Third Generation Earth Radiation Budget Measurements; ERBE in the Context of Earlier Systems

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The Earth Radiation Budget Experiment observations are just becoming available for scientific use. These represent the third generation of measurements with steadily improving accuracy and resolution. Beginning in the 1960s observations by spherical detectors established the mean albedo of the earth near 30% in substantial variance from presatellite estimates. The Nimbus 6 and 7 wide field of view ERB measurements represent a long-term climatology of measurements at 1000 km resolution. The ERBE measurements introduce higher accuracy and higher space and time resolution result.

Comparisons will be presented of several April ERB measurements to illustrate what this improvement in resolution and accuracy can yield. Simultaneous ERBE and Nimbus 7 measurements for April 1985 show nearly identical results on the large scale. Comparison of measurements of direct solar energy from ERBE, Solar Max Mission and Nimbus 7 suggest a "solar constant" value of 1368 w/m^2 for the 1979-1986 period. The long-term record of earth radiation budget (Aprils from 1976-1985) over large regions is shown to have interannual variation of $\pm$ 20-30 w/m^2. The new ERBE data will allow this climate record measurement to continue.

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Figure 1. Zonal means of ERBS, NOAA 9 and Nimbus 7 April, 1985 emitted exitance. The Nimbus 7 data has been deconvolved using the spherical harmonic approach.

