

Solar Activity Controls El Niño and La Niña

by

Dr Theodor Landscheidt

The Debate

Part 3

(For Part 1, click [here](#))

(For Part 2, click [here](#))

(For Part 4, click [here](#))

Comments to daly@vision.net.au
with "El Nino and the Sun" in the subject line. - John L. Daly

... a brief summary of the key finding of this paper ...

● Next El Niño to Happen in Late 2002 ●

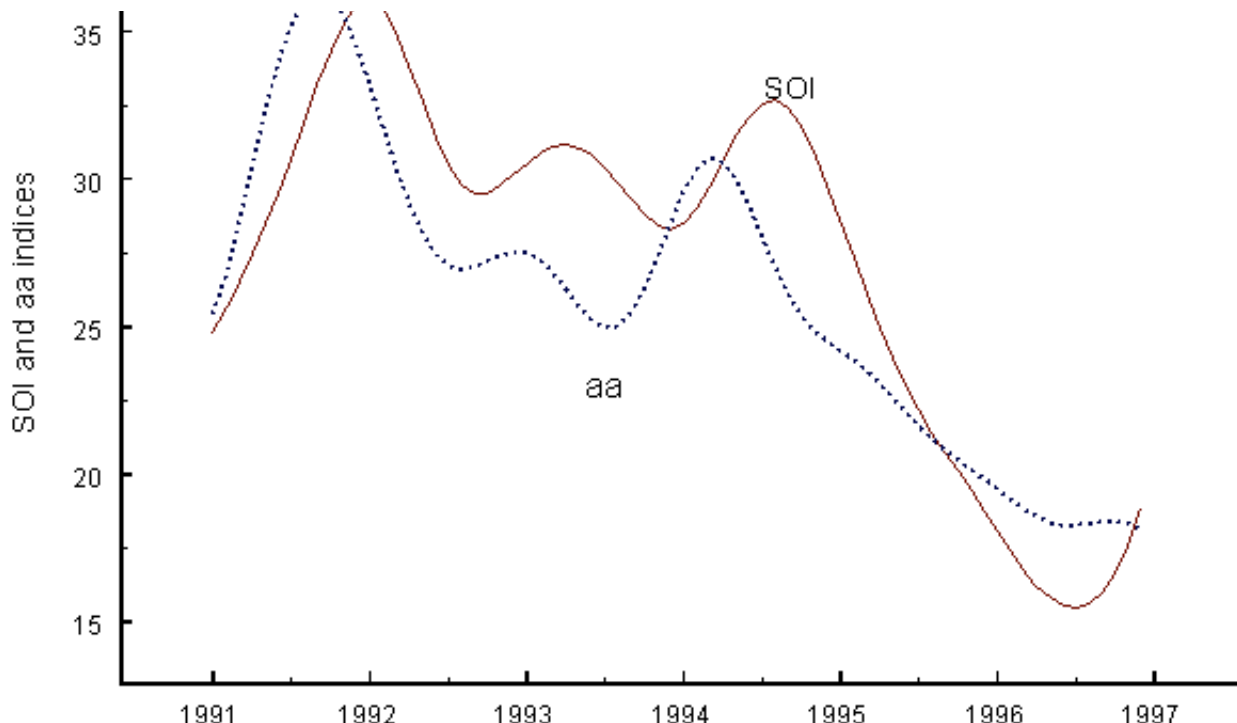
This is the startling prediction by **Dr Theodor Landscheidt**, of the Schroeter Institute for Research in Cycles of Solar Activity, Nova Scotia, Canada. In a major paper on this website, "[Solar Activity Controls El Niño and La Niña](#)", Dr Landscheidt has developed a model of solar activity which comprehensively explains the timing of not only all previous known El Niño/La Niña events, but also to predict future ones. At present, the best lead time to predict such events is at most one year, based on NOAA ocean buoy networks detecting the first changes in ocean temperature. This new discovery by Dr Landscheidt gives a prediction lead time of several years. According to him, **the present La Niña will continue for the next 12 months at least, followed by an El Niño late in 2002.**

Click [here](#) for the full paper.

And now **Part 3 of the Open Review -**

Dr Theodor Landscheidt	Info. on aa index and SOI to	El Niño and the Sun
Dr Theodor Landscheidt	Onar Åm	El Niño and the Sun
Dr Franz Gerl	Further info on aa index- SOI	El Niño and the Sun
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Richard Courtney	Response to Franz Gerl re aa index	El Niño and the Sun
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Dr Theodor Landscheidt	Comment to John Daly re SOI	El Niño and the Sun
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Richard Courtney	Further data on flares to Onar Åm	El Niño and the Sun
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Dr Theodor Landscheidt	Response to Theodor Landscheidt	El Niño and the Sun

of 20
 January that
 years ago
 he subjected
 the sunspot
 and SOI
 time series
 to routine
 signal
 analysis



(autocorrelation, cross-correlation, Fourier analysis), but did not find anything of interest. I had the same experience when I applied running variance, first derivatives, linear correlation etc. as usual. A comparison of smoothed first derivatives, for instance, yielded $r = -0.09$ for 1951 - 1998. With 573 monthly data this is barely significant at the 0.05 level.

In the next step I separated the data before 1965 and after 1965 because the figure I sent you shows a phase reversal at this time, 3 years before the BFS 1968. When I smoothed both time series and computed linear correlation, I got $r = 0.41$ for 1951 - 1965. When I transformed r so that Student's t-test could be applied, I got $P = 8.5$ to the power -8 for 166 degrees of freedom. In this respect the number of covered data is more important than the quantity of the correlation coefficient.

After 1965 I expected an impressive negative correlation. I got $r = 0.07$, which is not significant at all. Fortunately, I knew that from 1989 to 1991 the sun's motion about the center of mass of the solar system was retrograde and its orbital angular momentum, which had been positive for centuries, became negative for nearly two years. As I have shown in my paper "**Global Warming or Little Ice Age**", such rare phases of special instability have a strong impact on solar activity. So I differentiated between intervals around 1990 and those more distant from this phase of instability. This is what I got:

1965 - 1981:	$r = - 0.44,$	$n = 204,$	$t = 6.96,$	$P = 2.3$ to the power -11
1982 - 1985:	$r = +0.79,$	$n = 48,$	$t = 8.74,$	$P = 8.6$ to the power -12
1986 - 1990:	$r = - 0.65,$	$n = 60,$	$t = 6.51,$	$P = 8.5$ to the power - 9
1991 - 1996:	$r = +0.86,$	$n = 72,$	$t = 14.10,$	$P = 1.1$ to the power -22
1997 - 1998:	$r = - 0.74,$	$n = 21,$	$t = 4.80,$	$P = 4.8$ to the power - 5

285 months of the interval 1965 - 1998 showed the negative correlation expected after the dominant BFS. 120 months in this interval had a positive correlation due to retrograde solar motion, irregular negative orbital angular momentum, and their effect on solar activity. The highly significant positive or negative correlation between smoothed data of aa index and SOI covers the whole period from 1951 to 1998. There is no interval that shows no such correlation.

The attached figure shows how the smoothed indices correlate between 1991 and 1997. The SOI lags the aa index by about 4 months. When we shift aa by 4 months, the correlation coefficient reaches $r = 0.94$. I will see whether this is a consistent feature covering the whole data range 1951 to 1998.

Cordially,

Theodor

Subject: **El Niño and the Sun**

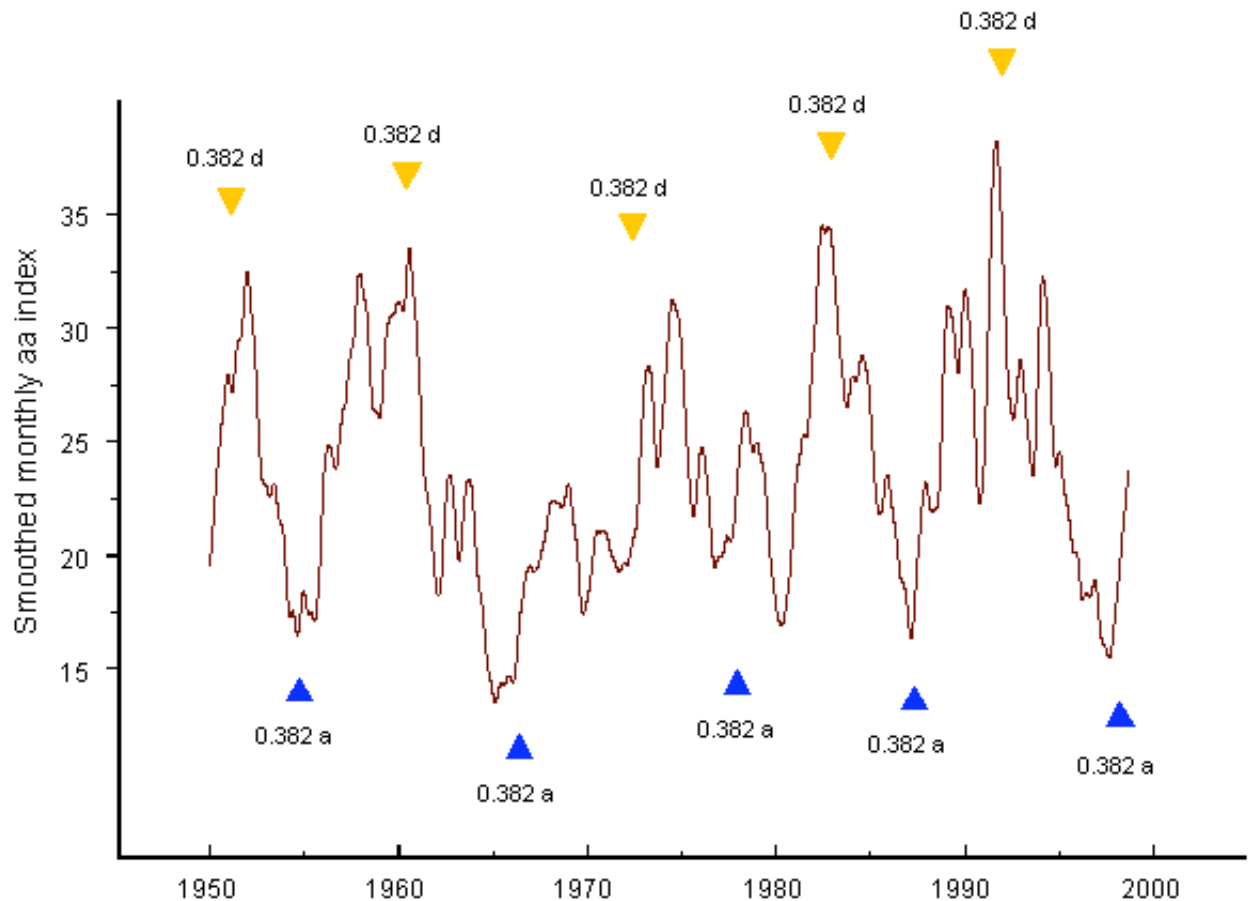
Date: Sun, 21 Feb 1999 20:55:38 -0400

From: "**Dr. Theodor Landscheidt**" <theodor.landscheidt@ns.sympatico.ca>

To: "**John L. Daly**" <daly@vision.net.au>

Dear John,

Obviously, public debate as it is going on at your web site enhances creativity. The author who is defending his paper is exposed to positive stress that helps him to find associations that yield new results. The attached figure presents such a result.



