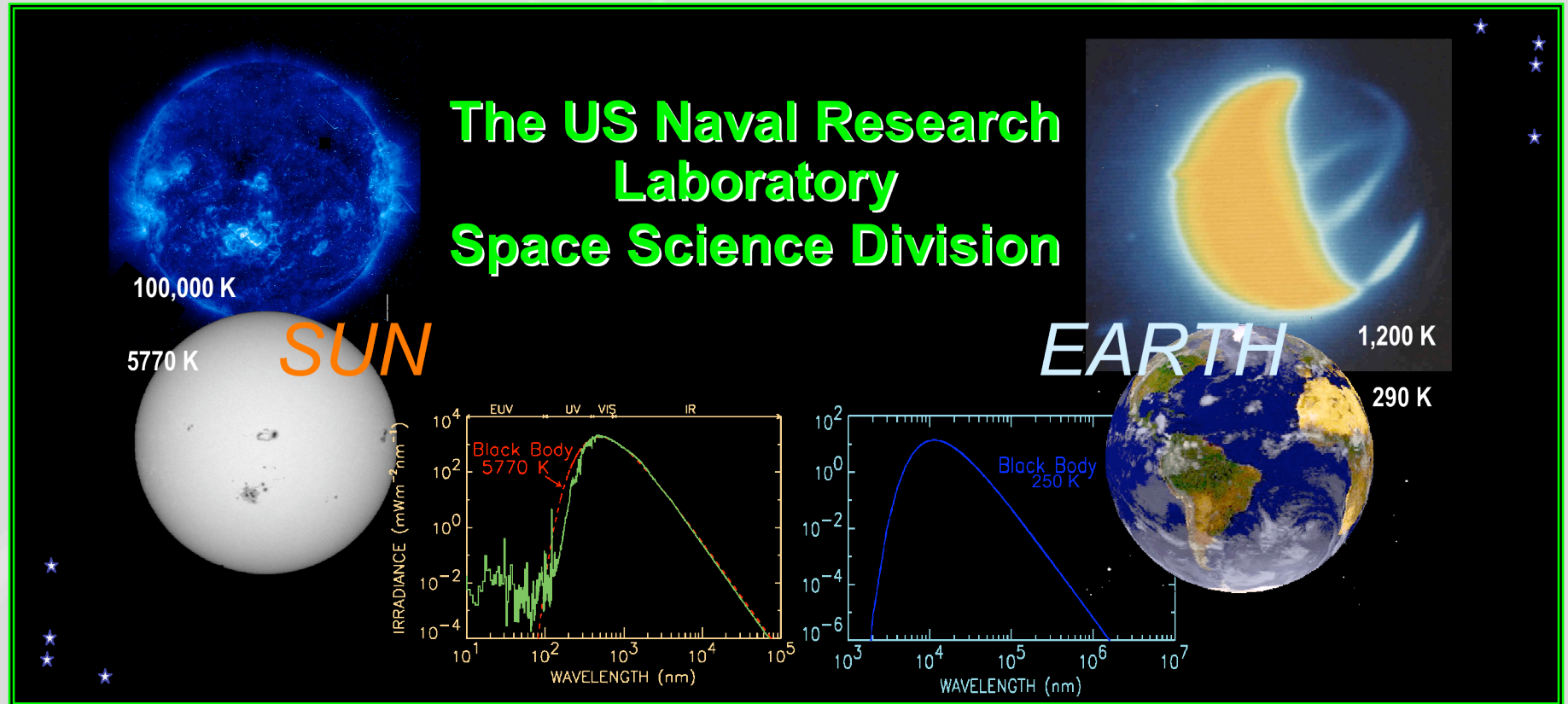




NRL SSD Jobs for New PhDs



Dr. Jill Dahlburg

SSD Superintendent (Acting), Naval Research Laboratory

25 June 2007

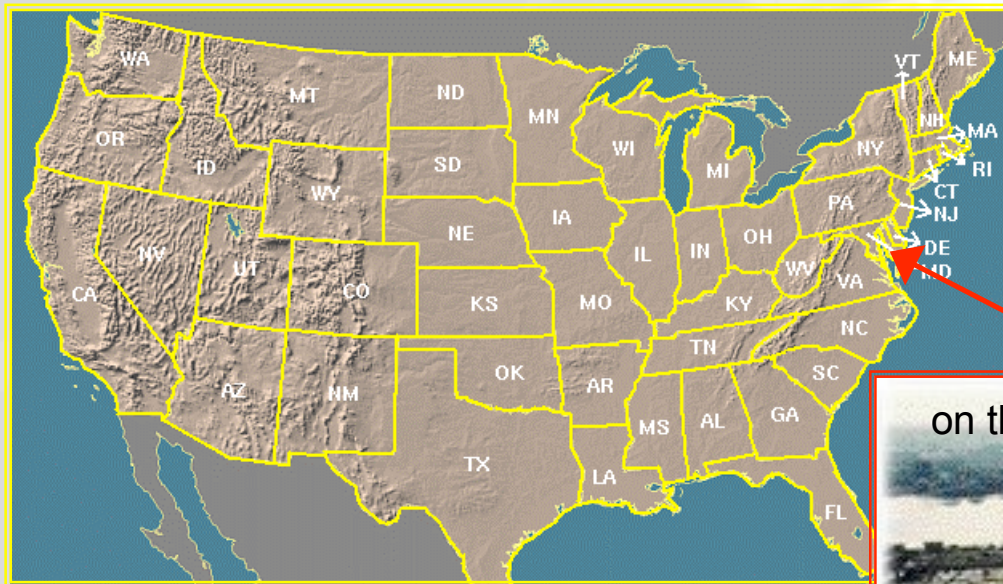
2007 CEDAR-DASI Workshop, Eldorado Hotel, Santa Fe, New Mexico



The US Naval Research Laboratory

[www.nrl.navy.mil]

NRL is the corporate research laboratory for the Navy and Marine Corps and conducts a broad program of scientific research, technology and advanced development.



on the Potomac River, Washington DC





The US Naval Research Laboratory Space Science Division

The NRL Space Science Division conducts a broad-spectrum RDT&E program in solar-terrestrial physics, astrophysics, upper/ middle atmospheric science, and astronomy. Instruments to be flown on satellites, sounding rockets and balloons, and ground-based facilities and mathematical models are conceived and developed. Researchers apply these and other capabilities to the study of the atmospheres of the sun and the earth, including solar activity and its effects on the earth's