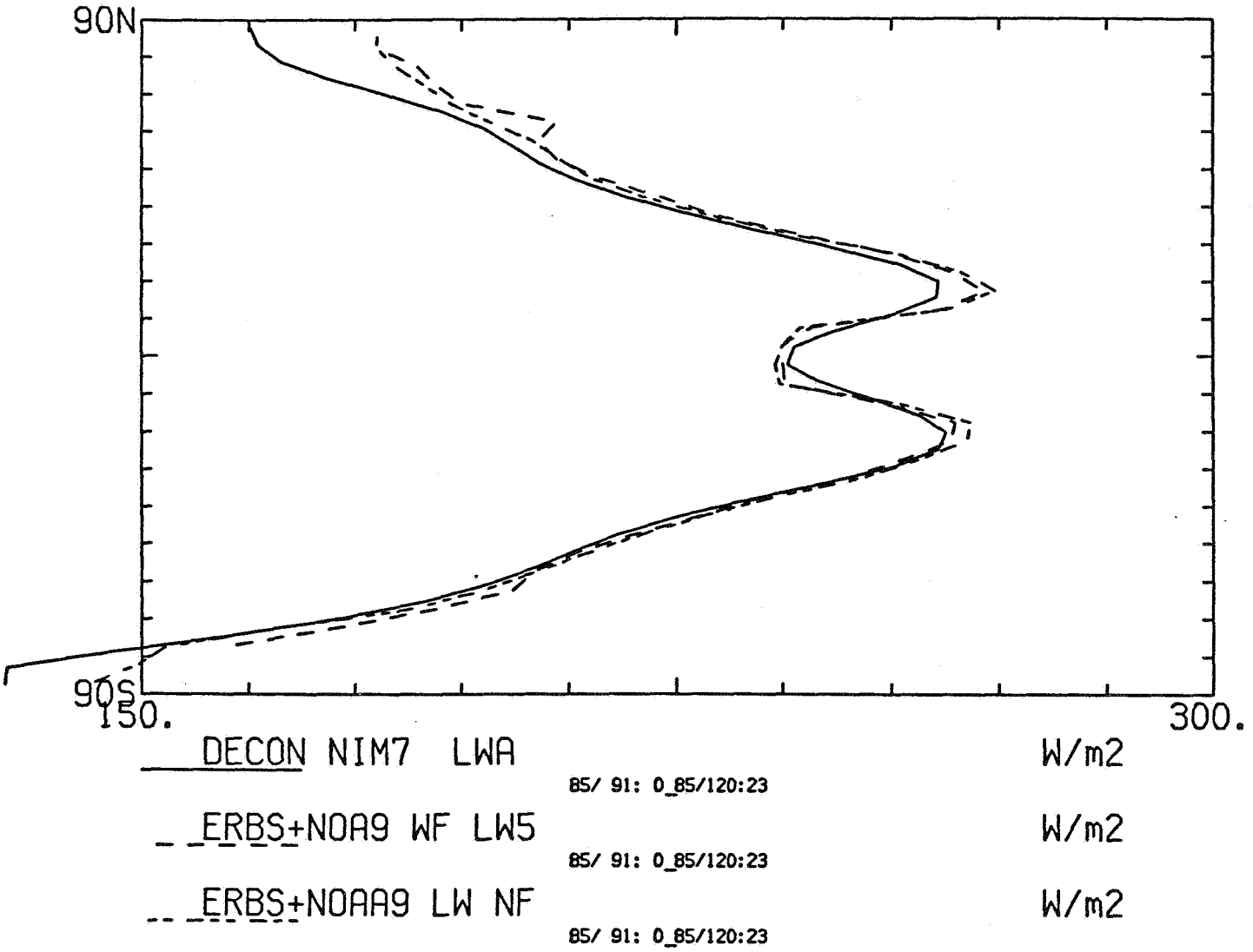
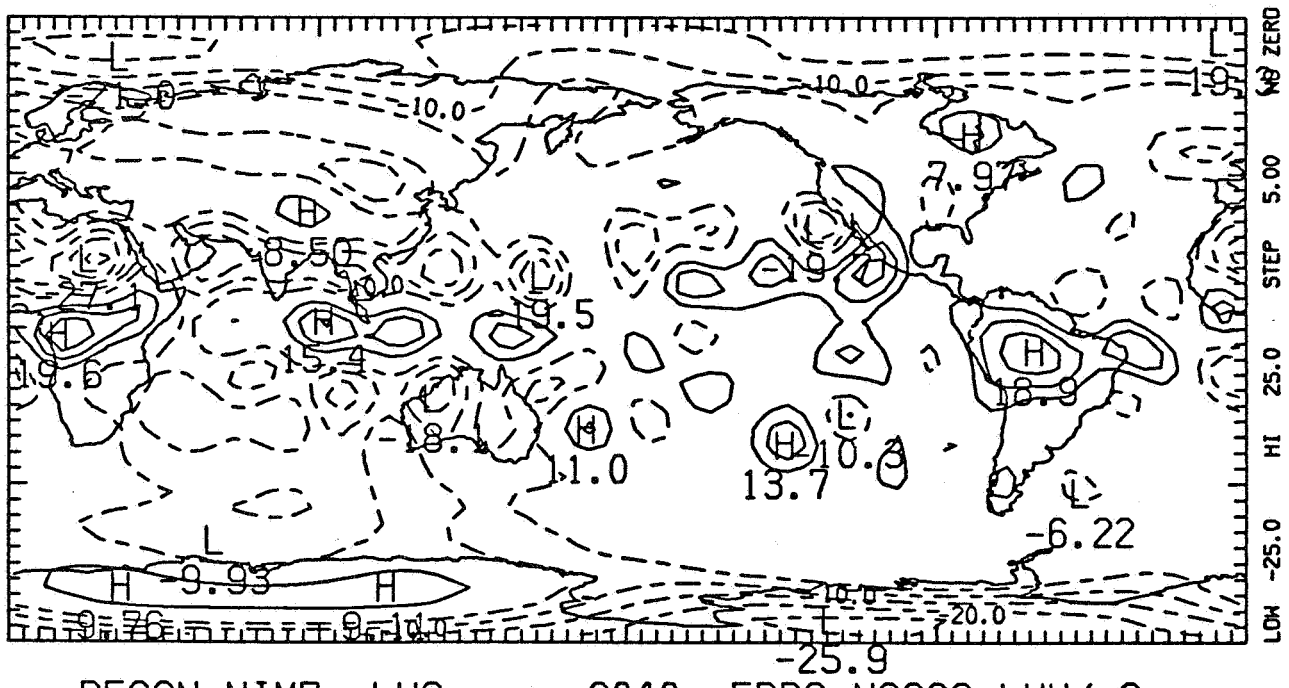