The plot shows the smoothed monthly aa index of geomagnetic activity observed 1951 to 1998. Yellow triangles indicate Golden section phases 0.382 d in the descending subcycle of the 11-year sunspot cycle and blue triangles phases 0.382 a in the ascending subcycle. Phases 0.382 d mark all outstanding peaks in geomagnetic activity and phases 0.382 a all deep troughs. All major turning points in the aa data are consistently set off by consecutive Golden section phases. This opens a new possibility of predictions of the course of geomagnetic activity.

With regard to ENSO events the new relationship adds a further link to the web of interrelations. As I have shown, El Niño and La Niña are connected with energetic solar eruptions, geomagnetic activity, and Golden section phases 0.382 a, d in subcycles of the sunspot cycle. The new result reveals that there is also a close relationship between Golden section phases and geomagnetic activity. It is getting rather difficult to maintain the opinion that ENSO events are not subjected to external forcing.

Cordially,

Theodor

Subject: Re: **El Nino and the Sun**

Date: Mon, 22 Feb 1999 21:40:06 +0100 (MEZ)

From: **Franz Gerl** <gerl@Theorie.Physik.UNI-Goettingen.DE>

To: **John Daly** <daly@vision.net.au>

Dear contributors to the discussion of Landscheidt's paper!

The first test of Dr. Landscheidt's prediction scheme -- the forecast of a prolonged La Nina event -- promises to become quite thrilling. It is most interesting to compare the forecasts that have been issued during the last few weeks. The "predictability barrier" in early spring seems to be quite high this year.

Most of the statistical models side with Landscheidt's forecast. However the majority of the physical models that I can access predict a rapid transition to near normal conditions in spring. Discussions and graphs can be found at <http://www.pmel.noaa.gov/toga-tao/el-nino/forecasts.html> <http://www.ecmwf.int/html/seasonal/forecast/plumes/index.html>

The NCEP coupled model, most runs of the EMWCF-model and the hybrid model of Scripps indicate an end of La Nina in spring. It is interesting to note that the forecasters at http://nic.fb4.noaa.gov/products/predictions/multi_season/13_seasonal_outlooks/fxus05.doc prefer their statistical models over the NCEP-model. The Australian coupled model OTH predicts a prolonged and even intensifying La Nina. However I don't know very much about the nature and sophistication of this particular model. Any informations about other forecasts by physical models would be most welcome.

There is another aspect to this besides being a competition between different modeling efforts. If we assume an end to La Nina and a failure of the statistical models, which also largely failed to anticipate the last El Nino, this means that the rules of the game are changing. These models have been trained with data from the colder 60s and 70s, and their "understanding" of the climate system may not be valid any more if it is changing. The physical models however would not be harmed by this.

If we look at figures T14 and T17 at http://nic.fb4.noaa.gov/products/analysis_monitoring/bulletin/ we can see that the subsurface waters in the West Pacific have warmed rapidly in the past months. If this continues it may be the reason for an early end of La Nina, which is not captured by the statistical models. So maybe the 90s were not only very warm because of lots of El Ninos but also vice versa.

If the opposite happens, of course this will be a data point for the camp skeptical of global change. Either way, one data point does not decide the issue.

In the debate about Dr. Landscheidt's predictions I have repeatedly argued that it is important that there are objective measures about success or failure. I therefore battled very hard to get a precise definition of "peak". Of course I want to make sure that the slightest cool temperatures in the Pacific or positive anomlies in the SOI are interpreted as La Nina. I don't want to repeat such a discussion, but simply state that to me it's a La Nina, if it is called one in the CPC Climate Diagnostics Bulletin at the address mentioned above.

If Dr. Landscheidt or anybody else disagrees and wants to use a different definition he should say so now.

Franz

Subject: Re: **El Nino and the Sun**
Date: Tue, 23 Feb 1999 22:29:36 +1100
From: **John Daly** <daly@vision.net.au>
To: **Franz Gerl** <gerl@Theorie.Physik.UNI-Goettingen.DE>

Dear Franz

Franz Gerl wrote:

- > The first test of Dr. Landscheidt's prediction scheme -- the forecast
- > of a prolonged La Nina event -- promises to become quite thrilling.

You got that right. I have just posted the latest graphed SOI figures on my main page and they suggest a weakening of La Nina. I thought it might just be an atmospheric cycle, but it appears the distinctive 'cold tongue' in the eastern equatorial Pacific is also weakening. It's too early to say if this might lead to a flip over to El Nino, or merely stabilise into a sort of neutral condition, but thrilling it certainly is.

- > It is most interesting to compare the forecasts that have been
- > issued during the last few weeks.

The most recent one I have seen was the NOAA who predicted La Nina would continue "through June". No-one is predicting El Nino as far as I know, so it would be failure for everyone if that happened.

- > ... to me it's a La Nina, if it is called one in the CPC Climate
- > Diagnostics Bulletin at the address mentioned above.
- > If Dr. Landscheidt or anybody else disagrees and wants to use a
- > different definition he should say so now.

I must disagree there. You are asking people to accept something on the basis of authority, not evidence. What matters is that there is clear physical evidence of the existence of a La Nina, not that some 'authority' source claims it to be so, or not so. Acceptance of any 'fact' on the basis of authority and not actual evidence is an attitude of mind which I hope will die out with the millenium.

I find that the SOI, taken over a 30-day average is still the best indicator of the existence, or lack of, an El

Nino/La Nina. Any shorter period is too easily influenced by natural atmospheric cycling. Too long a period results in too great a time lag to recognise new trends. I've been watching the daily SOI for over two years now and find the 30-day SOI the most accurate measure of the current situation. It is also an objective measure, free of the subjective influences which can pervade the most distinguished 'authority'.

John Daly

--

John L. Daly
"Still Waiting For Greenhouse"
<http://www.vision.net.au/~daly>

Subject: Re: **El Nino and the Sun**
Date: Tue, 23 Feb 1999 14:28:08 +0100 (MEZ)
From: **Franz Gerl** <gerl@Theorie.Physik.UNI-Goettingen.DE>
To: **John Daly** <daly@vision.net.au>

Dear John,

On Tue, 23 Feb 1999, John Daly wrote:

> Dear Franz

> Franz Gerl wrote:

>> The first test of Dr. Landscheidt's prediction scheme -- the forecast
>> of a prolonged La Nina event -- promises to become quite thrilling.

> You got that right. I have just posted the latest graphed SOI figures
> on my main page and they suggest a weakening of La Nina. I thought it
> might just be an atmospheric cycle, but it appears the distinctive 'cold
> tongue' in the eastern equatorial Pacific is also weakening. It's too
> early to say if this might lead to a flip over to El Nino, or merely
> stabilise into a sort of neutral condition, but thrilling it certainly is.

Since subsurface temperatures in the East are still below normal, I think a weakening of La Nina now may even help prolonging it. If it is a lasting feature it seems to be a surprise for everybody.

>> It is most interesting to compare the forecasts that have been
>> issued during the last few weeks.

> The most recent one I have seen was the NOAA who predicted La Nina would
> continue "through June". No-one is predicting El Nino as far as I
> know, so it would be failure for everyone if that happened.

Now the official forecast is La Nina through July, because the forecasters side/blend with their statistical tools, which keep La Nina going.

>> ... to me it's a La Nina, if it is called one in the CPC Climate
>> Diagnostics Bulletin at the address mentioned above.
>> If Dr. Landscheidt or anybody else disagrees and wants to use a
>> different definition he should say so now.

> I must disagree there. You are asking people to accept something on the
> basis of authority, not evidence. What matters is that there is clear
> physical evidence of the existence of a La Nina, not that some
> 'authority' source claims it to be so, or not so. Acceptance of any
> 'fact' on the basis of authority and not actual evidence is an attitude
> of mind which I hope will die out with the millenium.

I was trying to introduce a neutral third party to judge what the state of ENSO is. I don't mind to work out a definition of our own, as long as it happens before the facts come in.

> I find that the SOI, taken over a 30-day average is still the best
> indicator of the existence, or lack of, an El Nino/La Nina. Any
> shorter period is too easily influenced by natural atmospheric cycling.

> Too long a period results in too great a time lag to recognise new
> trends. I've been watching the daily SOI for over two years now and
> find the 30-day SOI the most accurate measure of the current situation.

> It is also an objective measure, free of the subjective influences which
> can pervade the most distinguished 'authority'.

This is fine with me, but we would have to specify thresholds for deciding between La Nina/ near normal / El Nino, and also how many months this threshold may be violated to still be called a La Nina. Any suggestions?

Franz

Subject: Re: **El Nino and the Sun**
Date: Wed, 24 Feb 1999 07:14:35 +1100
From: **John Daly** <daly@vision.net.au>
To: **Franz Gerl** <gerl@Theorie.Physik.UNI-Goettingen.DE>

Dear Franz

Franz Gerl wrote:

> John Daly wrote:

>> I find that the SOI, taken over a 30-day average is still the best
>> indicator of the existence, or lack of, an El Nino/La Nina. Any
>> shorter period is too easily influenced by natural atmospheric cycling.
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>> trends. I've been watching the daily SOI for over two years now and
>> find the 30-day SOI the most accurate measure of the current situation.

>> It is also an objective measure, free of the subjective influences which
>> can pervade the most distinguished 'authority'.

> This is fine with me, but we would have to specify thresholds for
> deciding between La Nina/ near normal / El Nino, and also how
> many months this threshold may be violated to still be called
> a La Nina. Any suggestions?

I was thinking less of a month-by-month figure, but more a running 30-day mean. At present I do two SOI graphs for the last 12 days and the last 30 days using daily data. The atmospheric transients are easily visible. But I could graph a 30-day running mean on my El Nino page (http://www.vision.net.au/~daly/el_nino.htm) to eliminate the transients.

As to thresholds, that's a hard one to determine objectively, but an arbitrary figure would need to be accepted, presumably the same one positive and negative. The current La Nina has been certainly present as such (**cold tongue in the ocean etc.**) but the SOI has hovered around 10 to 13 most of that time. So I would think an SOI of ≥ 7 would indicate a La Nina, while an SOI ≤ -7 would indicate an El Nino.

What do you think?

Regards

John Daly

Subject: Re: **El Nino and the Sun**
Date: Tue, 23 Feb 1999 21:43:56 +0100 (MEZ)
From: **Franz Gerl** <gerl@Theorie.Physik.UNI-Goettingen.DE>
To: **John Daly** <daly@vision.net.au>

Dear John

On Wed, 24 Feb 1999, John Daly wrote:

> I was thinking less of a month-by-month figure, but more a running
> 30-day mean. At present I do two SOI graphs for the last 12 days and

- > the last 30 days using daily data. The atmospheric transients are
- > easily visible. But I could graph a 30-day running mean on my El Nino
- > page (<http://www.vision.net.au/~daly/elnino.htm>) to eliminate the transients.

Good idea.

- > As to thresholds, that's a hard one to determine objectively, but an
- > arbitrary figure would need to be accepted, presumably the same one
- > positive and negative. The current La Nina has been certainly present
- > as such (cold tongue in the ocean etc.) but the SOI has hovered around
- > 10 to 13 most of that time. So I would think an SOI of ≥ 7 would
- > indicate a La Nina, while an SOI ≤ -7 would indicate an El Nino.

