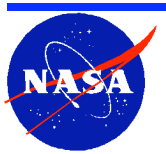
State of U.S. CCSP, IPCC, NASA Earth Science, CERES, NPP/NPOESS

3rd CERES-II Science Team Meeting
May 3-5
GFDL, Princeton, NJ



U. S. Climate Change Science Plan (CCSP)

- CCSP has formed an Observations Working Group with a Data Management sub-working group.
  - Chapters 12 and 13 of the CCSP Strategic Plan July, 2003 (V2)
- Fall, 2005 CCSP workshop may include a session on climate observation requirements and/or on climate prediction uncertainty: both have been proposed elements.
- Multi-agency report of workshop on satellite calibration requirements for climate data records published: NISTIR 7047 in March 2004. BAMS paper to appear in May, 2005 (Ohring et al.)
- So far, not much "new money" in CCSP. No real teeth in ability to fill gaps in the observing system

IPCC Assessment Report 4

- April, 2004 Meeting on Climate Sensitivity, Exeter, UKMO
  - Working Group Report on a new way to use Perturbed Physics Ensemble (PPEs) to attempt to infer more rigorous uncertainty in climate predicitons
    - Not likely to directly impact AR4 (only published or accepted for publication results are allowed): requires publication in 2004/2005.
  - AR4 Chapter development underway
    - Wielicki a contributing author on Chapter 3 for changes in TOA fluxes
    - First inclusion of radiation budget data in observations of climate change
    - New ocean heat storage/ERBS/CERES net radiation likely to be included
    - GEWEX radiative flux assessment partially impacted by AR4.
    - Sections on both TOA fluxes as well as surface fluxes

NASA Earth Science

- NASA Reorganization as a result of Bush administration's Lunar and Mars exploration initiative
  - Major funding changes starting to happen: look like 10 to 30% reductions in Earth and Space Science.
  - Recent NRC report on NASA Earth Science Decadal Study concluded that the exploration initiaitive is having major negative impacts on earth science
  - Congress not yet convinced on exploration (FY06 budget will tell)
  - Space Science and Earth Science now merged as in 80s early 90s
  - Diaz is AA for Science, Asrar is his deputy
  - Don Anderson is Modeling lead, Hal Maring is Radiation Sciences
  - New NASA administrator (Michael Griffin from APL): physics/engineering
- FY05 Budget led to 10 to 20% reductions in overall earth science
  - Problems remain with transition to "full cost accounting" and difficult to compare past number to current numbers.
- Not clear when next ESSP competition will be
- CALIPSO/Cloudsat launch planned for Sept, 2005 (problem with French spacecraft for CALIPSO: solar panel motor lubrication issue).
- NASA Earth Science Roadmap: deliver to NRC Decadal Survey May 22, 2005. Exploration, Continuing Awareness, Maintaining Perspective