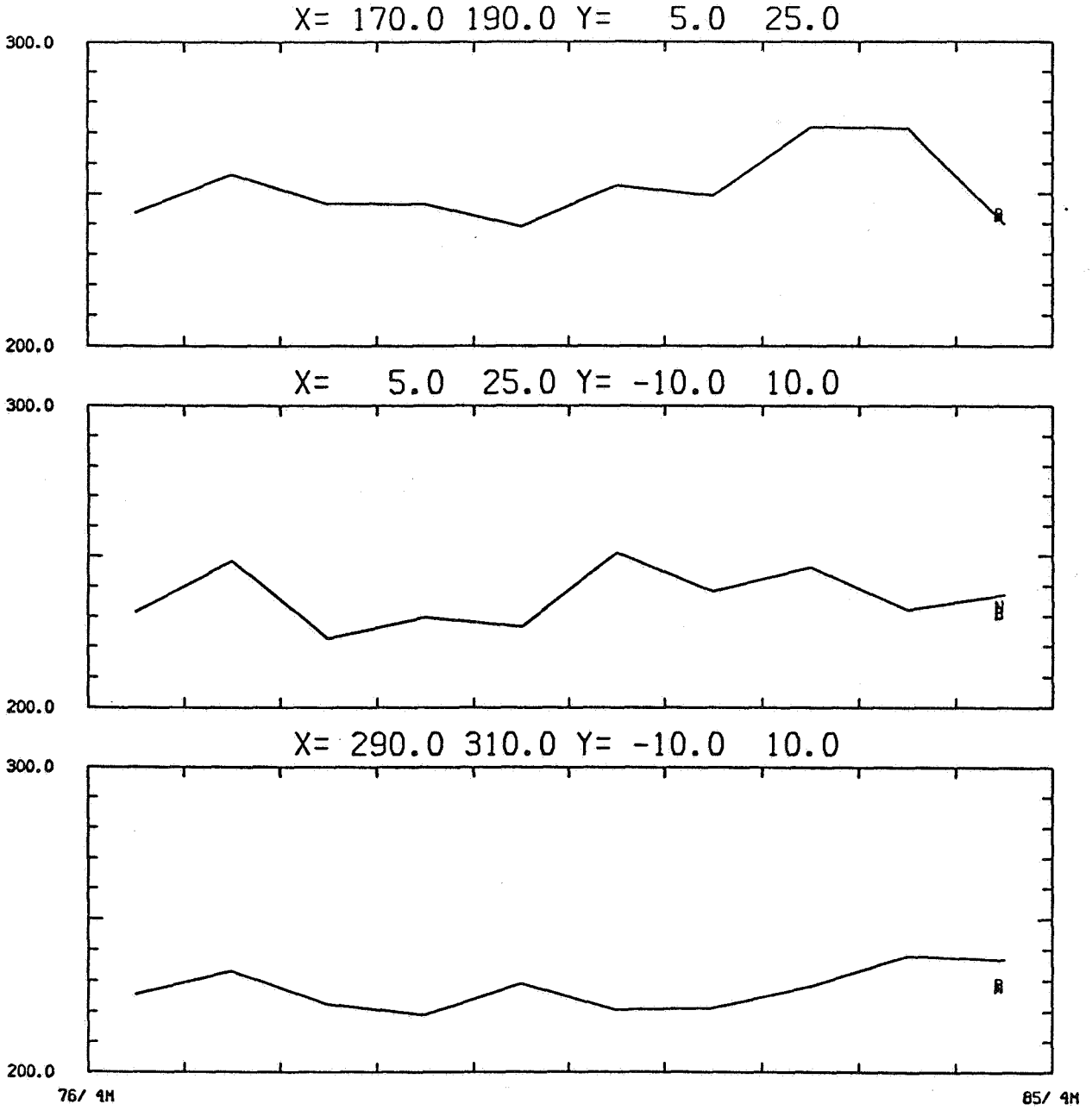
Figure 2. Map of the difference between combined NOAA 9+ ERBS and Nimbus 7 emitted exitance. The ERBE data was filtered to the same spherical harmonic resolution as the Nimbus 7 data, order 15.



DECON NIM7 LWA -8040_ ERBS+NOAA9 LWW/m2

— April, 1985 —

Figure 3. Time series for different regions of the emitted exitance. Included are 4/76, 4/77, 4/78 from Nimbus 6, 4/79 and 4/80 from the old Nimbus 7 analysis scheme and 4/81, 4/82, 4/83, 4/84, 4/85 from the new Nimbus 7 analysis. The symbols N (NOAA 9) and B (NOAA 9, ERBS) represent the monthly means for ERBE.