- > What do you think?

Seems reasonable to me, but I leave the final word to Dr. Landscheidt. We should finally specify the maximum time period, or fraction of time the running mean is allowed to cross the threshold. I would place the limit at two months (or one month if SOI ≤ 0) and about 25% of the time. Other suggestions are welcome.

Regards, **Franz**

Subject: Re: **El Nino and the Sun**

Date: Tue, 23 Feb 1999 21:47:10 -0400

From: "**Dr. Theodor Landscheidt**" <theodor.landscheidt@ns.sympatico.ca>

To: **Franz Gerl** <gerl@Theorie.Physik.UNI-Goettingen.DE>, "**John L. Daly**" <daly@vision.net.au>

Dear Dr. Gerl, Dear John,

I agree with you that we need a judgement of the state of ENSO. I have no objections against using the 30-day running mean of the SOI. Yet I think that the threshold ± 7 is not an appropriate choice. The 30-day average 25 January to 23 February 1999, for instance, was at +9.3, rather close to the proposed level, though La Niña reached values near +30 two times. A look at the [SOI plot 1947 to 1998](#) at John's site shows that data above or below 7 are not very frequent and already above or below neutral values. It often occurs that the running mean crosses this threshold for some time, even for two months, without El Niño or La Niña fading away. Under these circumstances I would prefer to follow the judgement of the CPC. Yet there is another problem. They base everything on the SST that lags the SOI. So I think that the threshold should be set lower, perhaps at 4.

Cordially,

Theodor

Resulting from the above discussion about the SOI, a [30-day running mean of the SOI](#) is now being included in this website's [El Nino page](#), located just below the 30-day daily data graph. - John L. Daly

Subject: Re: **El Nino and the Sun**

Date: Wed, 24 Feb 1999 03:49:59 +0100

From: "**Onar Am**" <onar@con2.com>

To: "**Franz Gerl**" <gerl@Theorie.Physik.UNI-Goettingen.DE>, "John Daly" <daly@vision.net.au>

- > Seems reasonable to me, but I leave the final word to Dr.
- > Landscheidt. We should finally specify the maximum
- > time period, or fraction of time the running mean is
- > allowed to cross the threshold. I would place the limit
- > at two months (or one month if SOI ≤ 0) and about 25%
- > of the time. Other suggestions are welcome.

My impression of the correlation between the aa-index and the ENSO is that it should be possible to define a more volatile relationship. As far as I can see the important measure is not just whether the ENSO is in a state of El Nino or La Nina, but also the actual *spikes* in the ENSO. I may just be hallucinating, but to me it appears that a solar flare may not necessarily cause an El Nino to arise, but rather weaken the ongoing La Nina. If this is true then it should be possible to predict *changes* in the ENSO, not just the events themselves.

Onar.

Subject: Re: **El Nino and the Sun**
Date: Wed, 24 Feb 1999 17:05:17 GMT
From: **Richard Courtney** richard@courtney01.cix.co.uk
To: "**Onar Am**" <onar@con2.com>

Dear Onar:

You make an interesting and important point. If your hypothesis is correct, then the effect of solar flares reducing La Nina may be discernible in historic data. Perhaps Theodor could investigate (has investigated) this ?

All the best

Richard

Subject: Re: **El Nino and the Sun**
Date: Wed, 24 Feb 1999 17:47:08 -0400
From: "**Dr. Theodor Landscheidt**" <theodor.landscheidt@ns.sympatico.ca>
To: **John Daly** <daly@vision.net.au>

Dear John,

I thank you for your piece of advice. [Your 30-day running mean](#) is a helpful new feature. I shall surely often look at it. You are right, this running mean smoothes the variations effectively.

I think that La Niña's end is not yet here though you correctly remarked that the cool tongue along the equator is a bit weaker now.

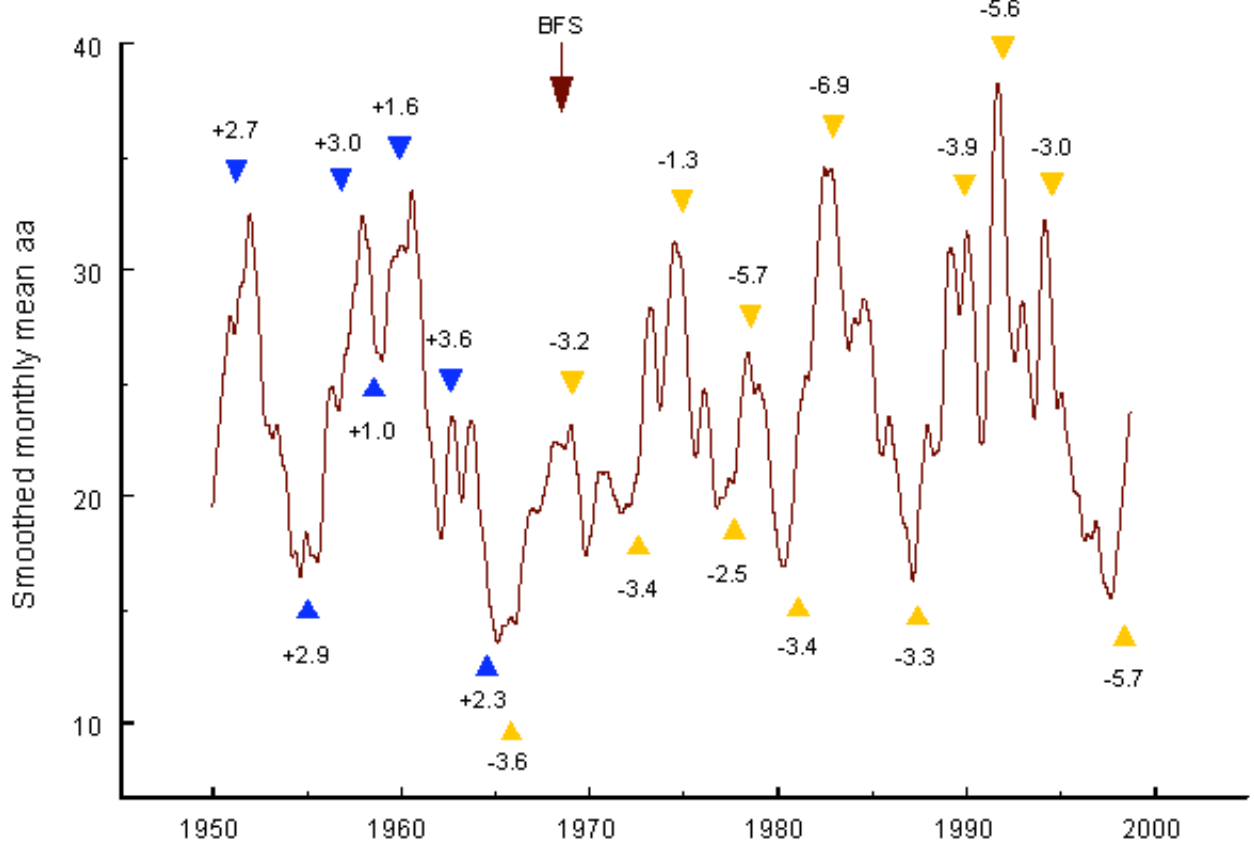
Kind regards,

Theodor

Subject: Re: **El Nino and the Sun**
Date: Thu, 25 Feb 1999 22:50:36 -0400
From: "**Dr. Theodor Landscheidt**" <theodor.landscheidt@ns.sympatico.ca>
To: "**Onar Am**" <onar@con2.com>

Dear Onar,

In my letter of 19 February I showed that the SOI lags the aa index by about 4 months between 1991 and 1997 and promised to see whether this is a consistent feature in the whole data range 1951 - 1998. The attached figure answers this question.



After BFS 1968, actually already after 1965, prominent aa peaks and troughs consistently go along with El Niños. This is indicated by yellow triangles and the respective negative values of SOI anomalies. It is easy to see that the aa extrema come first and negative extrema in the SOI later.

Before 1965 the aa peaks and troughs were consistently linked to La Niñas marked by blue triangles and positive anomaly values. This time the extrema in the SOI come first and the aa peaks and troughs later. This seems to be strange, but could perhaps contribute to the discussion of your suggestion, expressed in your letter of 24 February to Dr. Gerl, that solar flares may weaken ongoing La Niñas.

It is intriguing that not only strong geomagnetic disturbances, but also very quiet conditions (**no energetic solar eruptions and weak solar wind**) have the same effect on ENSO events. In my opinion, this points to instability as an important factor in the development of such events. Instability is nearly always inherent in extrema. I have found similar effects in many solar terrestrial cycles.

Cordially,

Theodor

Subject: **ENSO and the Sun**

Date: Fri, 26 Feb 1999 12:05:53 -0400

From: "**Dr. Theodor Landscheidt**" <theodor.landscheidt@ns.sympatico.ca>

To: "**John L. Daly**" <daly@vision.net.au>

Dear John,

When I looked at the 30-day running average of the SOI at your web site today, I found that it is a bit too volatile. It is already close to the threshold 7 you proposed. If we want to define the end or the beginning of ENSO events, it would perhaps be better to use a 90-day running mean as published by DNR Queensland. To look at the plot of this measure would be boring. So I think that for other purposes the 30-day running mean published at your site is much better.

The SOI is positive again. The negative phase 19 - 25 February could be linked to solar activity. On 18 and 19 February the geomagnetic field was disturbed ($A_p = 54$) after a long period of quiet conditions. The [figure 1](#) attached to my letter of 25 February to Onar shows that change in geomagnetic activity has an effect on the development of ENSO events.

Cordially,

Theodor

Subject: Re: **[Fwd: El Nino and the Sun]**
Date: Fri, 26 Feb 1999 16:27:11 GMT
From: **Richard Courtney** <richard@courtney01.cix.co.uk>
To: **Dr Theodor Landscheidt** <theodor.landscheidt@ns.sympatico.ca>

Dear Theodor:

I shall refer to Daly's web site and try to catch-up with what is happening there.

You say; "It looks as if not the intensity of solar activity, but strong change in it is important for the development of ENSO events." This is both fascinating and surprising. Solar flares have obvious electrical effects on the atmosphere and so could be expected to affect behaviours of storms. Barrett and Daly have both suggested (in email correspondence) that ENSO is driven by oceanic - not atmospheric - factors. Your suggestion that intensity of solar activity does not significantly affect ENSO would fit with the suggestion that ENSO is not mostly atmosphere-driven. But how could **changes** in solar activity affect oceanic behaviour ?

The plot congeals, and I have no immediate suggest for thinning it.