ionosphere, upper atmosphere, and middle atmosphere; laboratory astrophysics; and the unique physics and properties of celestial sources. The science is important to orbital tracking, radio communications, and navigation that affect the operation of ships and aircraft, utilization of the near-space and space environment of the earth, and the fundamental understanding of natural radiation and geophysical phenomena.



NRL space science research is widely collaborative.

SECRETARY OF THE NAVY
UNDER SECRETARY OF THE NAVY
ASSISTANT SECRETARY OF THE NAVY (RDA)
CHIEF OF NAVAL RESEARCH
NAVAL RESEARCH LABORATORY

Directorate
**RESEARCH OF
SYSTEMS**

RADAR
IT
OPTICS
TEWD

Directorate
**MATERIALS SCIENCE
& COMPONENT TECHNOLOGY**

CHEMISTRY
MATERIAL S&T
LCP&FD
PLASMA PHYSICS
ELECTRONICS
CBMSE

Directorate
**OCEAN AND ATMOSPHERIC
SCIENCE & TECHNOLOGY**

ACOUSTICS
REMOTE SENSING
OCEANOGRAPHY
MARINE GEOSCI
MARINE MET
SPACE SCIENCE

Directorate
**NAVAL CENTER FOR
SPACE TECHNOLOGY**

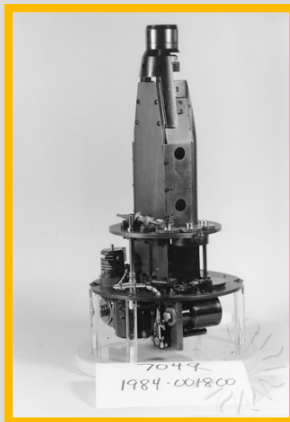
SPACE SYSTEMS
SPACECRAFT
ENGINEERING [SED]