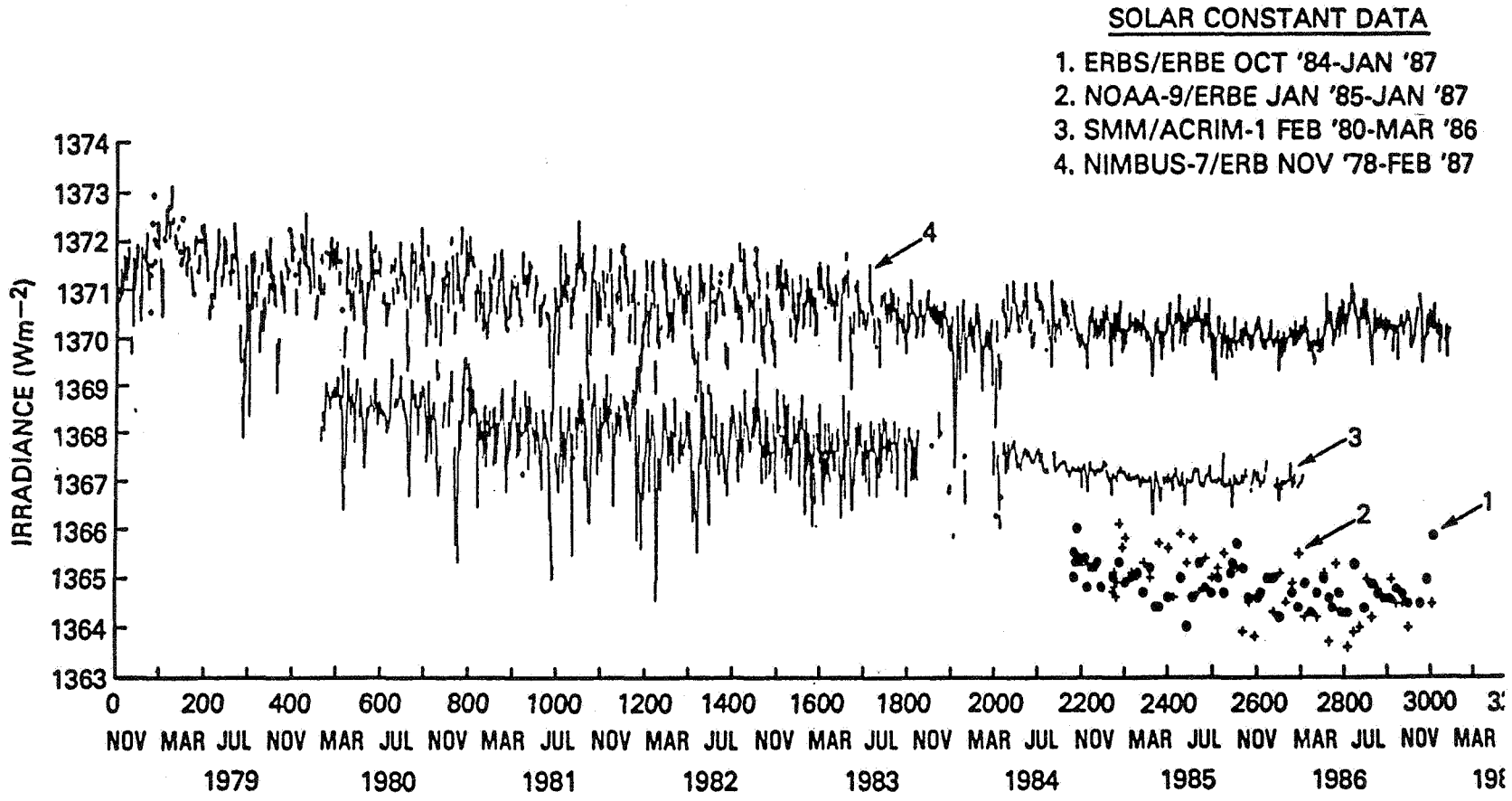


Figure 4. (after Mercherikunnel, Kyle and the Nimbus-7 ERB Experiment Team, 1988)