All the best

Richard

Subject: Re: **[Fwd: El Nino and the Sun]**
Date: Fri, 26 Feb 1999 18:07:54 -0400
From: "**Dr. Theodor Landscheidt**" <theodor.landscheidt@ns.sympatico.ca>
To: **Richard Courtney** <richard@courtney01.cix.co.uk>

Dear Richard,

I confess that I am also intrigued and surprised by the results of my investigation of energetic flares and geomagnetic activity in relation to ENSO events. It is a puzzle how El Niños can be released by strong flares and geomagnetic disturbances as well as by a protracted lull in flare activity and an unusually quiet geomagnetic field. The El Niños 1982/1983 and 1991/1992 were accompanied by intense flare activity and strong geomagnetic storms from the beginning, but the El Niño 1997/1998 was initiated when there had not been any energetic flares or coronal mass ejections since November 1992. A strong X-ray flare in November 1997, accompanied by proton flux, weakened the already strong El Niño for some time, and strong proton flares, extremely strong windshock waves, and severe magnetic storms ($A_p = 101$) in the last week of April and the first week of May 1998 marked the end of the 1997/1998 El Niño and the birth of La Niña. Interestingly, medium size eruptional solar activity weakened La Niña in October and November 1998 and again 19 - 25 February 1999.

The easiest way to get rid of these incompatibilities would be to pretend that the new results are spurious. Yet the connections I presented in my letters of 17 and 19 February to Onar, 21 February to John, and 25 February to Onar are so clear-cut that they can be considered to reflect a real relationship. There is a consistent pattern that emerges again and again, and the correlation coefficients given in my letter of 19 February to Onar are highly significant.

A key to a solution could be the Golden section phases 0.382 a, d in the ascending and declining subcycles of the sunspot cycle. The figure in the letter of 21 February to John shows that 0.382 d phases consistently concur with strong peaks in geomagnetic activity and phases 0.382 a with deep troughs. These extrema in geomagnetic activity are again connected with ENSO events (**Letter of 25 February to Onar**). As I shall soon show, this pattern extends back to 1868, as far as aa data are available. Energetic flares show a similar distribution, as shown in my letter of 19 February to Onar. After BFS 1968 flares concurring with phases 0.382 a, d are linked to El Niños and flares occurring close to the middle between these phases, as far away from them as possible, go along with La Niñas.

I have explained in my paper that the Golden section represents stability in polar opposition to instability. So it could be that solar eruptions and geomagnetic activity are connected to a pattern of stability and instability which decides how they affect the development of ENSO events. Intensity of solar activity and extreme lack of it would be of import, but what emerges from them, especially the direction of development, would depend on the stability/instability pattern of the sunspot cycle. We know from chaos theory what can happen when a dynamic system reaches a climax of instability or loses its stability. So the level of the energy input need not be very high. The changing quality of different phases of the solar cycle could be conveyed by a special structure of the solar wind. Perhaps we do not observe it because we do not expect it.

The phase reversals we encounter in the data point to electromagnetic phenomena. The observed variations in the downward air-earth current caused by solar eruptions come to mind. The solar wind could even change the quality of cosmic rays while it modulates them. This could be important with regard to the Svensmark effect. Yet I think that we have to collect much more data and examine their patterns before we get a real chance to see what is physically behind the relationship between solar activity and ENSO events.

Cordially,

Theodor

Subject: Re: [Fwd: El Nino and the Sun]

Date: Sat, 27 Feb 1999 00:00:31 +0100

From: "Onar Am" <onar@con2.com>

To: **Dr Theodor Landscheidt** <theodor.landscheidt@ns.sympatico.ca>, Richard Courtney <richard@courtney01.cix.co.uk>

(Dr Theodor Landscheidt said:)

- > A strong X-ray flare in November 1997, accompanied by proton
- > flux, weakened the already strong El Niño for some time, and strong proton flares,
- > extremely strong windshock waves, and severe magnetic storms (Ap = 101) in the last
- > week of April and the first week of May 1998 marked the end of the 1997/1998 El Niño
- > and the birth of La Niña. Interestingly, medium size eruptional solar activity
- > weakened La Niña in October and November 1998 and again 19 - 25 February 1999.

This is very interesting, but you definitely need to substantiate this. For instance, were there other eruptions that were not associated with anomalous changes in the ENSO? Were there other anomalous changes in the ENSO that did not correspond to eruptions?

- > The easiest way to get rid of these incompatibilities would be to pretend that the
- > new results are spurious. Yet the connections I presented in my letters of 17 and 19
- > February to Onar, 21 February to John, and 25 February to Onar are so clear-cut that
- > they can be considered to reflect a real relationship.

No, actually not. You still have to rigidly define what constitutes an ENSO event or anomaly. When we are able to quantify such an anomaly we can make rigid statistical analyses. What you've presented over the last few days is a set of very nice "handmade" analyses, which suggests that you definitely are on to something. BUT this is not sufficient to term the findings as "clear-cut." Define the quantities needed to do the analyses, and your results will be a lot stronger.

- > There is a consistent pattern
- > that emerges again and again, and the correlation coefficients given in my letter of
- > 19 February to Onar are highly significant.

Yes, they are, but **you** are still the one defining what constitutes an ENSO. You need to remove this subjectivity out of the analysis. Once an ENSO event is quantitatively defined it is easy to see how your predictions do out of sample. We should then not have to wait two years to verify/falsify your hypothesis.

Also, do you think we can have the data sets you are using?

Onar.

Subject: **El Niño and the Sun**

Date: Sat, 27 Feb 1999 05:49:23 -0400

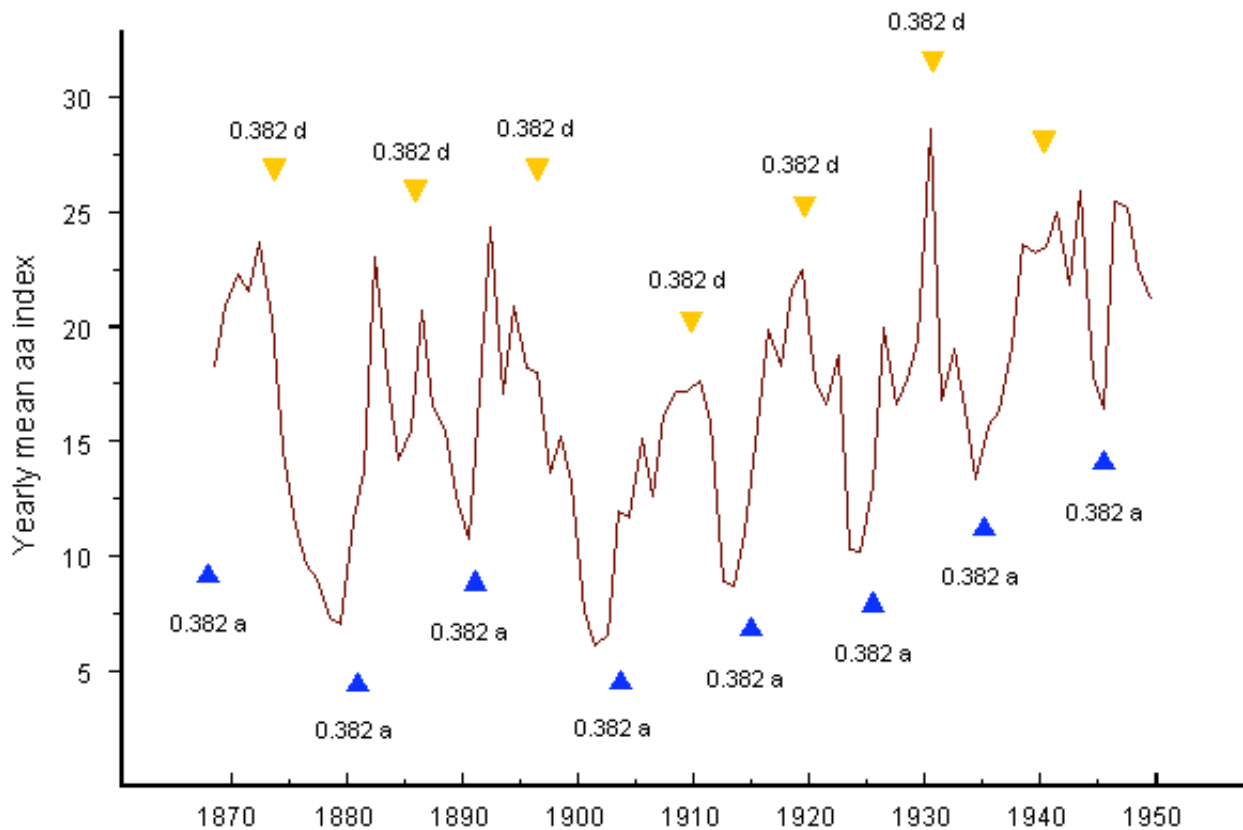
From: "**Dr. Theodor Landscheidt**" <theodor.landscheidt@ns.sympatico.ca>

To: "**John L. Daly**" <daly@vision.net.au>, **Richard Courtney** <richard@courtney01.cix.co.uk>

Dear John,

The figure attached to my letter of 21 February to you showed a close correlation between prominent peaks and troughs in the monthly aa index and phases 0.382 d, a of the sunspot cycle. The data covered the period 1951 - 1998. I promised to extend the investigation back to 1868, as far as aa data are available. The attached new figure shows the result. I made use of yearly means. The plot is coarser than with monthly means, but it serves its purpose. Yellow triangles indicate Golden section phases 0.382 d in the descending subcycle and blue

triangles phases 0.382 a in the ascending subcycle of the sunspot cycle.



As before, phases 0.382 d mark all outstanding peaks in geomagnetic activity and phases 0.382 a all deep troughs. Again, all major turning points in the aa data are consistently set off by consecutive Golden section phases. The relationship now covers 130 years, and there is

not a single exception. Per se, this opens a new possibility of predictions of the general course of geomagnetic activity, a stride forward in this field. Most scientists think that outstanding peaks and troughs in geomagnetic activity coincide with maxima and minima in the 11-year sunspot cycle. The plots covering 1868 - 1998 show distinctly that this is a preconception. It seems strange that this was not seen earlier.

I have shown that the Golden section phases 0.382 a, d, are closely connected with ENSO events. The new results make plain that the Golden section phases affect ENSO development via geomagnetic activity. Geomagnetic activity or protracted lulls in it depend on the sun's eruptional activity that drives and modulates the solar wind. So we know that there is such a connection and have even found ways to predict it. We do not yet know how this functions in physical detail, but the new information will surely make it easier to find a physical explanation. If you do not know that there is external forcing, how can you explain it.

Cordially,

Theodor

Subject: Re: **[Fwd: El Nino and the Sun]**

Date: Sat, 27 Feb 1999 15:05:16 +0100

From: "**Onar Am**" <onar@con2.com>

To: **Dr Theodor Landscheidt** <theodor.landscheidt@ns.sympatico.ca>, **Richard Courtney** <richard@courtney01.cix.co.uk>

> However, I partially disagree with Onar Am when he says:

> "**You** are still the one defining what constitutes an ENSO. You need to remove
> this subjectivity out of the analysis. Once an ENSO event is quantitatively
> defined it is easy to see how your predictions do out of sample. We should
> then not have to wait two years to verify/falsify your hypothesis."

> He is correct to observe that an agreed quantitative definition of ENSO
> would be useful, but you have as much right to formulate that definition as
> anybody else; and nobody else has done it.

I didn't suggest otherwise. I don't care what definition is used as long as it is defined quantitatively **and** defined in advance of prediction verification. By "subjective" I didn't mean "the only one in the world that uses the definition" but "quantitatively undefined."

Onar.

