

This document describes the changes to the manuscript that resulted from using the CERES TOA shortwave fluxes as opposed to the ERBE data-set. When possible, we have included the revised text (in black) and the original text (in red).

## **Section 2a**

This section has been rewritten to reflect the change in observational TOA radiation data-sets used.

## **Section 2b 2.**

### **Second paragraph.**

The global pattern of atmospheric solar absorption is virtually identical to the pattern of vertically integrated specific humidity (from NCEP reanalysis) with a spatial correlation coefficient of 0.92.

The global pattern of atmospheric solar absorption is virtually identical to the pattern of vertically integrated specific humidity (from NCEP reanalysis) with a spatial correlation coefficient of 0.94.

### **Fifth Paragraph**

The (solar weighted) global average planetary albedo of 0.298 is partitioned into a global average  $\alpha_{P,ATMOS}$  of 0.262 (88% of the total) and a global average  $\alpha_{P,SURF}$  of 0.036 (12%, Table 1)... The hemispheric average planetary albedo is very similar in both hemispheres (0.299 in the NH versus 0.298 in the SH) although the partitioning between  $\alpha_{P,ATMOS}$  and  $\alpha_{P,SURF}$  differs slightly between the hemispheres ( $\alpha_{P,ATMOS}$  contributes 86% of the hemispheric average planetary albedo in the NH as compared to 90% in the SH).

The (solar weighted) global average planetary albedo of 0.313 is partitioned into a global average  $\alpha_{P,ATMOS}$  of 0.277 (88% of the total) and a global average  $\alpha_{P,SURF}$  of 0.036 (12%, Table 1)... The hemispheric average planetary albedo is very similar in both hemispheres (0.314 in the NH versus 0.313 in the SH) although the partitioning between  $\alpha_{P,ATMOS}$  and  $\alpha_{P,SURF}$  differs slightly between the hemispheres ( $\alpha_{P,ATMOS}$  contributes 87.5% of the hemispheric average planetary albedo in the NH as compared to 89.7% in the SH).

## **Appendix A**

### **Intro**

The error bounds on the CERES TOA fluxes are discussed. Previously this discussion was about the ERBE uncertainties.

### **Last paragraph**

If the observational errors are systematic, the two standard deviation range of the global average  $\alpha_{P,ATMOS}$  is 0.244-0.280 (82%-94% of the total planetary albedo); the two standard deviation range of global average  $\alpha_{P,SURF}$  is 0.028-0.045 (9% - 15% of the total planetary albedo).

If the observational errors are systematic, the two standard deviation range of the global average  $\alpha_{P,ATMOS}$  is 0.258-0.297 (83%-95% of the total planetary albedo); the two standard deviation range of global average  $\alpha_{P,SURF}$  is 0.028-0.044 (9% - 14% of the total planetary albedo).

## **Appendix B**

### **Third paragraph**

Our method finds that 88% of the global average planetary albedo is due to  $\alpha_{P,ATMOS}$  where as the T07 method finds a value of 85% (Table A1). The single absorption model finds smaller values of  $\alpha_{P,ATMOS}$  (and larger values of  $\alpha_{P,SURF}$ ) than the other two methods; on average, the single absorption  $\alpha_{P,ATMOS}$  values are 4% smaller than the Taylor method and 9% smaller than the values found in this study.

Our method finds that 88% of the global average planetary albedo is due to  $\alpha_{P,ATMOS}$  where as the T07 method finds a value of 86% (Table A1). The single absorption model finds smaller values of  $\alpha_{P,ATMOS}$  (and larger values of  $\alpha_{P,SURF}$ ) than the other two methods; on average, the single absorption  $\alpha_{P,ATMOS}$  values are 5% smaller than the Taylor method and 8% smaller than the values found in this study.

### **Fifth paragraph**

Our method finds that the atmosphere attenuates the surface albedo's contribution to the planetary albedo by 69% in the global average where as the Taylor and single absorption methods find values of 61% and 57%.

Our method finds that the atmosphere attenuates the surface albedo's contribution to the planetary albedo by 68% in the global average where as the Taylor and single absorption methods find values of 63% and 58%.

### **Figure 2**

All four panels are revised.

### **Figure 3**

All three panels are revised.

### **Figure 4**

The observational data points are revised in both panels.

### **Figure 5**

The observational data points are revised.

### **Figure 6**

The observation curve has been revised in all panels.

**Figure A1**

The analysis has been repeated with the CERES data and re-plotted.

**Figure A2**

All curves in the upper panels have been revised.

**Table 1**

The first row of the table has been revised.

| (%)          | Total | $\alpha_{P,ATMOS}$ | $\alpha_{P,SURF}$ | Surface Albedo |
|--------------|-------|--------------------|-------------------|----------------|
| Observations | 29.8  | 26.2               | 3.6               | 12.3           |

| (%)          | Total | $\alpha_{P,ATMOS}$ | $\alpha_{P,SURF}$ | Surface Albedo |
|--------------|-------|--------------------|-------------------|----------------|
| Observations | 31.3  | 27.7               | 3.6               | 11.7           |