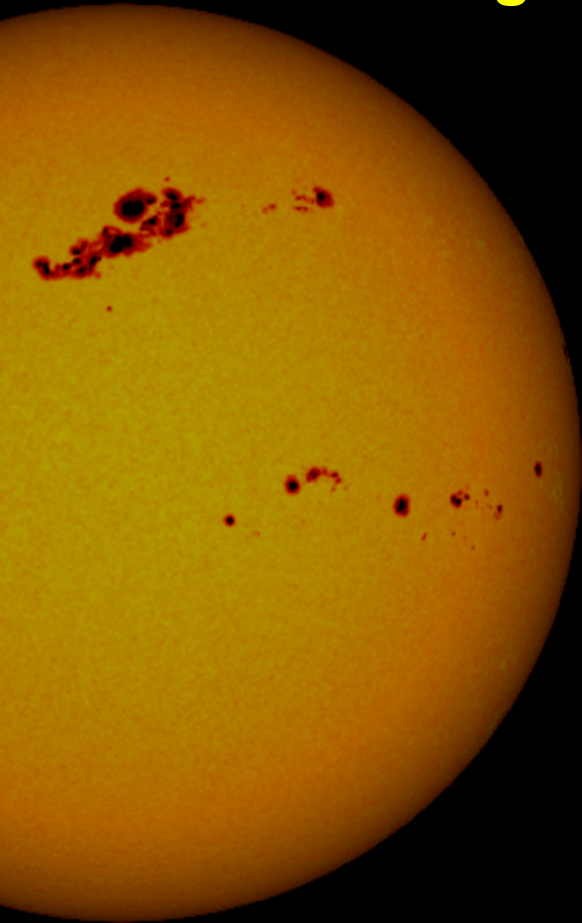


JPL/TMO ground comparisons and significance for flight TSI results



ACRIM SCIENCE TEAM

Dr. Richard C. Willson
Columbia University
Principal Investigator
acrim@acrim.com

ACRIM INSTRUMENT TEAM

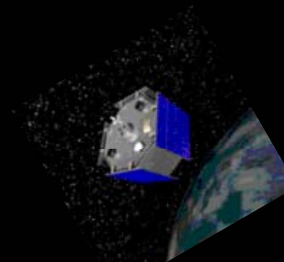
Roger S. Helizon
Jet Propulsion Laboratory
Instrument Scientist &
ACRIMSAT Project Mgr.
roger@simdac.jpl.nasa.gov



