A reminder for the last 3 weeks of class.

1. One week ahead of time, please consult with me about what short reading you will have the rest of the class read. I will then distribute the reading via e-mail.

2. Each student who is not presenting is required to send to me at least one hour before class at least one question that you have based on the short reading that you did on the topic. I will keep track if you have sent the question in, and your grade will be based on you participating in this aspect of the course.

3. The presenter will present the topic in 15-20 minutes, allowing 20 minutes for discussion, partly based on the presentation, and partly based on the questions that your classmates have turned in. I will help lead the discussion.

Presentation Rubric

For a standard presentation, I expect the following components

1. Demonstration of knowledge of the subject
2. Presentation of at least two different perspectives (for example, two different ways to study it, such as modeling and observations)
3. Clarity in organization
4. Clarity in graphics
5. Appropriate referencing of any figures shown.
5. At least one open question in the study of the topic.
6. Relevance of the topic to understanding the role of the oceans in climate and climate change.

In each case, an extraordinary presentation will contain more in depth analysis and integration of the knowledge contained in the readings that you did. Clarity of presentation and organization will count for 20% of your grade.

Ocean 423 Evaluation of research paper summaries (40 points possible)

(1) What was done?

9-10 Complete, clear and accurate description of the data and/or analysis methods used in the paper (to the extent that the authors describe them)
8 Nearly complete description of what was done, missing a few important details or having minor inaccuracies.
7 Summary of only part of what was done or misrepresenting some important aspects
1-6 Very incomplete or inaccurate summary

(2) What was learned?

9-10 Complete, clear and accurate summary of the direct results of the analyses.
8 Nearly complete summary of the results, missing a few important details
7 Summary of only part of the results, or partially inaccurate summary
1-6 Very incomplete or inaccurate summary of the results

(3) What it means?

9-10 Demonstrating that you fully understand the implications of these results and were able to think past what was said in the paper to place the work in context or identify weaknesses.
8 A good summary of the authors' interpretation of their results
7 Partial summary of the authors' main points
1-6 A summary that misses many of the main points of the paper

(4) What one figure says the most about this paper?

9-10 Good choice of figure and accompanying explanation of what it shows and why it is the key figure
8 Less clear explantion of what the figure shows and why it is important
7 Selection of a minor figure, or a confusing explanation
1-6 A figure that doesn't show very much / lacking explanation

Reference

Douglass, D.H. and B. D. Clader (2002). Climate sensitivity of the Earth to solar irradiance. Geophysical Research Letters 29: 10.1029/2002GL015345.

What was done?

The authors used multiple regression analysis to separate out surface and atmospheric temperature responses over 1979-2001 to variations in (1) *S*, El Niño (indexed by SST in the eastern tropical Pacific, lag=6 months), (2) *V*, volcanic activity (indexed by stratospheric optical depth, lag=3 months), (3) *L*, a linear trend, and (4) *I*, solar irradiance (lag=3 months). The temperature record analyzed for the lower troposphere as analyzed by Christy, et al. (2000) was best fit to the relationship $T = k_1 S + k_2 V + k_3 I + k_4 L + b$. To test the robustness of the results, given the relatively short (22 year) data set, they repeated the analysis while truncating the series by one year each time for up to 6 years. They also applied the method to three different temperature data sets.

What was learned?