Subject: Re: [Fwd: El Nino and the Sun]

Date: Sat, 27 Feb 1999 15:41:01 GMT

From: **Richard Courtney** <richard@courtney01.cix.co.uk>

To: **Dr Theodor Landscheidt** <theodor.landscheidt@ns.sympatico.ca>

Dear Theodor:

Thank you for your thought-provoking response to your recent findings.

I do not dispute your findings and my failure to understand their cause does not imply that your findings are wrong. You make some interesting suggestions concerning their cause. I doubt some of these suggestions, but my doubt is also not important. The point of significance is your findings. Their cause may promote interesting thought and research, but that promotion should not be permitted to distract from your findings and the testing of their validity.

Onar Am has responded to your comment that:

"A strong X-ray flare in November 1997, accompanied by proton flux, weakened the already strong El Niño for some time, and strong proton flares, extremely strong windshock waves, and severe magnetic storms ($A_p = 101$) in the last week of April and the first week of May 1998 marked the end of the 1997/1998 El Niña and the birth of La Niña. Interestingly, medium size eruptional solar activity weakened La Niña in October and November 1998 and again 19 - 25 February 1999."

He says:

"This is very interesting, but you definitely need to substantiate this. For instance, were there other eruptions that were not associated with anomalous changes in the ENSO? Were there other anomalous changes in the ENSO that did not correspond to eruptions?"

I agree with Onar's comment on this point because your statement is so important. If you can substantiate your statement then you will have produced yet another startling observation. (But if you fail to convince others on this point it will not affect anything in your paper.)

However, I partially disagree with Onar Am when he says:

"**You** are still the one defining what constitutes an ENSO. You need to remove this subjectivity out of the analysis. Once an ENSO event is quantitatively defined it is easy to see how your predictions do out of sample. We should then not have to wait two years to verify/falsify your hypothesis."

He is correct to observe that an agreed quantitative definition of ENSO would be useful, but you have as much right to formulate that definition as anybody else; and nobody else has done it.

All the best

Richard

Subject: Re: [Fwd: El Nino and the Sun]

Date: Sun, 28 Feb 1999 13:50:57 GMT

From: **Richard Courtney** <richard@courtney01.cix.co.uk>

To: "**Onar Am**" <onar@con2.com>

Dear Onar:

Thank you for your clarification. I am sorry that I misinterpreted your meaning, but I think others are likely to have made a similar mistake to myself; your wording - and especially your use of capitals for "YOU" - did suggest the interpretation that I mistakenly made. Hence, I think your clarification is important and I thank you for it.

All the best

Richard

Subject: Re: [Fwd: El Nino and the Sun]
Date: Sun, 28 Feb 1999 18:47:09 +0100
From: "Onar Am" <onar@con2.com>
To: **Dr Theodor Landscheidt** <theodor.landscheidt@ns.sympatico.ca>

> As I mentioned already in my letter of 26 February, "the El Niño 1997/1998 was
> initiated when there had not been any energetic flares or coronal mass
> ejections since November 1992." The first X-ray flare (X = 9.4) after the last
> one in November 1992 occurred on 6 November 1997. The SOI (anomaly) rose from
> -3 to -2. Climatologists thought that El Niño would fade away. Yet it recovered
> and showed a strong performance January to April 1998. After strong proton
> flares, extremely strong windshock waves and a severe magnetic storm in the
> last week of April and the first week of May 1998 El Niño died and the SOI
> switched abruptly to La Niña conditions.

One of the most distinct features of the 97/98 El Nino is that it is almost an exact replication of the 82/83 El Nino. This provides evidence for internal dynamics, rather than external forcing. Now, if there were a massive magnetic storm somewhere in the period of January and April 82, then this significantly enhances your position.

> "Handmade" analysis seems to hint to a lower level of scientific achievement.

If you by "achievement" mean "discovery" then there is no such hint. All I meant is that concepts such as "trough", "dip", "energetic", "strong", "weaken" and "strengthen" are too flexible to be called scientific. If these concepts had a very precise quantitative meaning then your analyses would be rigid, but as of now they can only be dubbed "promising preliminary investigations." As you know, we global warming skeptics spend a great deal of time criticizing the IPCC report for using a too sloppy language. Several papers on John's site deal with the sloppy nature of IPCC's language. Given this, I'm sure you understand that you can't expect me to demand anything less from you.

> You had perhaps the rigid performance of supercomputers in mind and the
> astounding models they make possible.

No, I didn't. I was only looking for rigid, quantitative definitions, so that we can assess past correlations and rigidly test future predictions.

> Yet when you are not dealing with complete time series, but
> with special phases within cycles of varying length, simple plots are the most
> efficient approach. For the rest, I refer to the highly significant correlation
> coefficients I presented in my letter of 19 February to you.

Yes, that was a good one. Was there a particular reason that you didn't extend your period beyond 91 and 97?

> Please tell me more precisely which quantities I should define. All those
> quantities I make use of, whether aa-index, SOI, or sunspot numbers and cycles,
> were defined already by those specialized scientists who first dealt with them.

> I do not understand what you mean when you say that I am still the one who
> defines what constitutes an ENSO. Those institutes that collect data and make
> forecasts published their definitions long ago.

You refer to troughs and dips in the ENSO. While there certainly is such a phenomenon it is also worth noting that the ENSO is intrinsically cyclic and defining anomalous dips is therefore notorious.

Onar.

Subject: **El Nino and the Sun**
Date: Sun, 28 Feb 1999 07:54:12 -0400
From: "**Dr. Theodor Landscheidt**" <theodor.landscheidt@ns.sympatico.ca>
To: "**Onar Am**" <onar@con2.com>

Dear Onar,

In your letter of 28 February you state that the concepts I use are "too flexible to be called scientific" and that my analyses "as of now can only be dubbed promising preliminary investigations" because they lack rigidity. I reject this judgement, as it is not based on facts.

My investigation of a relationship between ENSO events and Golden section phases within subcycles of the sunspot cycle made use of SOI and SST data observed, processed and defined by specialists in the field. As far as I made use of El Niño data going back to 1610, they were taken from literature published by acknowledged scientists. The sources quoted in my paper contain lists of SST anomalies large enough to be classed as El Niños. This classification is confirmed by El Niño lists published by ENSO prediction centers. The Golden section phases I investigated are exclusively correlated with events that were already classified as El Niños when I began my analysis. So it is not correct when you allege that I am "still the one defining what constitutes an ENSO" and ask me "to remove this subjectivity out of the analysis." This all the more so, as there was a discussion about the definition of future ENSO events at this site in which I proposed to see whether the 90-day running mean of the SOI published by DNR, Queensland, transgresses the threshold +/- 4.

The employed epochs of maxima and minima in the 11-year sunspot cycle are well defined and in worldwide use. The Golden section phases within subcycles have a mathematical basis. When I analyzed solar eruptions, I defined their classes, for instance X equal to or greater than X6, or made use of a collection of cosmic ray flares classified by an astrophysicist. When I later mentioned "strong" or "energetic" flare activity, expressions you object to, I referred to the definitions I had given earlier. This is scientific usage. When I reported special flare activity, I always added whether these were X-ray flares of a special category, proton flares (including the particle flux pfu), or flares that caused Forbush decreases. Geomagnetic disturbances were quantified by quoting Ap values.

As far as you criticize my use of the words "weaken" and "strengthen" as non-scientific, you do not consider the context in which they were applied. I used these expressions in my letter of 27 February to you: "La Niña was again weaker in October and November 1998, but reached greater strength in December 1998 and January 1999." I had made clear at the beginning of the quoted paragraph that these remarks were related to a special SOI index: "The SOI (anomaly) rose from -3 to -2." As I addressed scientists, it was clear that "weaken" or "strengthen" was linked to the precise SOI quantities of the quoted months. To emphasize this connection again and again would have been redundant and time consuming.

The context argument is valid in all other cases, too. Here only one example. You criticized my use of the concept "trough". In my letter of 27 February to John I showed a plot of the yearly mean aa index and stated that the marked phases 0.382 are correlated with all outstanding peaks and troughs in geomagnetic activity. From the context it is clear that there are 7 such prominent extrema that catch the eye. Even if someone would not see where these extrema are that fit the description, they could be identified by the marks of the 0.382 phases. Precise aa-quantities of the level of the extrema can be read from the vertical axis that measures them.

Apropos of rigidity, I refer to my maximum entropy spectrum analysis, the Blackman-Tukey power spectrum, and the highly significant correlation coefficients of my aa-SOI analysis 1951 - 1998. Do you think that they can be called "preliminary investigations"?

You wrote: "We global warming skeptics spend a great deal of time criticizing the IPCC report for using too sloppy language. Several papers on John's site deal with the sloppy nature of IPCC's language. Given this I'm sure you understand that you can't expect me to demand anything less from you." John pointed to cases of hair-raising sloppiness and inconsistent logic. Your wording implies that the concepts I use are on the same deplorable level so that you have to exhort me to adhere to scientific standards. I think that my work is beyond this criticism.

Yes, there was a particular reason why I did not extend the plotted course of SOI and aa beyond 1991 - 1997. As explained in my letter of 19 February to you, the correlation changed at the beginning of 1997 from significantly positive to significantly negative.

Cordially,

Theodor

Subject: Re: [Fwd: El Nino and the Sun]
Date: Sat, 27 Feb 1999 12:25:29 -0400
From: "Dr. Theodor Landscheidt" <theodor.landscheidt@ns.sympatico.ca>
To: "Onar Am" <onar@con2.com>

Dear Onar,

When I pointed out that there was strong flare activity when El Niño 1997/1998 faded away, you answered:

- > This is very interesting, but you definitely need to substantiate this. For
- > instance, were there other eruptions that were not associated with
- > anomalous changes in the ENSO? Were there other anomalous changes in the ENSO

> that did not correspond to eruptions?

As I mentioned already in my letter of 26 February, "the El Niño 1997/1998 was initiated when there had not been any energetic flares or coronal mass ejections since November 1992." The first X-ray flare (X = 9.4) after the last one in November 1992 occurred on 6 November 1997. The SOI (anomaly) rose from -3 to -2. Climatologists thought that El Niño would fade away. Yet it recovered and showed a strong performance January to April 1998. After strong proton flares, extremely strong windshock waves and a severe magnetic storm in the last week of April and the first week of May 1998 El Niño died and the SOI switched abruptly to La Niña conditions. From November 1992 to May 1998 there were no other energetic solar eruptions than those I reported. In August 1998 there were two geomagnetic storms. Promptly, La Niña got weaker, but recovered afterwards. After a strong geomagnetic storm and strong proton flux (pfu = 1200) end of September 1998 La Niña was again weaker in October and November 1998, but reached greater strength in December 1998 and January 1999 when there were no noteworthy eruptions on the sun. After eruptive activity and a geomagnetic storm (Ap = 54) La Niña got weaker again. This synchronicity covers only a relatively short interval, but it fits the pattern that emerged during our debate. I will certainly observe future events. If this relationship holds, solar forcing must be very strong and fast.

When I said in my letter that the recently presented results were so clear-cut that they could be considered to reflect a real relationship, you answered:

> No, actually not. You still have to rigidly define what constitutes an ENSO
> event or anomaly. When we are able to quantify such an anomaly we can make
> rigid statistical analyses. What you've presented over the last few days is
> a set of very nice "handmade" analyses, which suggests that you definitely
> are on to something. BUT this is not sufficient to term the findings as
> "clear-cut." Define the quantities needed to do the analyses, and your
> results will be a lot stronger.

