soon given the new book release (two birds with one stone).

*Harry S. Dent Jr, Sep2011 “The great crash ahead: Strategies for a world turned upside down” Free Press, New York, 341pp ISBN 978-1-4516-4514-7*

c1 Historical thinking/ science - I enjoy this chapter, and I feel that it's essential to understand the history and individuals driving science, as that gives one a great starting point to locating fundamental errors in all of the great theories! At times the wording in the Introduction (and elsewhere) is a bit convoluted.

C2 I really like the historical context for de Jager & Duhau, and the credence given to Russians, the awards etc.

C3 Again, I really enjoy the historical context,...

c6p18h0.6 global versus regional

Good point – better to state that we're really far more interested in the regional changes, which are HUGE compared to global variances!

C7p7h0.2 Figure 4 – great figure!!

c7p9h0.0 Figure 6 - I love the way theyshow the “non-chaotic” phase.

C7p18h0.6 “... a base function of compact support is needed ...”

Interesting. Are they including tools like radial basis functions, wavelets, etc? Oops – you say that in a GREAT citation of Buhmann!! Neural Networks have long employed tools like these (also Support Vector Machines as a special case of NNs (Vapnik's Statistical Learning theory) – Guangbin Huang's “Extreme Learning Machines” subsume SVMs).

## Trivia comments

c1p9h0.25 - “... Parker spiral ...” , , c2p3h0.1 - “... future Bruce Medallist Dr. Eugene N. Parker ...”

I guess this is the scientists that first proposed the existence of the solar wind and was ridiculed. A friend of mine pointed out that another common school-friend's father was the “solar-wind scientist”. I have a terrible memory and don't remember any of this, but I had checked quickly on the internet but perhaps had written the name down incorrectly. Perhaps I should track this down just for the sake of my friend.

c1p5h0.25 - “... which in its turn brought de Jager and Duhau in contact with me ...”

Cool. Personally, I love anecdotes like these! Other thing to note, de Jager's not getting younger and probably needs to get major themes on the record, beyond the constraints of scientific papers. I'll probably comment elsewhere too, but I get the impression that the book would benefit from even more insights or “lunatic thoughts ...” of de Jager, Duhau, and Yaskell.

c2p6 References for key de Jager & Duhau papers - Great to provide these. Still need a list of references by chapter or for the whole book.

c3p3h0.5 - reason, logic, and nationalism

As you already know, I'm not an adherent of special relativity. There have been comments that in a sense, Einstein's concepts were pushed much farther and faster than they might have because it provided a refutation or challenge to the rising dominance and success of German science and scientists. Maybe that's a stretch, but even though I do not have a good feel for the context of those years, it isn't entirely implausible to me. But I'll put that aside until I stumble across more historical notes (… but I won't be chasing this theme).

C6p14h0.0 “... it is now known ...”

The meaning hear is not clear, but I do think that repeated mention of the different components of SI, and that these are temporarily “partially de-correlated” is very important. (And you do refer to that several times.)

# Off-colour points – randomly selected

There are a few comments that struck me as being difficult to defend, albeit personal style and preferences play a huge role in these things. Being an adherent of a “multiple conflicting hypothesis” approach to prevent myself from doing what we all do anyway (ignore the data in favour of a cherished belief), the idea isn't to remove points, but to prompt second thoughts.

c1p8h0.9 - Svensmark and predecessors' galactic ray theory is glossed over and, right or wrong, is NOT put into proper context. Furthermore, CERN should not be mentioned except in a footnote (an appropriate treatment of back-stabbers). At the current time, right or wrong, Svensmark's work describes well a huge chunk of climate variability across timescales from days through 140 My, while de Jager and Duhau's theory cannot at present do anything like that except for a very restricted set of timescales. Most of all, keep in mind that the cosmic ray & de Jager-Duhau theories do not conflict!

c1p9h0.1 - Here, as through-out the book, I think that you are making a huge mistake by harping on the phrase “non-linear”:

* Definition - First of all, you don't define it, (eg gentle non-linear, strongly non-linear but still continuous and well-behaved, violently non-linear & chaotic, discontinuities and singularities all over, stochastic chaos, and of course special families of systems). There are also other contexts – such as with regression techniques when the PARAMETERS are linear, even though the variable expressions might be extremely non-linear (including complex, non-linear combinations of variables), as well as linear differential equations (separable, superposition applies). My GUESS, is that you are referring to continuous, non-violent non-linearities (including smooth chaotic attractor systems) AND the differential equation/ chaos contexts. But that's a wild guess on my part as I really don't know what your thinking is.
* Wrong judgment - probably more often than not, you are accusing scientists of applying linear techniques when that is absolutely NOT the case! (I may be wrong with reespect to simplifications of MHD that may be applied – and if that is the case, it's important for de Jager & Duhaue to clarify how that is being done and the errors inherent in that.) Perhaps it is more a case that coventional/consensus scientists fail to apply tools like chaos theory, which are far better able to describe many real systems?
* c6p2h0.3 “... linearity of TSI ...” - What do you mean by this?
* C7p14h0.9 a definition of non-linjear → sort of, but not really. My impression here is that you mean chaotic systems, not non-linear. (non-linear is so general as to be kind of meaningless)

c2p7h0.5 - “... So what's a grand episode ...”

Quasi-cycles of climate and geology are introduced elsewhere and should be at least introduced here, to provide context for the “grand episodes”.

c3p8h0.1 “... No earth tree signature of 11 year signal ...”

Be careful – the diagram and wording almost imply that there are NO rings during a grand solar minimum, even though that's not what you say. This should be clarified to avoid confusion and misunderstandings that could be embarrassing for readers in later conversations they have with others.

c6p12h0.4 C14 lifetime in atmosphere. It seems that for a long time, scientists clained a residence time of perhaps 70 years or so in the atmosphere for CO2. My own modelling, and more recent statements, have put that at closer to 5 years (perhaps for C14 in particular, I don't remember, but I don't expect the isotope makes that much difference).

C6p13h0.3 “...to puncture, on a cold, radiation-calm, near-3 A.M. Earth night side (c. 4 A.M.) corkscrew punch ...”

Strange – why punctures on the NIGHT side? Night for whom? - Presumably means an effect the 1859 Carrington event on the atmosphere on the opposite side of the world (night)?

C6p13h0.45 It seems to me you are confusing the peak of the sunspot cycle with the timing of specific CMEs?

C6p15h0.25 “... very ambiguous term: forcings. ...”

You are right that this terminology is (purposefully) misleading, so introduce your own!! I prefer [drivers / modulators / reservoirs].

C6p14h0.4 Title “Solar – and orbital – forcing” and “... and this is determined by the Sun, only ...”

Wrong, the way I look at it. Orbitals aren't solar (although they are certainly influenced by solar!). “Astronomical” is a much better term – as with all Milankovic forcings (precession, obliquity, eccentricity plus others like tilt of plane of Earth's orbit).

C6p18h0.5 CO2 models (GCMs)

Get rid of this paragraph!! The GCMs ALL completely fail to model the troposphere - for the GHG CO2 concept to work, these models REQUIRE mid-latitude tropospheric warming that DOES NOT OCCUR. It's BULLSHIT!

 C6p20h0.1 “... cosmic ray intensity is modulated by ...”

Add extra solar system & maybe extra galactic effects.

C6p21h0.4 Halstatt Cycle vs Dansgaard-Oeshiger events

Keep these separate!! I had wanted to see if the D-O events were a component of the 2,400 year cycle, but still its best to keep separate.

C6p25h0.1 Navier-Stokes

Navier-Stokes are NOT a genral fluid flow equation, and certainly aren't applicable to plasmas – MHD goes into that, but is still perhaps not adeqUATE.

C7p5h0.5 “... not founded on computational fact ...”

Yikes! Computational models aren't facts!