SMM/ACRIM1



UARS/ACRIM2



ACRIMSAT/ACRIM3

JPL Table Mtn. Solar Test Facility

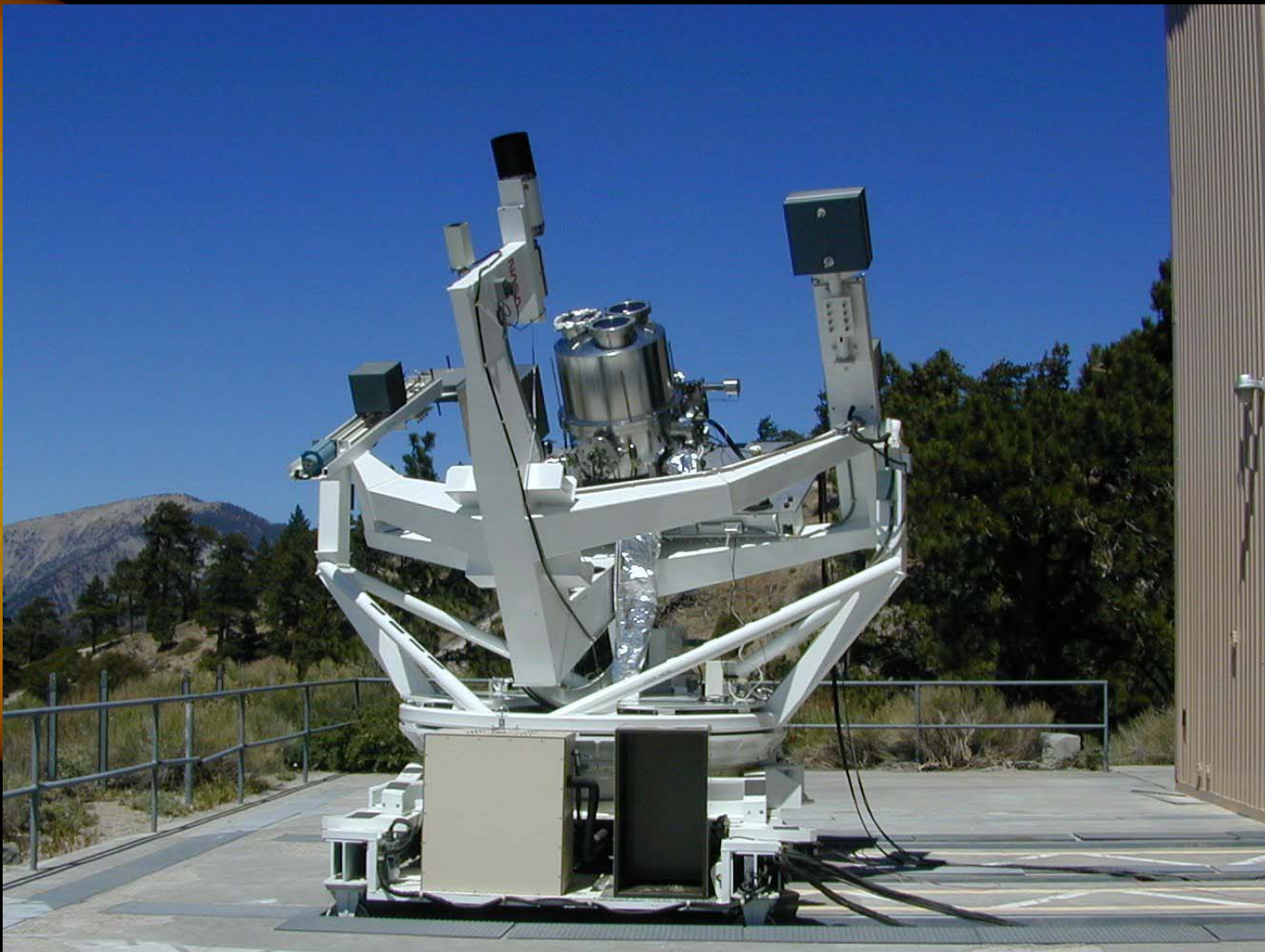