"Handmade" analysis seems to hint to a lower level of scientific achievement. You had perhaps the rigid performance of supercomputers in mind and the astounding models they make possible. Yet by now none of those scientists who make use of these supertools have seen the connections we are discussing. They even did not observe that outstanding extrema in geomagnetic activity are not linked to maxima and minima in the sunspot cycle, but to special phases in subcycles of this cycle. Naturally, scientists are impressed when you present naked numbers. Yet when you are not dealing with complete time series, but with special phases within cycles of varying length, simple plots are the most efficient approach. For the rest, I refer to the highly significant correlation coefficients I presented in my letter of 19 February to you.

Please tell me more precisely which quantities I should define. All those quantities I make use of, whether aa-index, SOI, or sunspot numbers and cycles, were defined already by those specialized scientists who first dealt with them.

I do not understand what you mean when you say that I am still the one who defines what constitutes an ENSO. Those institutes that collect data and make forecasts published their definitions long ago.

> Also, do you think we can have the data sets you are using?

When I made use of data, I quoted the accessible source in my paper or my letters. The sunspot data are not available in electronic form. I had to take them from **M. Waldmeier, The Sunspot Activity in the Years 1610 - 1960, Zürich 1961**, and from **J. A. McKinnon, Sunspot Numbers: 1610 - 1985, World Data Center for Solar-Terrestrial Physics, Washington 1987**. The rest of the data is available on the internet. For the aa-index, Nigel Calder quoted the URL in his paper, "[The Carbon Dioxide Thermometer and the Cause of Global Warming](#)" (Sources of Data) published at John's web site. The URL for one of the SOI sources is: <http://www.dnr.qld.gov.au/longpdk/lpsoidat.htm>.

Cordially,

Theodor

Subject: **El Niño and the Sun**

Date: Sat, 27 Feb 1999 21:43:42 -0400

From: "**Dr. Theodor Landscheidt**" <theodor.landscheidt@ns.sympatico.ca>

To: **Richard Courtney** <richard@courtney01.cix.co.uk>, "Onar Åm" <onar@con2.com>

Dear Richard,

I thank you for your positive response in your letter of 27 February. I think that the new hypothesis, you explain

in your letter of 1 March, is really promising as it reflects the polar categories stability and instability that seem to be the background of the data. I will see whether I can find further data patterns that back your hypothesis. I will especially follow your idea of the importance of sustained levels of solar activity. In the following you will find some data that point in this direction.

As you wanted, I gave more details about flare activity during the 1997/1998 El Niño in [a letter to Onar](#).

Onar answered that the 1997/1998 El Niño was almost an exact replication of the 1982/1983 El Niño, providing evidence for internal dynamics, rather than external forcing, but added that if there were a massive magnetic storm somewhere in the period of January to April 1982, this would significantly enhance my position.

There was a proton flare (pfu 830) on 31 January and a strong geomagnetic storm ($A_p = 107$) on 2 March 1982. Most important is, however, that the monthly aa index for February 1982 reached 50.6. This was the highest monthly mean in three decades. Yet this is not all. The El Niño was especially strong from June 1982 to March 1983. During this time 6 energetic X-ray flares (X equal to or greater than 8) and a strong proton flare (7% Forbush decrease) occurred, the first one on 3 June 1982 and the last one on 4 February 1983. When this El Niño faded away and died in May and June 1983, there was no longer any noteworthy solar activity. The next energetic X-ray flare occurred as late as April 1984.

My tentative hypothesis is: If an El Niño comes into existence when the geomagnetic field is extremely quiet as in 1997, it is sustained by continued quiet, whereas it is weakened or killed by geomagnetic storms caused by strong eruptive activity on the sun. When an El Niño is born during strong solar activity, such activity helps to prolong it, whereas fading solar and geomagnetic activity makes it fade away, too. This should be valid after BFS 1968. The reverse should be true of El Niños before 1968. To see how this works with La Niñas, I have to look at the data.

Cordially,

Theodor

Subject: **ENSO effects of changes to solar behaviour**

Date: Mon, 1 Mar 1999 13:37:36 GMT

From: **Richard Courtney** <richard@courtney01.cix.co.uk>

To: **Dr Theodor Landscheidt** <theodor.landscheidt@ns.sympatico.ca>

Dear Theodor:

You may remember that I was puzzled by your finding that changes to solar behaviour - not the state of solar behaviour - affect ENSO. This seemed to make no sense because it could be expected that one ENSO phase would relate to high solar activity, and the other ENSO phase would relate to low solar activity. Why should a change to higher solar activity induce El Niño on some occasions but induce La Niña on others? And why should change to lower solar activity induce El Niño on some occasions but induce La Niña on others?

Following additional thought, I have an hypothesis that may assist investigation of why your finding may be.

I postulate that the ocean system may have more than one quasi-stable state, and the system responds to a change in heat flux to ocean surface by losing quasi-stability. It then settles towards a new quasi-stability in its original or a different state.

The Svensmark hypothesis proposes that solar behaviour controls the strength of solar wind that modulates the flux of cosmic rays into the Earth's atmosphere, and the strength of this cosmic ray flux affects the probability of cloud formation. Clouds affect Earth surface temperature by modulating the Sun's heat that can reach the surface. But the surface takes time to heat, especially in ocean areas because water has high thermal capacity. This time delay would act to smooth the sea surface temperature effects of solar variability. Simply, I suggest that the ocean surface temperature responds to a running mean of solar activity and not detectably to individual solar events such as single solar flares. In this case, the ocean system may form a quasi-stability in response to the solar heating it receives from the Sun but lose that quasi-stability when the solar heating changes significantly. The change in solar heating needs to be sustained for sufficient time for the sea surface temperature to alter sufficiently to disturb the quasi-stability. The ocean system would then adjust by forming a new quasi-stable condition in its original or - more likely - another state.

ENSO is an oceanic effect that oscillates between El Niño and La Niña conditions, and solar behaviour is cyclic.

All the best

Richard

Subject: Re: **Solar Erruptive activity and climate anomalies**

Date: Mon, 01 Mar 1999 12:00:56 -0500

From: **Paul Trimble** <ptrimble@sfwmd.gov>

Organization: **South Florida Water Management District**

To: **John Daly** <daly@vision.net.au>

CC: "Jobey@sfwmd.gov" <Jobey@sfwmd.gov>, "cal@sfwmd.gov" <cal@sfwmd.gov>, "beheen@sfwmd.gov" <beheen@sfwmd.gov>, "dcary@sfwmd.gov" <dcary@sfwmd.gov>, "bhamrick@sfwmd.gov" <bhamrick@sfwmd.gov>, hewett@cse.fau.edu, enfield@aoml.noaa.gov, landsea@aomal.noaa.gov, mestas@aoml.noaa.gov
References: 1 , 2

Hi John,

I had the opportunity to scan Dr Theodor Landscheidt paper ([Schroeter Institute for Research](#)). I obtained a copy of this paper via the URL you maintain (thank you). I was very enthused my first read through paper. This paper is what prompted my initial response to you. I only had the opportunity to scan the article to this point and did not realize he was using the 'aa' geomagnetic index. I have only a few references that apply geomagnetic activity for climate forecasting. As for predicting Lake Okeechobee inflows, I have found that the Cp index may actually work better ([the jury is still out on this finding](#)). The Cp is an estimate of global geomagnetic disturbances from a larger number of stations ([aa is just two stations](#)).

The evidence appears to be quickly mounting to support the concept that useful ties exist between solar activity and climate variability such that these ties can be used for useful climate prediction. The challenge is to realize the many various forms and time scales the solar energy energy is transported from the sun through space to earth. Only once this is understood, can the solar-climate relationships can be realized. In the case of south Florida, the geomagnetic activity appears to be a useful indicator for recognizing and understanding shifts in the seasonal climate regimes. This is especially true for the months from May through October:

I need to read Dr Theodor Landscheidt in more detail and will be checking on your WWW site for further updates on climate variability research. I probably don't have the time to enter into the ongoing solar-climate debate. However, I do offer Lake Okeechobee hydrology as one piece of evidence that appears to support a real solar-terrestrial connection that is useful for seasonal climate predictions.

Thank you for your time and interest in our studies!

Paul

Subject: **Geomagnetic indices**

Date: Sun, 28 Feb 1999 03:05:10 -0400

From: "**Dr. Theodor Landscheidt**" <theodor.landscheidt@ns.sympatico.ca>

To: **Paul Trimble** <ptrimble@sfwmd.gov>

Dear Paul,

I thank you for your comments on my ENSO paper. It was interesting to hear about your experience regarding connections between climate in your region and geomagnetic activity.

It is true that the aa index is only based on two stations. Yet these stations were selected very carefully, and the aa index is recognized to be very homogeneous, sensitive, and dependable. It begins in 1868, so that you can make historical studies. The Cp index, you are working with, is a rough measure. The planetary A index (Ap) is much more sensitive. You find both indices in "[Solar-Geophysical Data](#)", [Prompt Reports](#), [NOAA](#), [National Geophysical Data Center](#), [Boulder, Colorado](#).

Cordially,

Theodor

Subject: Re: **El Niño and the Sun**

Date: Tue, 2 Mar 1999 10:12:59 GMT

From: **Richard Courtney** <richard@courtney01.cix.co.uk>

To: **Dr Theodor Landscheidt** <theodor.landscheidt@ns.sympatico.ca>

Dear Theodor:

Thank you for your detailed response to my suggested hypothesis. Please note that I am not arguing my suggested hypothesis is true (there is no currently available method to determine if it is or is not true). Its point is to indicate that there are possible reasons why the apparent paradox of your results may be true. You put the paradox clearly when you say:

"My tentative hypothesis is: If an El Niño comes into existence when the geomagnetic field is extremely quiet as in 1997, it is sustained by continued quiet, whereas it is weakened or killed by geomagnetic storms caused by strong eruptional activity on the sun. When an El Niño is born during strong solar activity, such activity helps to prolong it, whereas fading solar and geomagnetic activity makes it fade away, too."

My hypothesis provides one potential explanation of why your hypothesis may be correct.

However, if my hypothesis is correct, then there is no need for you to research periods of "sustained levels of solar activity". Your finding that changes to solar activity affect ENSO phases does suggest that a near-constant level of solar activity would sustain an ENSO phase. But it is important to note that the effect of the smoothing from ocean heat sink would act to make a stable rate of change to solar activity act like a series of increments to change.

Consider the case of a linear rate of change to solar activity. The quasi-stable ocean system would not respond until the degree of change to solar activity induced significant sea surface temperature change, and then the quasi-stability would be lost. The system would settle to its new quasi-stability and the degree of solar activity would have changed during the transition time between the two quasi-stable states. Then, the ocean system would not respond until the degree of change to solar activity again induced significant sea surface temperature change. Hence, a linear rate of change to solar activity would behave in similar manner to a series of increments to the degree of solar activity.

I hope this is helpful.