**NRL has developed more than eighty satellites,
and flown first-of-a-kind instrument hardware
on hundreds of additional space missions.**

**Space Research & Space Technology
throughout the Naval Research Laboratory**

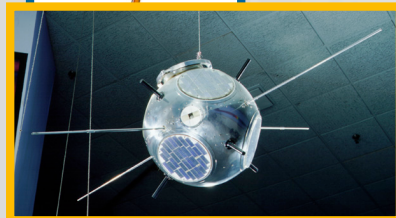


NRL Space Science Research Heritage: 60 years of experimental scientific research excellence



1946: NRL (Tousey) solar spectrograph for V2 warhead. Oct 1946 1st successful flight returned solar spectra that revealed the nature of ozone absorption in the Earth's atmosphere, and thereby marked the dawn of the space age

DeVorkin, p.144



1963: SOLRAD-3 (Wilhelm) was one of 8 NRL high energy radiation satellites; carried two of NRL's (Friedman) Lyman-alpha ionizing chambers and an x-ray spectrometer

1960: NRL pinhole x-ray camera (Friedman), first of Sun in x-rays

1971: First white light coronagraph (NRL, Tousey) in space; discovered Coronal Mass Ejections [CME]

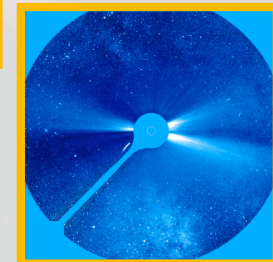


1972: Apollo-16 carried the first and only lunar astronomical observatory, the NRL Far UV camera/spectrograph (Carruthers); used a 3" telescope to obtain Earth FUV airglow, & imagery, spectroscopy of nebulae, star clusters, Large Magellanic Cloud.



1991: UARS Solar Ultraviolet Spectral Irradiance Monitor (NRL, Cook), scanning spectrometer that measured variability till 2005, longer than 11-year solar cycle

1973: Apollo Telescope Mount UV spectrometers (NRL, Tousey) flew on Skylab and obtained unprecedented solar spectra of many regions



1995: LASCO on ESA-NASA Solar and Heliospheric Observatory. NRL is the LASCO PI institution, & built C3 coronagraph

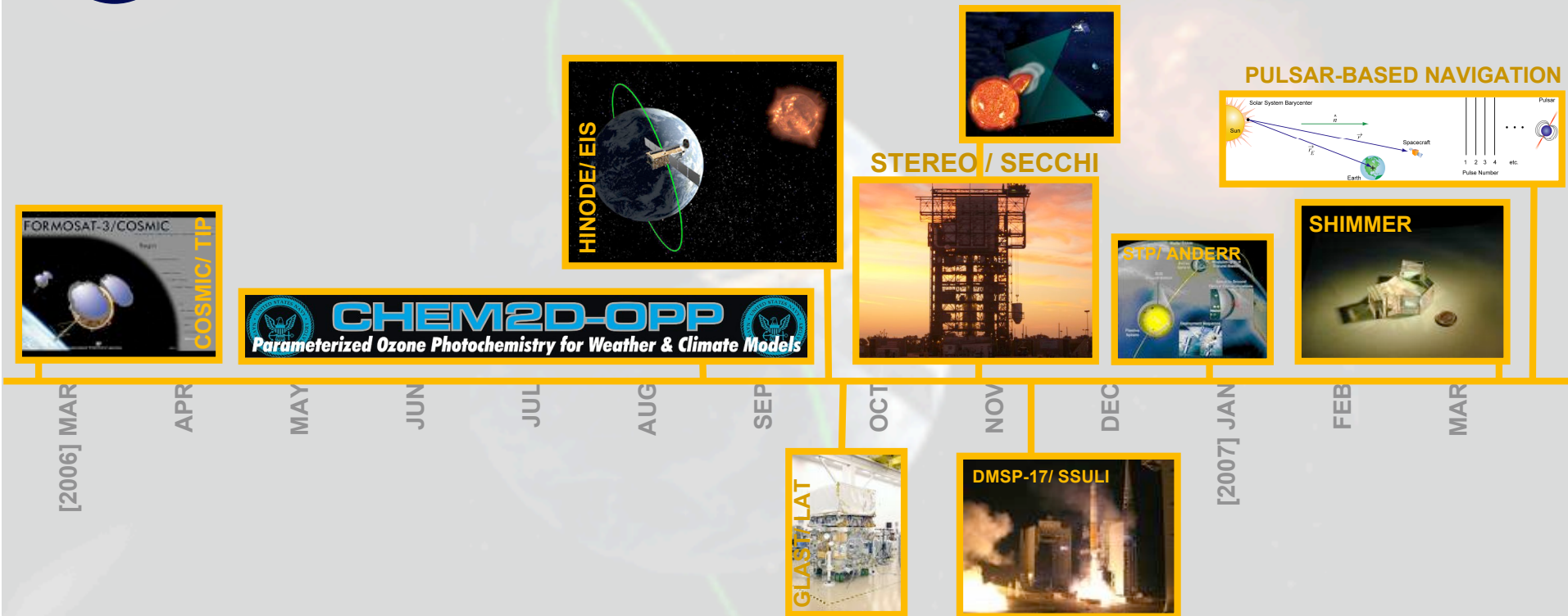
1991: Oriented Scintillation Spectrometer Experiment (NRL, Kurfess) launched on CGRO; detects gamma rays from 50 keV to 10 MeV