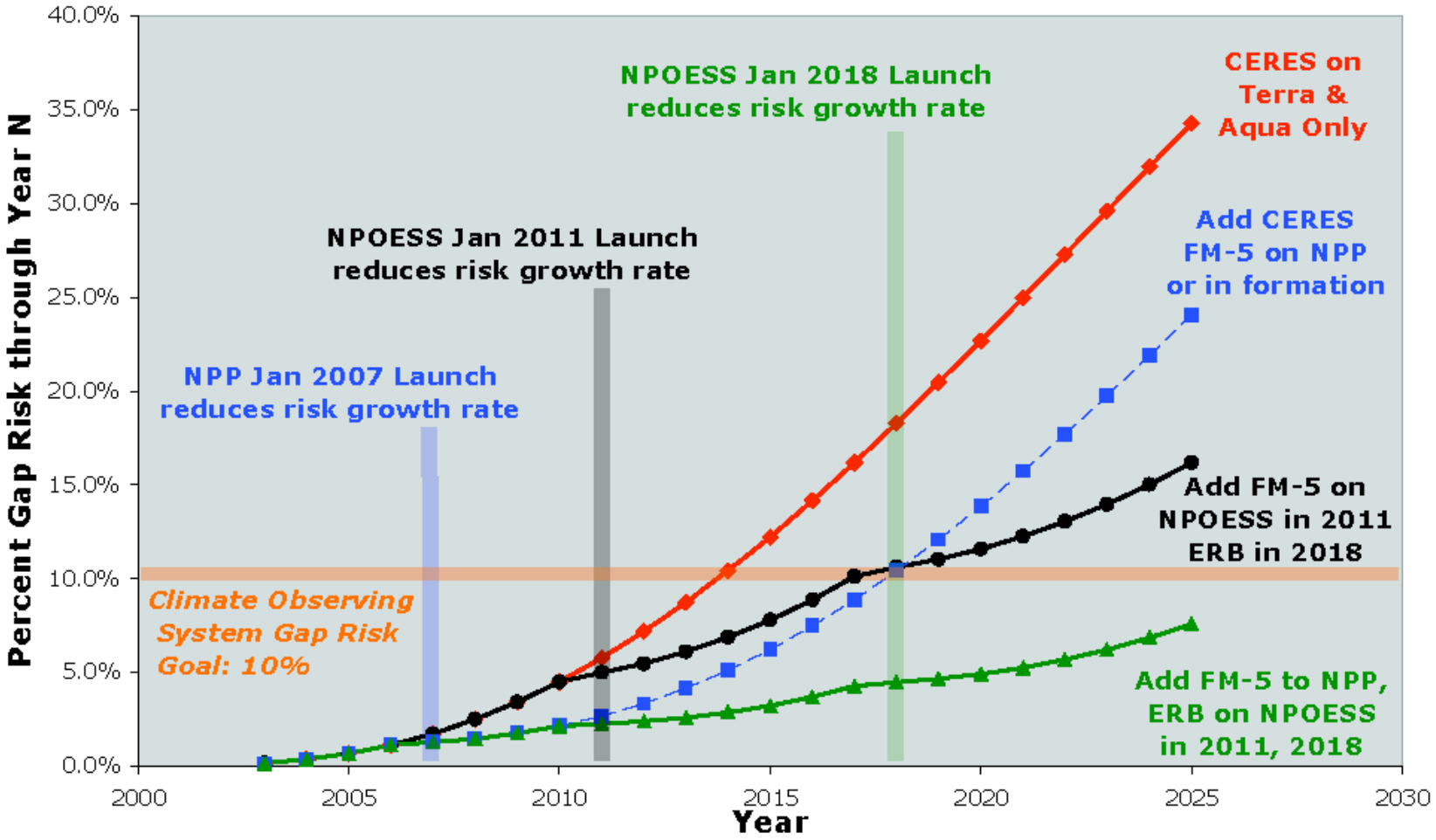
CERES Program

- 20% budget cuts taken in FY04: primarily staff reduction
- FY05 and FY06 plan is 5% further reduction for each year
- Full Cost Accounting changes are causing budget headaches
  - have not yet affected CERES program funding
  - main headaches are in fighting battles on how indirect costs are done (on-site contractors, off-site contractors, etc)
  - to date, full-cost does not equal true cost for overhead charges
  - even corporations have the same issue: new business always starts off losing money: if you only started businesses that profit from day one: you wouldn't start new business
  - bad fit to high risk research, but NASA has been mandated as the full-cost U.S gov guinea pig.
  - some benefit to force resolution of staffing skill mix issues.
- NASA Langley has also recently re-organized
  - Radiation Sciences Branch => Climate Science Branch (D. Young acting)
  - Atmospheric Sciences Competency => Science Directorate (L. Vann acting)
  - Eliminates old program offices
  - Overall, not a lot of change in how atmospheric sciences is done at LaRC

NPP and NPOESS

- CERES FM-5 is NOT on NPP gap filling mission (budget problems knocked us off for the second time)
- CERES has been working with NPOESS to estimate costs of transitioning CERES data product codes to NPOESS system
  - *either* process at NPOESS data centers for near real time use
  - *or* process at LaRC for near real time use
  - *in either case*, process at LaRC later for Climate Data Records
- NPOESS cost and schedule over-runs have been a problem (current biggest issue is the imager).
  - NPOESS has formally requested NASA HQ to provide the stored CERES FM-5 instrument for use on first NPOESS 1:30 LT satellite (~ 2011 launch)
  - NASA HQ has written a letter giving CERES FM-5 to NPOESS. Details TBD.
  - CERES has re-examined the radiation budget data gap risk
  - Gap risk moderately exceeds climate goals (NISTIR 7047) if Terra and Aqua data continue to be taken as long as viable: ~10% gap risk through 2015.
  - CERES has sent the gap analysis and suggested minimum improvements to FM-5 MAM, calibration, and characterization if used on NPOESS