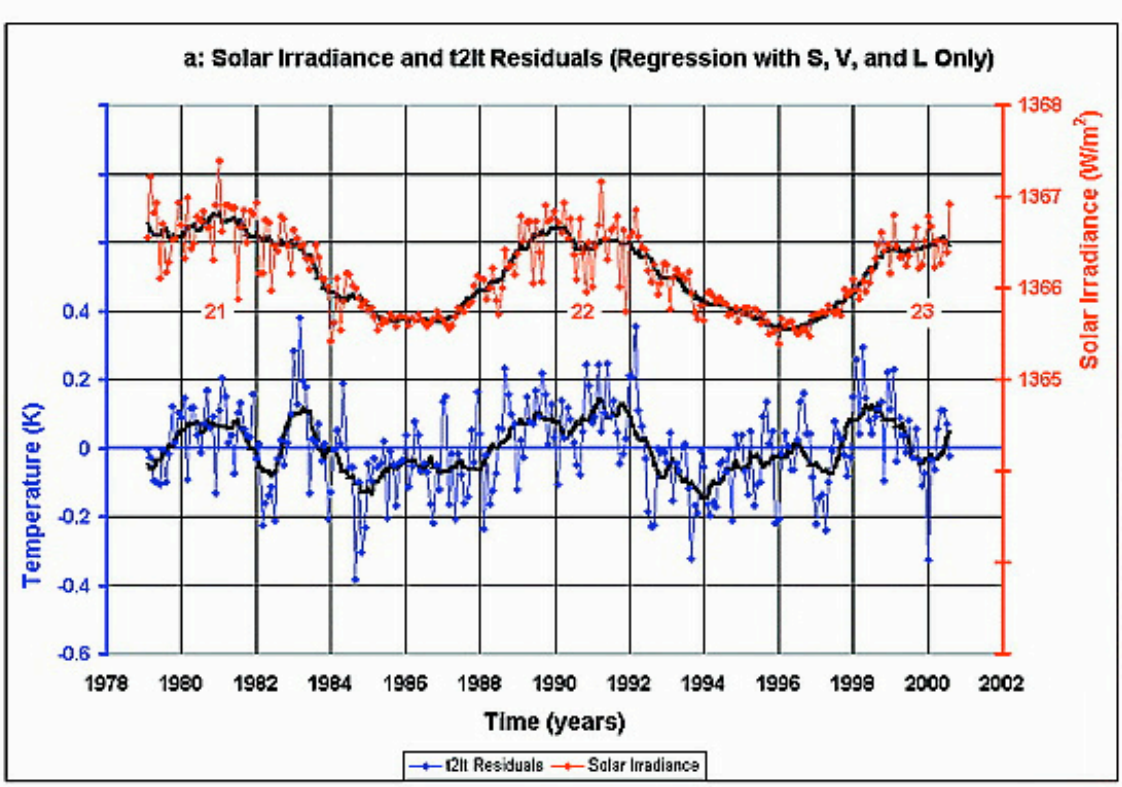
The authors determine the sensitivity to solar irradiance as, $k_3 = 0.11 \pm 0.02$ °C/(W/m^2). This value is similar to that obtained from other studies. They also determined a linear warming trend of 0.065 ± 0.012 °C per decade.