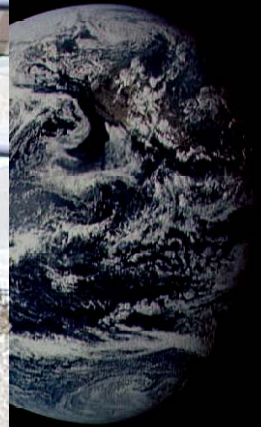
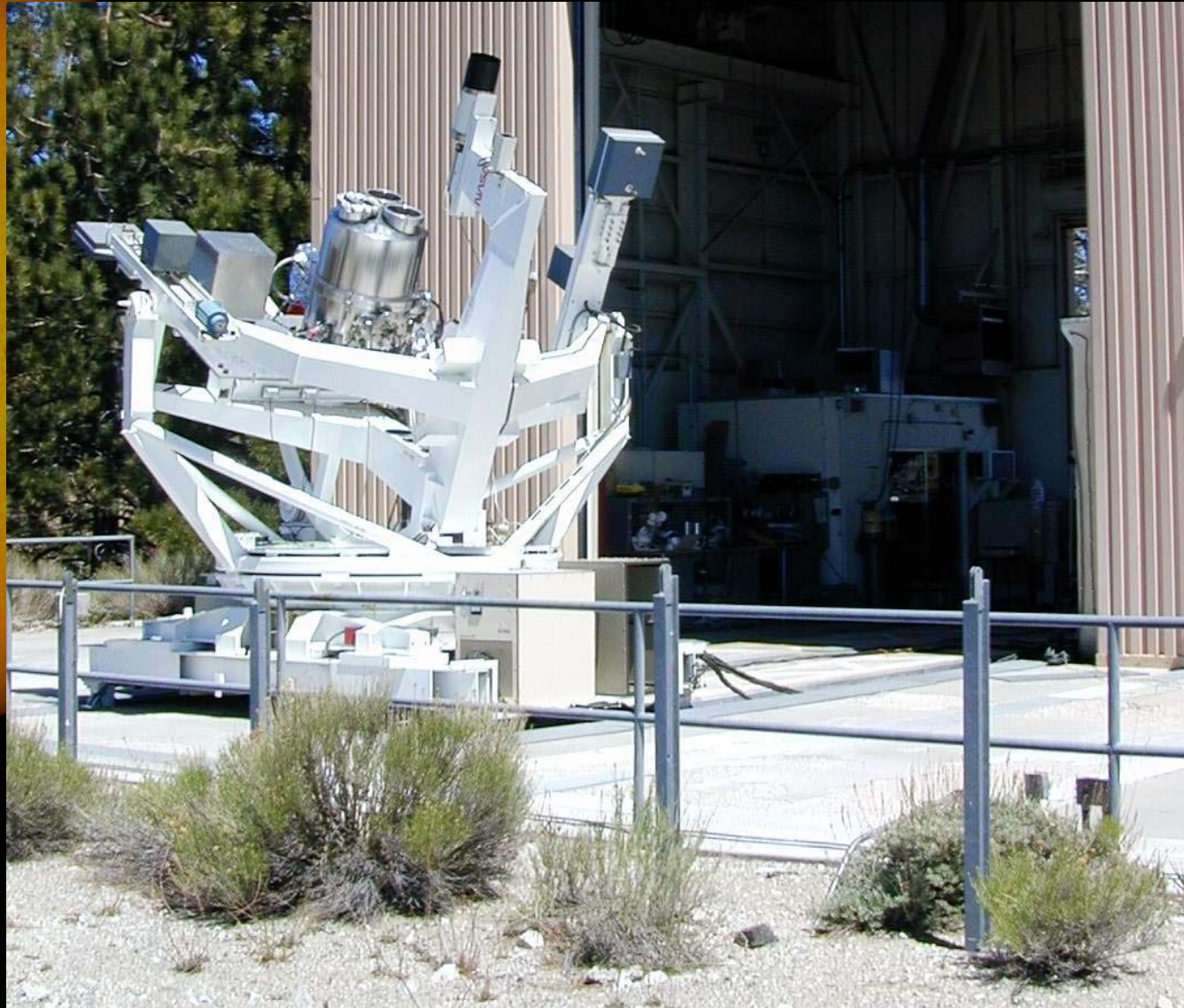