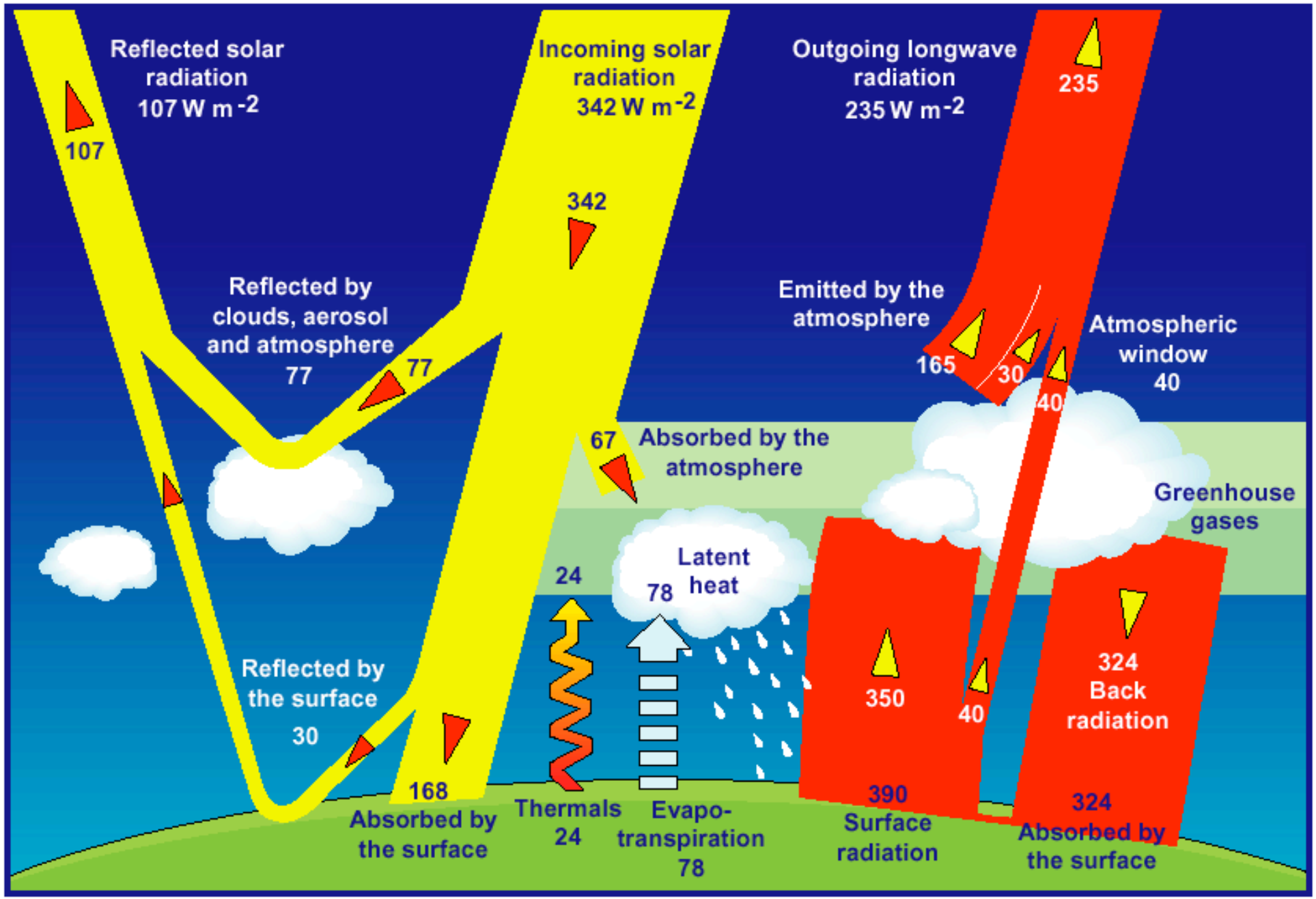
Radiation Budget Gap Risk: Satellite Scenarios



The 4 Slide Executive Summary

Climate System Energy Balance

Clouds and the Earth's Radiant Energy System



CERES: Integrated Data for Radiation/Cloud/Aerosol

- 2 to 10 times ERBE accuracy: moving from 5 W/m^2 toward 1 W/m^2

- TOA, surface and atmosphere fluxes

- A radiative 4-D assimilation: integration of surface/ cloud/aerosol/atmosphere constrained to TOA flux