All the best

Richard

Subject: Re: **El Nino and the Sun**

Date: Tue, 2 Mar 1999 20:35:01 +0100

From: "**Onar Am**" <onar@con2.com>

To: **Dr Theodor Landscheidt** <theodor.landscheidt@ns.sympatico.ca>

(Theodor Landscheidt wrote:)

- > My investigation of a relationship between ENSO events and Golden section
- > phases within subcycles of the sunspot cycle made use of SOI and SST data
- > observed, processed and defined by specialists in the field. As far as I made
- > use of El Niño data going back to 1610, they were taken from literature
- > published by acknowledged scientists. The sources quoted in my paper contain
- > lists of SST anomalies large enough to be classed as El Niños. This
- > classification is confirmed by El Niño lists published by ENSO prediction centers.

It is not the data you are using that I am critiquing, but rather your interpretation of it. I **do** think that you make the right interpretations, **but** they are intuitive rather than quantitative. If you can translate your interpretations into quantified definitions then your hypothesis can be objectively tested by others without having to worry about after the fact evaluations.

- > This all the more so, as there was a discussion about the definition
- > of future ENSO events at this site in which I proposed to see whether the
- > 90-day running mean of the SOI published by DNR, Queensland, transgresses the
- > threshold +/- 4.

This is indeed a quantified definition. Is this the definition you are using?

- > As far as you criticize my use of the words "weaken" and "strengthen" as
- > non-scientific, you do not consider the context in which they were applied. I
- > used these expressions in my letter of 27 February to you: "La Niña was again
- > weaker in October and November 1998, but reached greater strength in December
- > 1998 and January 1999." I had made clear at the beginning of the quoted
- > paragraph that these remarks were related to a special SOI index: "The SOI

> (anomaly) rose from -3 to -2."

But this happens all the time. The ENSO oscillates at various frequencies. You are therefore obliged to define what kind of filter you use as assumption. I'm sure you're able to produce such specifications, but it is important that you **do** specify them.

> As I addressed scientists, it was clear that "weaken" or "strengthen" was
> linked to the precise SOI quantities of the quoted > months.

As I've pointed out before, the ENSO weakens and strengthens all the time. The ongoing La Nina, for instance, weakens to almost zero every 25 days or so, but with a 30 day filter it is almost steady as a clock.

> The context argument is valid in all other cases, too. Here only one example.
> You criticized my use of the concept "trough". In my letter of 27 February to
> John I showed a plot of the yearly mean aa index and stated that the marked
> phases 0.382 are correlated with all outstanding peaks and troughs in
> geomagnetic activity.

Yes, this is fine.

> From the context it is clear that there are 7 such prominent extrema that catch the eye.

"Catch the eye" is exactly my point. This is an **intuitive** perception, not a quantitative definition. Call me a nit-pick here, but if you submitted a paper with troughs defined as the ones that are "eye catching" then it would be rejected on the spot. I understand that you are still developing these concepts as you go along, but rigidity is still important. Some of the so-called troughs that you call eye catching did not appear particularly eye catching to me. So we now have a subjective discrepancy. This can easily be fixed by defining a trough quantitatively (**not just in terms of phases**). The trough function then determines whether there is a trough, independently of "eye catchiness."

> Even if someone would not see where these extrema are that fit the description,
> they could be identified by the marks of the 0.382 phases.

That's not good enough. The correlation **must** emerge from the data, not from a mathematical proxy. The mathematical proxy is a good tool, but in itself not enough.

> Precise aa-quantities of the level of the extrema can be read
> from the vertical axis that measures them.

That's not a definition of a trough.

> You wrote:

>"We global warming skeptics spend a great deal of time criticizing
> the IPCC report for using too sloppy language. Several papers on John's site
> deal with the sloppy nature of IPCC's language. Given this I'm sure you
> understand that you can't expect me to demand anything less from you."

>John pointed to cases of hair-raising sloppyness and inconsistent logic. Your
> wording implies that the concepts I use are on the same deplorable level so
> that you have to exhort me to adhere to scientific standards. I think that my
> work is beyond this criticism.

I did not mean to imply that your work is sloppy like the IPCCs language. That was merely an analogy to illustrate the need for exact language. I think you've done an excellent job so far, and I'm sorry if you think I am being too demanding, but you are here dealing with new scientific ground which requires special care. When I ask myself if the evidence you've presented is convincing beyond doubt my answer is "no." I frequently find myself being skeptical of relations you present, not because of the lack of correlation, but because of lack of rigid definitions. I am left with the feeling that there is room for interpretation and after the fact adjustment. And as long as this is the case, you run the danger of creating a new epicycle theory. You may dismiss me as unreasonably skeptical, **but** you can be 100% certain that if I, who am positively inclined towards your hypothesis, are left with doubts, then you can be sure that scientists worldwide will be highly skeptical of your findings. This is why I constantly urge you to rigidify your definitions: if you can't convince **me**, then you can't convince the scientific community.

> Yes, there was a particular reason why I did not extend the plotted course of
> SOI and aa beyond 1991 - 1997. As explained in my letter of 19 February to you,

- > the correlation changed at the beginning of 1997 from significantly positive to
- > significantly negative.

But as far as I can see this is just an after the fact observation. You have provided no justification why this should be the case. You haven't linked them to specific phenomena. If you were able to predict these phase shifts in advance by linking them to specific phenomena and constellations **then** it would be justified. Otherwise it is open to an epicycle critique. It's pretty easy for me to show that two semi-cyclic signals will have large periods of correlation or anti-correlation. Therefore, if you are allowed to pick your phase shift points after the fact, then you may indeed just find coincidental correlations. In short, this ad hoc choice of phase shifts is not convincing at all. You need to justify it.

Onar.

Subject: **El Nino and the Sun**
Date: Wed, 03 Mar 1999 00:10:52 +0200
From: **Timo Niroma** <timo.niroma@pp.inet.fi>
To: daly@vision.net.au

Dear Dr Landscheidt,

You might be interested in my website personal.inet.fi/tiede/tilmari/sunspots.html.
Especially in the part 4.

Regards, **Timo Niroma**

Subject: **El Niño and the Sun**
Date: Sun, 07 Mar 1999 15:29:16 -0400
From: "**Dr. Theodor Landscheidt**" <theodor.landscheidt@ns.sympatico.ca>
To: "**John L. Daly**" <daly@vision.net.au>

Dear John,

Our investigation of close correlations between solar activity and ENSO events, driven by the motivation motor open debate, is making progress. During the last weeks, the analysis of the effect of energetic X-ray flares, solar cosmic ray events, and geomagnetic activity has yielded results no one expected. ENSO events are linked to extrema in the sun's eruptional activity and their effects on earth such that the same type of event, whether El Niño or La Niña, can be released by strong flare activity and geomagnetic disturbances as well as by a protracted lull in flare activity and an unusually quiet geomagnetic field. Correspondingly, correlation coefficients of SOI and aa index oscillate between negative and positive values. Though these correlation coefficients are highly significant and indicate that there is an actual connection, their volatility may be cause for concern as long as we do not know where these changes come from. This is especially true when we want to make predictions.

In my letter of 26 February to Richard I suggested that the polarity reversals pointed to electromagnetic phenomena. Meanwhile, this proved correct. Strong magnetic fields are present in all sunspots. Such spots form bi-polar groups of opposite polarity. In a given 11-year cycle all preceding spots in one solar hemisphere have the same polarity, for instance they are all magnetic north poles or south poles, while all following spots are magnetic south poles. In the other hemisphere it is the other way round. When a new 11-year cycle begins, the polarities in the two hemispheres are reversed. It should be noted that this polarity reversal in sunspot groups occurs around the sunspot minimum. Another magnetic reversal takes place around the sunspot maximum. It affects the sun's general magnetic field. It is believed that the reversal of sunspots in groups is intimately related to the reversal in the general magnetic field.

Though I knew this well, I did not associate it with the ENSO results, as the phases 0.382 a, d in the rising and falling subcycles of the sunspot cycle were years away from the epochs of the sunspot extrema. Yet the switching polarities in the correlation coefficients reminded me of the switching in the sunspot polarity. Lo and behold, this was it. The correlation coefficients switch when the magnetic polarities on the sun switch around sunspot minimum and maximum. The regular pattern of the switches after the dominant BFS 1968 is just reversed before this initial phase. There was only one irregularity just after 1968. I shall soon present these results in detail.

Here in advance some correlation coefficients and probabilities covering the period since the sunspot maximum 1979.9:

1979.9 - 1986.6: $r = +0.54$, $n = 82$, $t = 5.74$, $P = 8.2$ to the power -8

1986.7 - 1989.4: $r = -0.87$, $n = 34$, $t = 9.98$, $P = 1.2$ to the power -11

1989.5 - 1996.3: $r = +0.59$, $n = 83$, $t = 6.58$, $P = 2.2$ to the power -9

1986.4 - 1988.7: $r = -0.66$, $n = 28$, $t = 4.48$, $P = 6.6$ to the power -5.

Inspection of X-ray flares equal to or greater than X6, the solar cosmic ray flares from the Sakurai list, and the aa index since the sunspot minimum 1954 showed that these observed data follow the polarity of the correlation coefficients. When it is positive, flare activity and peaks in the geomagnetic index go along with El Niños and protracted lulls with La Niñas. When the correlation is negative, this is reversed. Flares concur with la Niñas and lulls with El Niños. The sunspot minimum 1996. 4 initiated a period governed by negative correlation. A protracted lull in the sun's eruptional activity concurred with the El Niño 1997/1998. Strong eruptional activity, I described already in detail in earlier letters, stopped El Niño and brought La Niña into existence. Further eruptional activity on the sun would strengthen La Niña and a protracted lull would mean its end, at least till about 2000.4, the epoch of the impending solar maximum.

It could be that the magnetic reversals on the sun affect the climate system already a bit before the precise date of sunspot maxima and minima or a little later. I will look at this possibility before I give more details. Open debate as practiced at Johns web site presents science in statu nascendi. Things develop gradually. This is quite different from publishing a paper with a static result.

Kind regards,

Theodor

Subject: Re: **El Niño and the Sun**

Date: Mon, 8 Mar 1999 19:07:12 -0500

From: "**Onar Åm**" <onar@con2.com>

To: **Dr Theodor Landscheidt** <theodor.landscheidt@ns.sympatico.ca>, "**John L. Daly**" <daly@vision.net.au>

Thanks Theodor,

this was exactly the kind of motivation I was looking for. If indeed the correlation reversals can be predicted in advance based on sunspot maxima and minima then this strengthens your findings significantly. I am eagerly awaiting to see the results of your investigation throughout the whole history of the aa index. The results would be extremely significant if they hold for the whole period. This would virtually remove any doubt about the connection. Another acceptable result would be if minima/maxima not always trigger a reversal, but the reversals that DO occur always occur in minima/maxima. If this results holds up then we know quite certainly that the physical mechanism has to involve magnetic fields somehow. This correlates well with the Svensmark effect which also relies on magnetic fields. It is, however, unclear to me what physical impacts a polarity change has on the atmosphere.

Onar.

Subject: Re: **El Niño and the Sun**

Date: Tue, 09 Mar 1999 20:27:21 -0400

From: "**Dr. Theodor Landscheidt**" <theodor.landscheidt@ns.sympatico.ca>

To: **Onar Åm** <onar@con2.com>

Dear Onar,

I thank you for your positive response. Naturally, I will extend my investigation throughout the whole history of the aa index, back to 1868. The corresponding epochs of sunspot minima and maxima are available. Only the ENSO data, I need for the correlation, are a bit problematic. There is no SOI that covers the years 1868 - 1899. The JMA SST index begins in 1868, but it lags the SOI by 4 months. Yet Troup's SOI is available since 1900. So I shall begin with these data published by the Queensland Department.