TIP, HINODE/EIS, ANDERR, 2006
STEREO/ SECCHI, SSULI
SHIMMER, STPSat-1

Examples of NRL space instruments and satellites

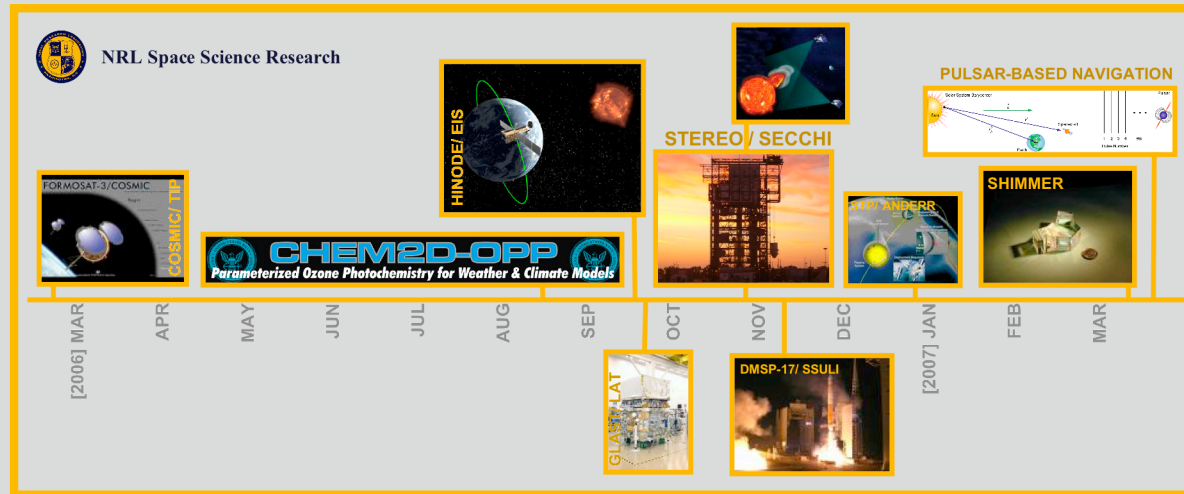


Recent NRL space science research:



Examples of recent activities:

Mission	Sponsor	From - To	Instrument
JAXA HINODE	NASA	FY99 - FY11	EIS
NASA STEREO	NASA	FY00 - FY11	SECCHI
NASA GLAST	NASA	FY00 - FY12	LAT



FEB 2006: The joint Taiwan / US six-satellite COSMIC system was **launched**, carrying onboard the NRL TIP sensors that are now providing characterization data of the Earth's night-side ionosphere.