Input Data

- CERES Crosstrack Broadband
- CERES Hemispheric Scan ADMs
- MODIS Cloud/Aerosol/Snow&Ice
- Microwave Sea-Ice
- MATCH Aerosol Assimilation
- GEOS 4-D Assimilation Weather (fixed climate assimilation system)
- Geostationary 3-hourly Cloud
- Consistent Intercalibration

Output Data

- ERBE-Like TOA Fluxes (20km fov, 2.5 deg grid)
- CERES Instantaneous TOA/Sfc/Atmosphere Flux
  - 20km field of view (SSF, CRS products)
  - 1 degree grid (SFC, FSW products)
  - Fluxes, cloud & aerosol properties
- CERES Time Averaged TOA/Sfc/Atmosphere
  - 3-hourly, daily, monthly
  - 1 degree grid (SRBAVG, AVG, ZAVG products)
  - Fluxes, cloud and aerosol properties

CERES Key Advances over ERBE

- Calibration and characterization improved by a factor of 2
- Field of view improved to 20km nadir for clear-sky
- Explicit VIRS/MODIS cloud/aerosol/sfc properties for each CERES fov
- Cloud property retrievals optimized for radiation budget/climate
- New Surface and Atmosphere Fluxes
- Factor of 2 to 10 improvement in TOA fluxes (new angular models)
- New polar cloud properties and radiative fluxes
- Improved clear-sky fluxes and cloud radiative forcing
- Use of geostationary to improve diurnal cycle accuracy
- Use of 4-D weather data and snow/ice maps to improve cloud retrieval.
- Independent instruments on Terra and Aqua (hemispheric, xtrack

CERES Data Product Status

	LW Accuracy Goal	SW Accuracy Goal	Terra Yrs of Data (3/00 on)	Aqua Yrs of Data (7/02 on)	Sampling Dimensions Cal Wv Lat Lon Ht Tim Szn Vzn Vaz
Level 1b: Instrument					
Radiances/Absolute Calibration (BDS)	0.5%	1%	4.8 yrs	2.1 yrs	
Radiances/Stability(BDS)	0.5%	0.5%			
Level 2: Instantaneous FOV					
ERBE-Like TOA Flux (ES-8)	20 1σ	35 1σ	4.8 yrs	2.1 yrs	
CERES Angular Models	<1 bias	<1 bias	complete	beta	
CERES TOA Flux (SSF, CRS)	<6 1σ	<15 1σ	4.8 yrs	2.1 yrs	
CERES Surface Flux (SSF, CRS)	20 1σ	20 1σ	3.1 yrs	0.8yrs beta	
CERES Atmosphere Flux (CRS)	consist	consist	3.1 yrs	0.8yrs beta	
CERES MODIS cloud (SSF, CRS)	prop dep	prop dep	4.8 yrs	2.1 yrs	
Level 3: Grid Instantaneous					
ERBE-Like TOA Flux (ES-4/9)	15 1σ	35 1σ	4.8 yrs	2.1 yrs	
CERES TOA Flux (SFC, FSW)	<6 1σ	<15 1σ	3.8 yrs	1.5 yrs	
CERES Surface Flux (SFC, FSW)	20 1σ	20 1σ	3.1 yrs	0.3 yrs beta	
CERES Atmosphere Flux (FSW)	consist	consist	3.1yrs	0.3 yrs beta	
CERES MODIS cloud (SFC, FSW)	prop dep	prop dep	3.8 yrs	1.5 yrs	
Level 3: Grid Monthly					
ERBE-Like TOA Flux (ES-4/9)	5 1σ	5 1σ	4.8 yrs	2.1 yrs	
CERES TOA Flux (SRBAVG)	1 1σ	1 1σ	3 yrs	0.2 yrs beta	
CERES Surface Flux (SRBAVG)	<10 1σ	<10 1σ	3 yrs	0.2 yrs beta	
CERES MODIS/geo cloud prop	prop dep	prop dep	3 yrs	0.2 yrs beta	
Level 3: Grid 3-hrly Synoptic, Daily, and Monthly					
CERES TOA Flux (SYN, AVG)	beta/tbd	beta/tbd	0.4yrs beta	none	
CERES Surface Flux(SYN, AVG)	beta/tbd	beta/tbd	0.4yrs beta	none	
CERES Atmosphere Flux(SYN,AVG)	beta/tbd	beta/tbd	0.4yrs beta	none	
CERES MODIS/geo cloud (SYN, AVG)	beta/tbd	beta/tbd	0.4yrs beta	none	

CERES Data Product Schematic