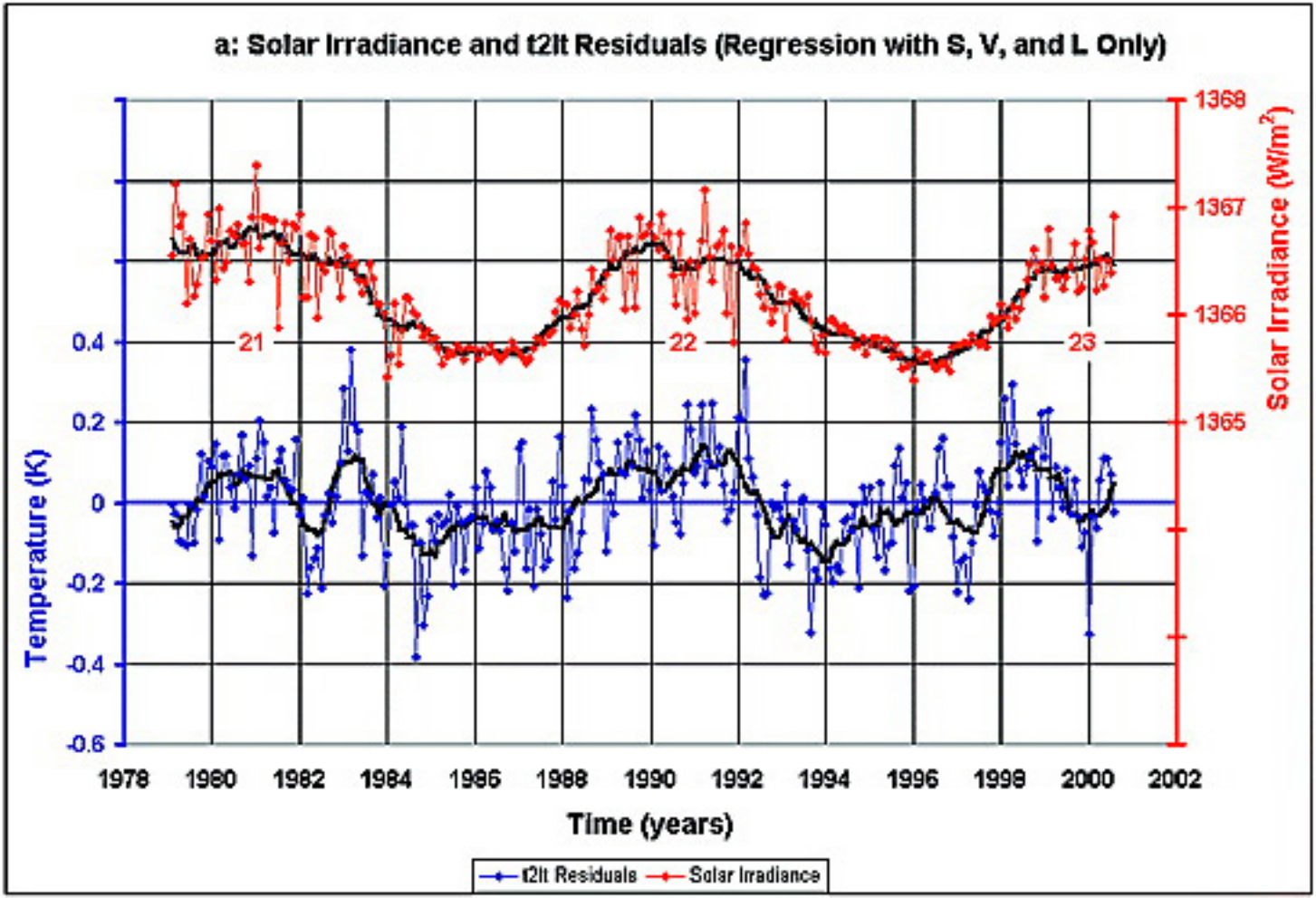
What it means?

The authors concluded that "the close agreement of these various independent values suggests that the sensitivity *k* is the same for both decadal and centennial time scales and for both ocean and lower tropospheric temperatures." Using the sensitivity to extrapolate outside the time period of the observations, the value of *k* imples a surface warming of 0.2°C over the last 100 years in response to the 1.5 W/m^2 increase in solar irradiance (Lean, 2000). This warming represents 25-30% of the total increase in global surface air temperature that has been observed (0.55 to 0.65°C, Parker, et al. 1997; Hansen, et al. 1999). The authors also present the linear warming trend as an improved estimate since their analysis “accounts for three of the natural effects (*S*, *V* and *I*) that obscure the observation of any underlying trend.”

What one figure says the most about this paper?

The attached figure shows the solar irradiance as measured from satellites (red curve) and the difference between the observed temperature and that predicted by a regressison analysis using only *S*, *V* and *L* (blue curve). The solar irradiance varies by about 1.5 W/m2 over this time period with a characteristic time scale of about 9.6 years following the sunspot cycle. We can see a similar variation in tropospheric temperature by about 0.2°C, in rough agreement with the conclusions of the paper.


a: Solar Irradiance and t2lt Residuals (Regression with S, V, and L Only)
Temperature (K)
Solar Irradiance (W/m²)
Time (years)
21
22
23
0.4
0.2
0
-0.2
-0.4
-0.6
1368
1367
1366
1365
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
t2lt Residuals
Solar Irradiance


a: Solar Irradiance and t2lt Residuals (Regression with S, V, and L Only)
Temperature (K)
0.4
0.2
0
-0.2
-0.4
-0.6
Solar Irradiance (W/m²)
1368
1367
1366
1365
21
22
23
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
Time (years)
t2lt Residuals
Solar Irradiance