MAY 2006: Dr. Allan Tylka of NRL SSD was elected Fellow of the American Physical Society.

AUG 2006: NCEP completed installation of the NRL SSD ozone parameterization, CHEM2D-OPP, into their Global Forecast System for NWS global forecasts.

SEPT 2006: The EIS NRL-collaborative spectrometer was **launched** onboard JAXA's HINODE satellite. EIS is obtaining the highest quality EUV spectra of the Sun ever obtained from an orbiting spacecraft.

SEPT 2006: SSD delivered the NRL collaborative Large Area Telescope for GLAST satellite integration. When launched in early FY08, GLAST will measure the most energetic processes in the universe.

OCT 2006: NRL's SECCHI, which **launched** aboard NASA's STEREO Observatories, is providing unprecedented observations of Coronal Mass Ejections as they form at the Sun and travel to the Earth.

NOV 2006: NRL's SSULI remote sensing instrument, **launched** on board the US Air Force DMSP F-17 satellite, is now providing valuable scientific data in support of military and civil systems.

NOV 2006: Dr John Seely of NRL SSD was elected Fellow of the American Physical Society.

DEC 2006: Dr. James Klimchuk was selected as an Honorary Fellow of the Royal Astronomical Society.

DEC 2006: Two NRL micro-satellites were successfully **launched** from NASA's Space Shuttle Discovery.

JAN 2007: The GAIM ionospheric assimilation model, managed by NRL SSD, went operational at AFWA.

MAR 2007: NRL's SHIMMER, which **launched** onboard the Space Test Program Satellite-1 (STPSat-1), detected its first Polar Mesospheric Clouds (PMCs) on 28 May 2007.

MAR 2007: U.S. Patent 7,197,381, "Navigational System and Method Utilizing Sources of Pulsed Celestial Radiation," was granted to U.Maryland and NRL SSD Co-Inventors.

APR 2007: NRL achieved first results from DASH, a new technology to measure optical Doppler shifts.



NRL Space Science Division (SSD) Jobs for New PhDs

NRL SSD seeks to hire over the next few years a significant number of exceptional scientists motivated to undertake creative research, to enhance and expand the Laboratory's state-of-art research program,
with areas including
the physics of the upper atmosphere, solar & heliospheric physics, X-ray/gamma-ray astronomy.

Recent hardware programs include experiments on the DMSP F17 satellite, funded by the DoD, and on the Hinode, STEREO, and GLAST missions, funded by NASA. Current models under development by the SSD, and in widespread use by the general science community, include the solar MHD simulation code, *ARMS*, the Wang-Sheeley solar wind model, solar irradiance variability models, the NRLSMIS, HWM and GAIM upper atmosphere/ionosphere models and NOGAPS, CHEM2D and gravity wave middle/lower atmosphere models.

We are actively searching for individuals interested in modeling and remote sensing of space and geospace plasmas relevant to space weather phenomena.

Within NRL, additional capabilities exist in the areas of space plasma physics, remote sensing and space technology, all of which offer opportunities for collaborative research.



NRL Space Science Division Open EOS Advertisement

Atmospheric and Space Research Naval Research Laboratory

The Upper Atmospheric Physics Branch in the Space Science Division at the Naval Research Laboratory has job opportunities in the general areas of meteorology and aeronomy of the middle and upper atmosphere. Specific topics of interest include studies of middle atmospheric gravity waves; global meteorological modeling, particularly including the coupling of chemistry and dynamics; modeling and analysis of infrasound and its use as an atmospheric diagnostic; and the use of optical remote sensing as a tool for understanding the composition and structure of the atmosphere. In addition, there exist opportunities to participate as part of science teams for the following ongoing or up coming satellite missions: NASA/AIM, NASA/TIMED, Space Test Program/SHIMMER and AF/SSULI. Our preference is to hire at the postdoctoral level, but in the case of candidates with more experience, higher-level appointments will be considered. All applicants must either be a US citizen or have a permanent resident "green" card. More information about NRL postdoctoral programs can be found at the National Research Council (NRC) (<http://www.national-academies.org/rap>). More information about the Upper Atmospheric Physics Branch can get found at <http://uap-www.nrl.navy.mil/> or by contacting David Siskind directly at siskind@nrl.navy.mil or 202-767-0928