* Correlation isn't causation, but its a great clue
* models aren't reality – they can help but far too often they blind

De Jager & Duhau may feel uneasy because of the relatively lukewarm acceptance of chaos & complexity theory – but that may be a cognitive failure of most sceientists who can't handle the concepts, and who can't recognise models that describe data well, as opposed to being married blindly to “classical modeling techniques. De Jager & Duhau shouldn't be so defensive in the book – rather, they would do a service by provisiding opinions and visions based on their own experience, perhaps prodding mainstream sciene to wake up, if that is appropriate (scary thought).

## Useless whining by the reviewer (me) ...

Entire book

You need to establish the habit of putting a draft notice, version/date, website contact, and copyright notice!

c0p8h0.1 “... the plants are sitting nuclear bombs ...”

You discredit yourself with this. There is a complete lack of [rational, logical, scientific] thinking in relation to nuclear energy, and I don't expect that to change until we are conquered by a superior race. <grin – that's a joke, referring most likely to homo sapiens or bio-successor, but possibly to the Terminator robots>

c0p8h0.6 “... photovoltaic: not thermal – which requires too much water ...”

This is based on confusing what is being done, versus what can be done, with thermal cycles. Actually, there are many examples of what can be done – it's just not what is done normally if one is driven by rational thinking in current markets.

c0p9h0.25 “... The final frontier – space – hasn't changed since John F. Kennedy's invocation as to its existence ...”

Generations of scientists and sci-fi writers might feel slighted. The guy who made it happen was Josef Stalin (I think you refer to this elsewhere).

c1p6h0.6 - I feel that coverage of evolutionary theory should first mention Alfred Russell Wallace, then Charles Darwin. That's key – as its entirely possible that the heart of the theory ONLY came from Wallace. It's not possible the other way around (based on information on hand that I've seen – but missing or buried correspondence could change that).

c1p7h1.0 footnote 16 - who is the woman?

c2p8h0.2 Figure ??? Grand & regular episodes (see also c3p16)

Change the waveforms for each example!!! Given the obvious rescaling of exactly the same graph, the illustration is actually confusing...

c2p8h0.95

 “... We can safely say without reservation that longer term predictions of how Earth is affected by longer term warming (stronger) and cooling (weaker) are clear and well known. ...”

Bullshit its predictable, clear and known! More like we're all true believers in a pile of baloney. (Not even Milankovic is correct).

*A very important point is that ALL spatio-temporal time-scales are important. This is counter-intuitive to scientists (and others), as we usually focus only on processes of the same temporal-spatial “size” as the phenomenum we are looking at, and this is usually not a bad 1st assumption. But climate effects are typically third or fourth order, NOT “common sense first order thinking”.*

c2p9h0.1 “... Shorter term variations in Sun-Earth climate change are difficult to pin down ...”

Seems categorically wrong to me – there are lots of associations/ correlations. The issue is that most scientists refuse to consider this (Courtillot etal paper 2010, Paul Vaughan, famous solar cycle length vs climate etc etc).

c3p15h0.0 Figure ??? “400 years of sunspot observations”

I suggest using a graph more like Ken Tappings where the solar irradiance (F10.7) is plotted. That gives a feel for the sunspots AND solar irradiance levels at the same time! It's important that readers underst5and that the solar irradiance drift during solar episodes is anything but insignificant!!

c6p3h00.8 flux tubes 10 to 13 Angstroms? Seems like a scaling issue, big time???

c6p14h0.25 “... you could define as a system of pure energy transport ...”

Seems very wrong. Energy is very important, but not “purely” - as per water cycles etc. Mechanisms are important!

C6p14h0.45 “... about 70 percent ...”

Wrong – best to include a table of albedo (snow maybe 10%, ocean 70% maybe, I forget numbers etc).

C6p14h0.5 “... ”gradients” are those risings and fallings of temperature and pressure ...”

Misleading – gradients are spatial, not temporal (as may be inferred by readers from your wording).

Be carefulwith wording in this paragraph.

C6p16h0.0 “... determined by the distortion of the Earth’s orbit by the gravitational forces of the other planets ...”

This confuses normal eccentricity and perterbations by other planets.

C6p18h0.75 “... changes in forcings on decade levels and on even shorter time scales are less important ...”

Changes at ALL timescales are important – a point not well understood even by specialists!

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