It will be interesting to see how reported eruptional and geomagnetic activity will affect the course of ENSO. The new relationship should make it possible to make short-range forecasts about the ENSO response to solar activity or inactivity.

Kind regards,

Theodor

Subject: Re: **El Niño and the Sun**

Date: Thu, 11 Mar 1999 23:12:50 -0400

From: "**Dr. Theodor Landscheidt**" <theodor.landscheidt@ns.sympatico.ca>

To: "**Onar Am**" <onar@con2.com>

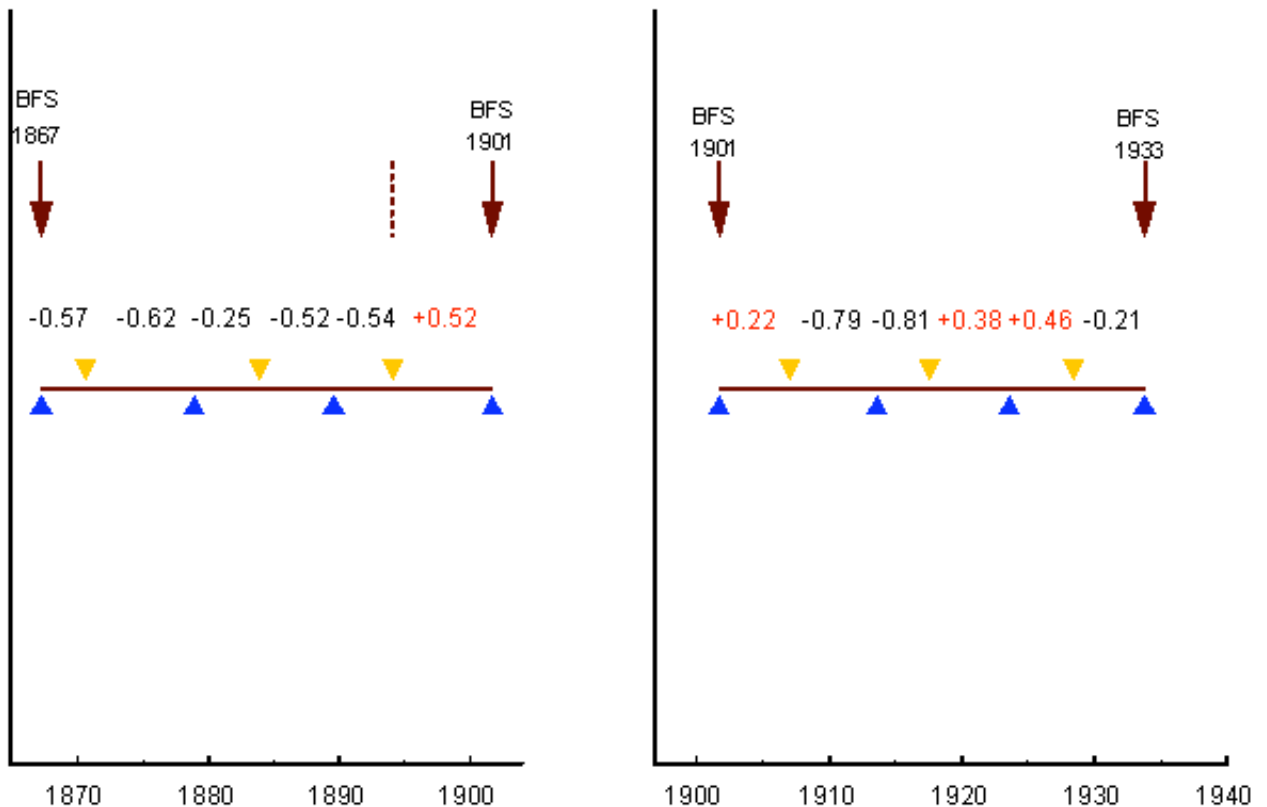
Dear Onar,

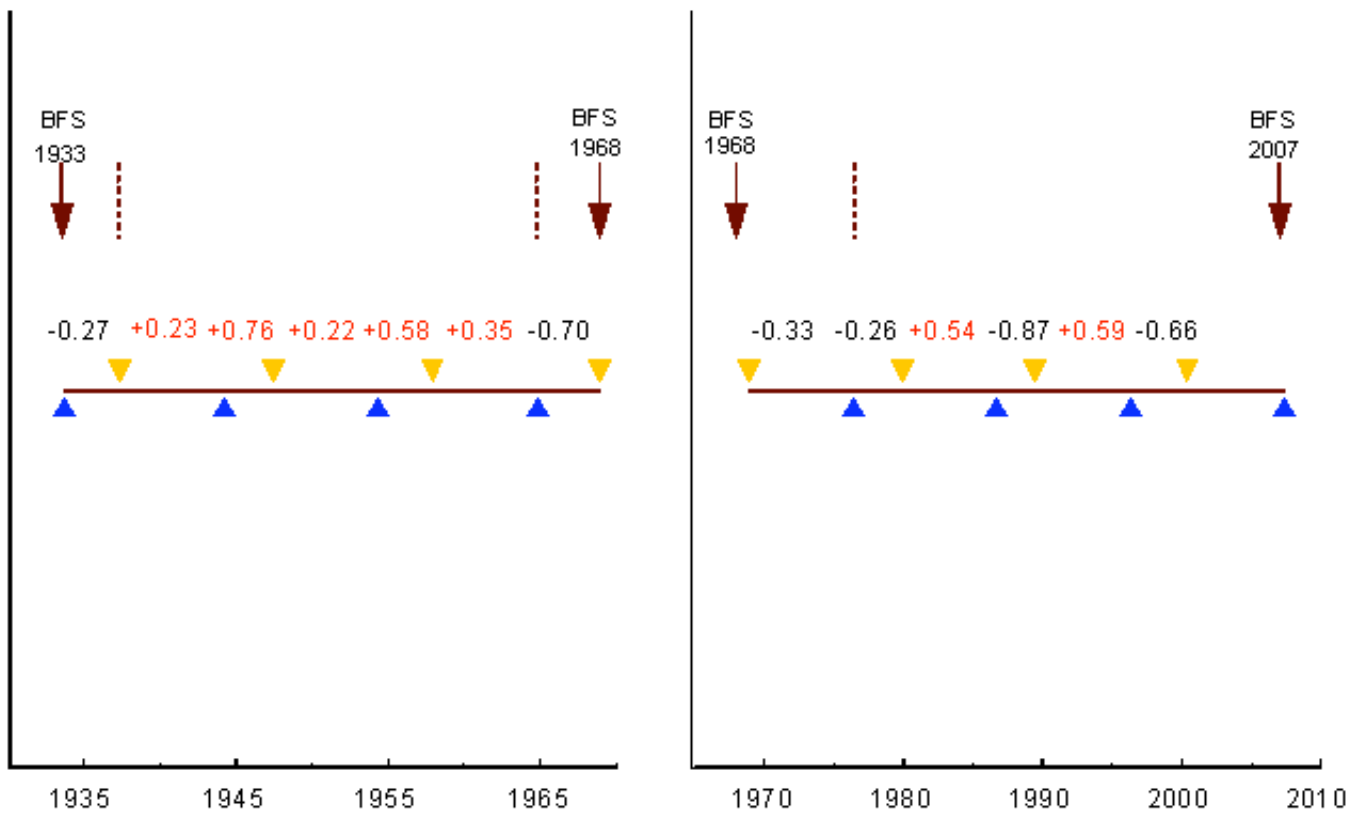
Meanwhile, I traced the SOI - aa index connection back to 1868. For the period 1900 - 1950 I made use of the historical SOI published by the Queensland Department based on barometric pressure readings from Darwin and Tahiti. As there is no SOI covering 1868 - 1899, I took the JMA SST index, but adjusted the data to balance the SST lag.

The attached figures show the result. Initial phases 1867, 1901, 1933, 1968, and 2007 of the dominant big finger cycle (BFS) are indicated by arrows. Sunspot minima are marked by blue triangles and sunspot maxima by yellow triangles. The horizontal axis measures years within the period 1868 - 2007. Interestingly, all BFSs exactly coincide with sunspot maxima or minima. This may be related to the fact that the Golden section major 0.618 of the big finger cycle of 35.76 years is equal to the magnetic Hale cycle of 22.1 years.

The correlation coefficients of the positive or negative correlation between SOI and aa-index are given in the figures for intervals measured from sunspot minimum to maximum and from sunspot maximum to minimum. Reversals from positive to negative correlation or vice versa are exclusively linked to sunspot extrema which go along with reversals of magnetic polarities on the sun. These correlation reversals form patterns that seem to be related to the level of sunspot activity. Changes in the pattern occur exclusively at sunspot maxima or minima close to BFSs. These phases of instability, also to be found in many other solar-terrestrial cycles, are indicated by vertical dashed lines.

>From sunspot minimum 1867.2 to sunspot maximum 1894.1, the correlation coefficient was constantly negative. A new pattern emerged at sunspot maximum 1894.1, close to BFS 1901.8. Now a full sunspot cycle, measured from maximum to maximum, alternately showed positive and negative correlation. This continued till sunspot maximum 1937.4, just after BFS 1933.6. From this epoch to sunspot minimum 1964.8, just before BFS 1968.9, the correlation was continuously positive. Around BFS 1968.9 it was negative. A new pattern formed at the sunspot minimum 1976.5, just after BFS 1968.9. Now the subcycles from sunspot minimum to maximum and from maximum to minimum alternately showed positive and negative correlation. These fast reversals seem to be linked to the high level of solar activity in the last decades. Another period of instability is imminent around BFS 2007.2.





It should be noted that low correlation coefficients accumulate at phases of instability around 1901, 1933, and 1968. Yet even these weak coefficients are highly significant. I shall present a list of the respective probabilities of all correlation coefficients in my next letter. Logically, the correlation seems to be strongest just around actual ENSO events. I will look more thoroughly into this relationship. Some of the historical data did not yield as strong correlation coefficients as the recently observed data. This was to be expected. Even today different institutes publish different global temperatures for the same year.

Kind regards,

Theodor

Subject: Re: **El Niño and the Sun**
 Date: Sun, 14 Mar 1999 00:38:12 -0500
 From: "**Onar Am**" <onar@con2.com>
 To: **Dr Theodor Landscheidt** <theodor.landscheidt@ns.sympatico.ca>

- >Changes in the pattern occur exclusively at sunspot maxima or
- >minima close to BFSs. These phases of instability, also to be found in many
- >other solar-terrestrial cycles, are indicated by vertical dashed lines.

I'm sorry, but this is not good enough. The correlations are way too low to be convincing. As I've pointed out earlier, if you have two random signals with strong peaks in the same frequency region (**wavelength approx. equal 5-10 years**) then we can expect exactly the kind of correlations you found. The original correlation you found from 1991 to 1997 was a lot more convincing because the smaller variations in the aa index consistently mirrored changes in the ENSO four months later. THIS is the pattern you are looking for. Can you generate a comparison of each period like the 1991-97 graph you made?

Onar.

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