Middle and Upper Atmospheric Physics at NRL

Branch Head: David Siskind

(tutorial on mesospheric modeling: Wednesday June 27th)

Analysis of PMC and mesospheric data from AIM, SHIMMER and other recently launched satellites

Trace constituent transport and coupling between middle and upper atmosphere

Middle Atmospheric Dynamics Section: Steve Eckermann

global dynamical modeling

gravity wave simulations, mountain wave turbulence and forecasting

Upper Atmospheric Modeling Section: Mike Picone

analysis of UV remote sensing data

modeling of thermosphere and ionosphere

PI of SHIMMER and experimental efforts: Chris Englert

applications of Spatial Heterodyne Spectroscopy

to a variety of space and terrestrial applications

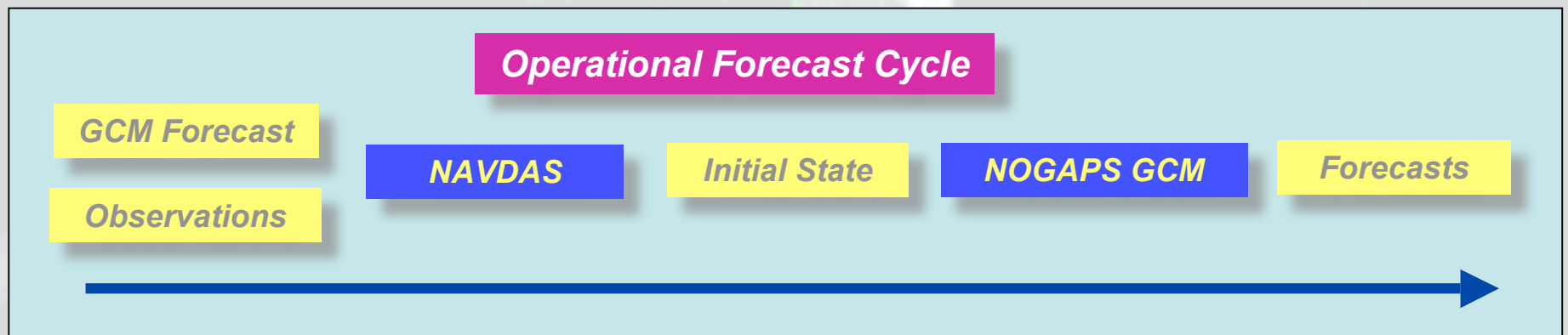


Navy Operational Global Atmospheric Prediction System (NOGAPS)

The Navy's main weather forecasting system.