TABLE MTN. OBSERVATORY SOLAR TEST FACILITY

JPL Table Mtn. Solar Test Facility



JPL Table Mtn. Solar Test Facility

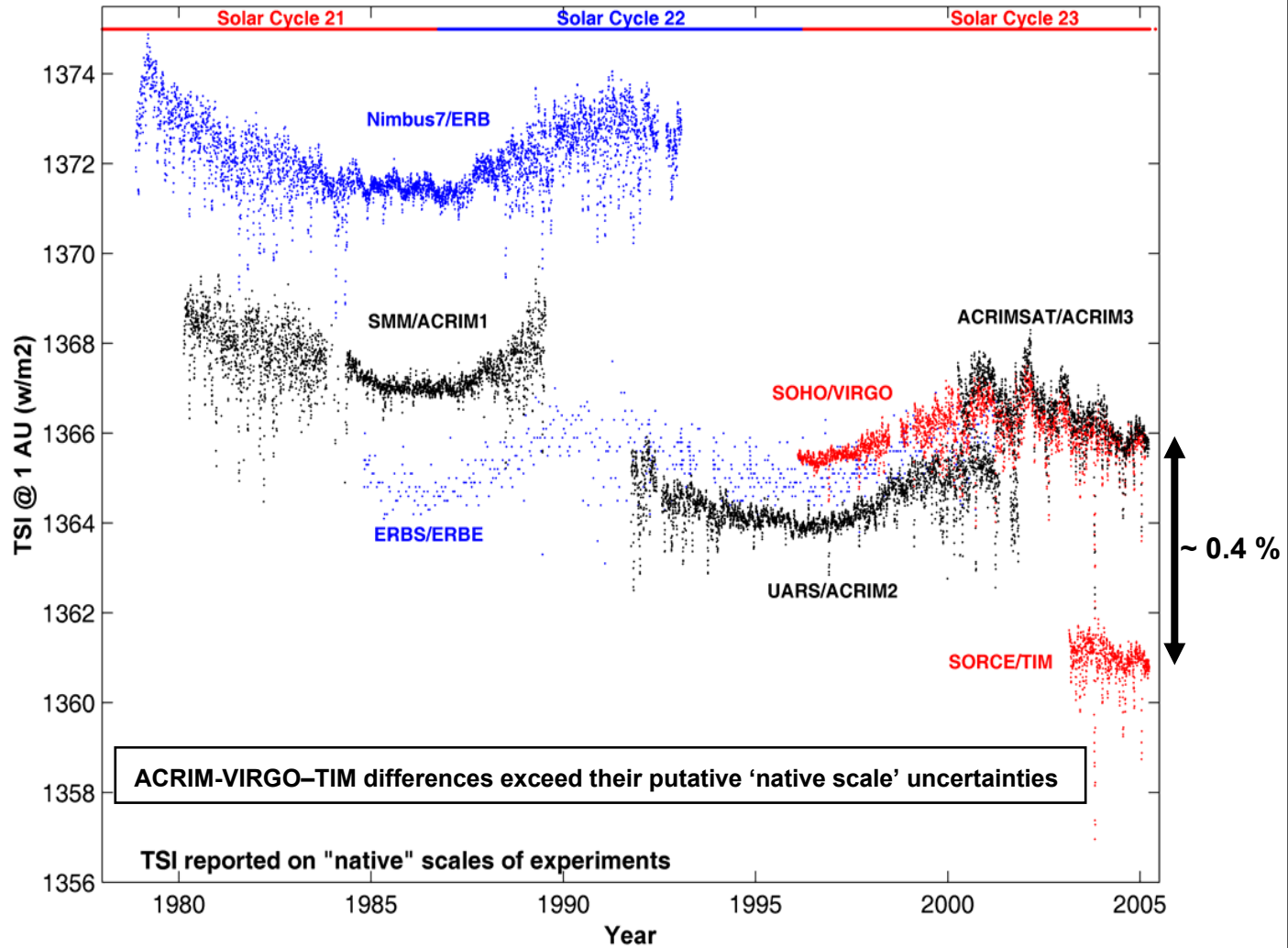


JPL Table Mtn. Solar Test Facility



Rationale for a TMO Comparison Test of ACRIM3, TIM and VIRGO instrumentation

TOTAL SOLAR IRRADIANCE MONITORING RESULTS: 1978 to Present



RC Willson, earth_obs_fig1 07/01/2005

Rationale for a TMO Comparison Test of ACRIM3, TIM and VIRGO instrumentation

- Analysis doesn't appear to resolve the ACRIM3/VIRGO-TIM 0.4 % scale difference
- Direct comparison of ACRIM3, VIRGO and TIM instrumentation may resolve the issue
- Representative flight backup technology should be compared
- Comparisons should be made using the sun as the source
- Comparisons should be made in a vacuum to emulate spaceflight conditions
- Comparisons should be simultaneous



Rationale for a TMO Comparison Test of ACRIM3, TIM and VIRGO instrumentation

- The Table Mtn. Observatory Solar Test Facility uniquely suited a comparison experiment

- STF experimental capabilities are:

A large solar tracker and flight rated vacuum chamber

A flight rated clean room

A laboratory environment with data acquisition and processing capability

- The TMO site has accommodations for 24 experiment personnel and meeting space

- The TMO STF site has a uniquely advantageous solar observing location

7500 feet elevation

Adjacent to the Mojave desert (dry overlying atmosphere)

High incidence of transparent skies and $> 100 \text{ W/m}^2$ irradiance levels

Clear, dry skies will provide a minimum solar 'aureole' factor



TMO/STF Comparison Test Concept

- All three instruments can be accommodated in the vacuum chamber.
- Circumsolar scattering (the solar 'aureole') could produce systematic differences

External view-limiting apertures could be used to conform all to the same solar view
or

A solar aureole calibrator could be designed to empirically reduce scattering effects

- Simultaneous TSI observations could be made over a range of temperatures
- Air/vacuum differences could be determined if deemed useful
- Comparisons with historical ancillary instrumentation could be included
- Test planning and results could be discussed using the on-site conference facility

JPL Table Mtn. Solar Test Facility



1978 SMM/ACRIM1 TMO preflight comparisons