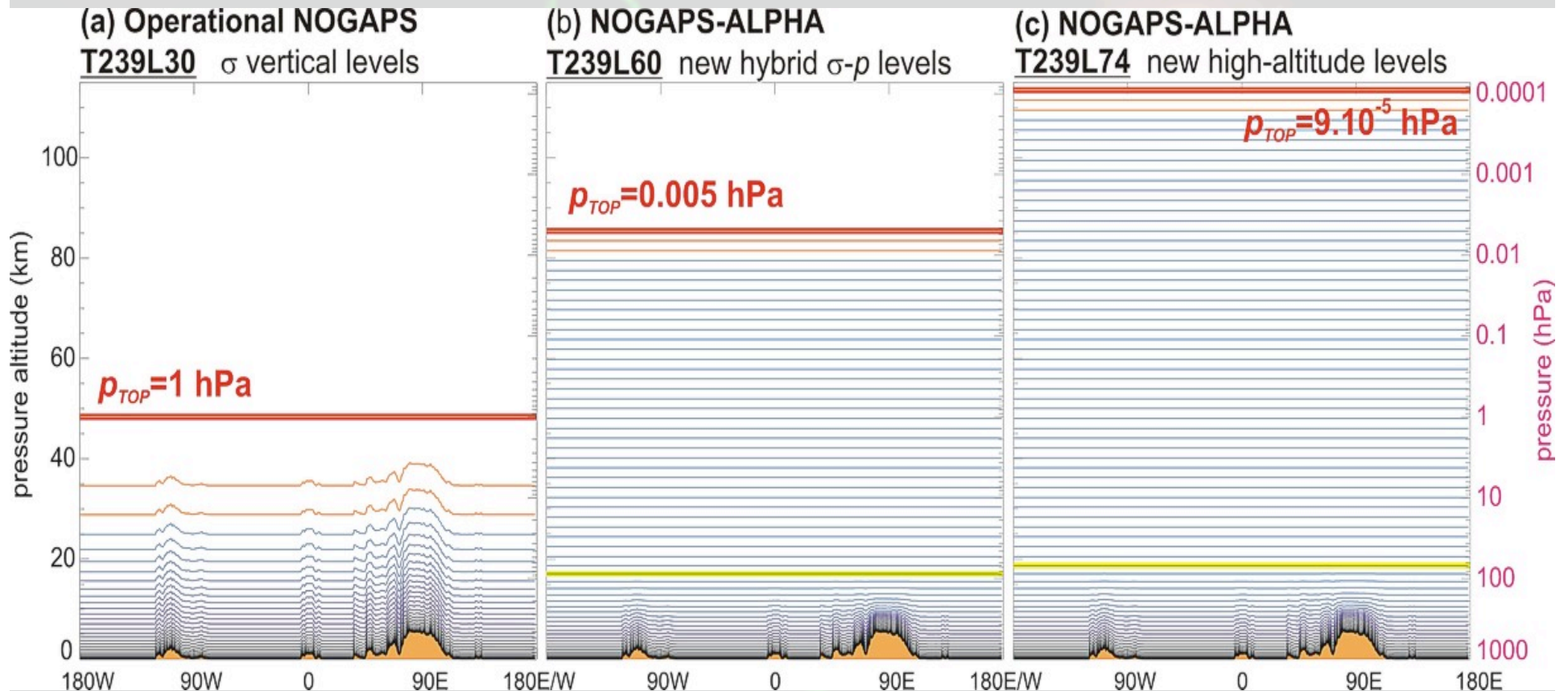
Two main components:

1. **GCM** (General Circulation Model)
2. **Global Data Analysis System** (NAVDAS: NRL Atmospheric Variational Data Assimilation System).





Extension of Weather Model to the Upper Atmosphere

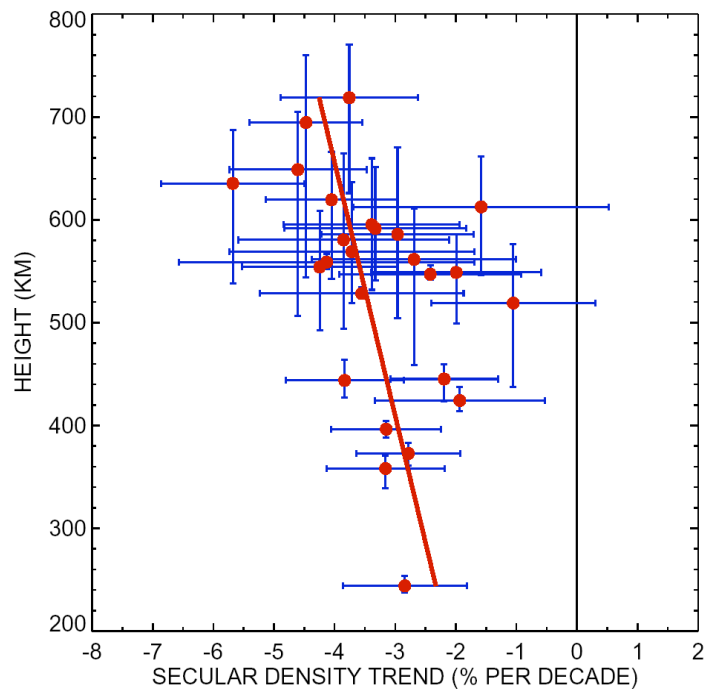


- Change in coordinate system from terrain-following in troposphere to pressure surfaces in middle atmosphere
- New radiation module (non-local thermodynamic equilibrium (non-LTE) cooling) enables extension of upper boundary to 115 km

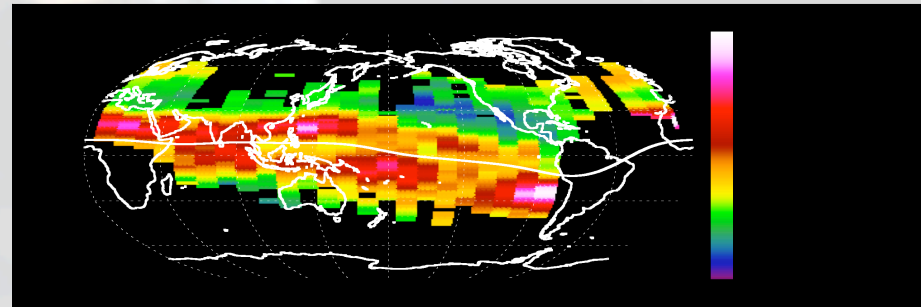


Thermosphere and Ionosphere

Thermospheric Orbital Drag Studies



Ionospheric electron densities (NmF2) from UV remote sensing (ARGOS/LORASS- 135.6 nm)



Science Times Section of the New York Times (Highlights NRL work)

Pollution Is Blamed for Thinner Air at Edge of Atmosphere
By ANDREW C. REVKIN

Published: February 10, 2004

Scientists say they have found strong new evidence that carbon dioxide, the main smokestack and tailpipe emission linked to global warming, is cooling and shrinking the atmosphere's outermost layers in ways that could aid as well as endanger space activities.



Mesospheric remote sensing and analysis

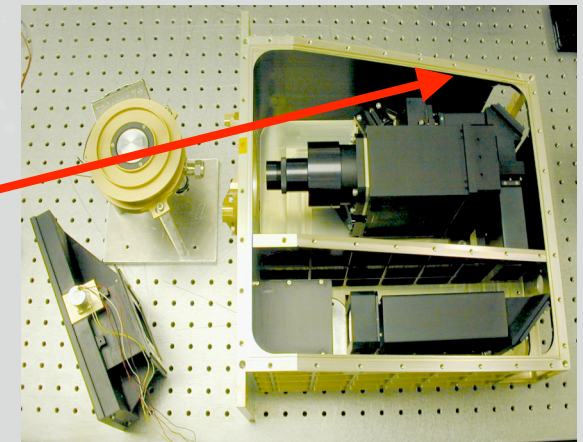
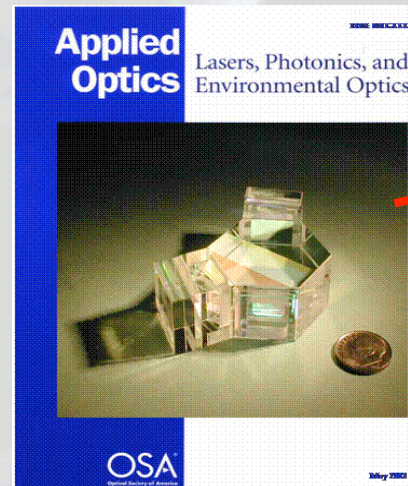
PMCs/NLCs- the subject of the AIM mission

MAHRSI

(Middle Atmosphere High Resolution Spectrograph Investigation)



Deployed from Space Shuttle in 1994, 1997
Measured OH, discovered that Shuttle plumes can cause PMCs



SHIMMER: Spatial Heterodyne IMager for MEsospheric Radicals, launched 3/07, taking mesospheric data now



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For more information this week, please see:

Jill Dahlburg, NRL SSD Superintendent (Acting)

- *and / or* -

David Siskind, NRL SSD 7640 Branch Head
[attending Tuesday through Thursday]
is giving a tutorial 8-9 AM on Wednesday
"State of the Art of Mesospheric Modeling"

Douglas Drob, NRL SSD [attending all week]

John Emmert, NRL SSD [attending all week]

Andy Nicholas, NRL SSD [attending all week]