



Recommendations on the GOES-R Series From the GOES Users' Conferences

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Outline:

- GOES Users' Conferences I
- Recommendations for:
 - ◆ Data and products
 - ◆ Instruments
 - ◆ Data and product access
 - Real time and archived
 - ◆ Data Utility
 - Algorithm development
 - User education
 - ◆ Improve 2-way communication between NOAA and Users
- GOES Users' Conference II
- GOES Users' Working Group



GOES Users' Conferences I & II

- May 22 – 25, 2001 (I)
- Oct. 1 – 3, 2002 (II)
- Boulder, CO: NIST Auditorium
- Approximately 200 participants each conf.
 - ◆ Government
 - ◆ Commercial interests
 - ◆ Academia
 - ◆ Scientific organizations
 - ◆ International



GOES Users' Conferences

– Goals:

- ◆ Inform users of future capabilities and applications
- ◆ Determine user needs for:
 - New products
 - Distribution of GOES data
 - Data archiving and access to stored data
 - Instruments of opportunity
 - Access to sample data sets (prior to launch of next series)
 - Future training
- ◆ Assess user and societal benefits
- ◆ Improve communication between NESDIS and users



GOES Users' Conference I Recommendations: Suggested New Products... Partial List:

- Atmospheric aerosols;
- Cloud phase;
- Cloud particle size;
- Cloud optical depth;
- Cloud emissivity;
- Cloud layers;
- Surface properties;
- Moisture flux;



GOES Users' Conference I Recommendations: Suggested New Products... Partial List:

- Improved volcanic ash product;
- Improved QPE;
- Improved satellite derived winds;
- CAT threat;
- Improved low cloud and fog product;
- Probability of rainfall for each pixel;
- Improved sea surface temperature product;
- True color product;



GOES Users' Conference I Recommendations: Suggested New Products... Partial List:

- Sulfur dioxide concentration;
- Aircraft icing threat;
- Ocean color;
- Under (ocean) surface products;
- Improved sea ice product;
- Improved vegetation index;
- Ozone layers;
- Surface emissivity;



GOES Users' Conference I Recommendations: Instruments

- Imager;
- Sounder;
- Space Weather and Solar Instruments;
- Instruments of Opportunity;

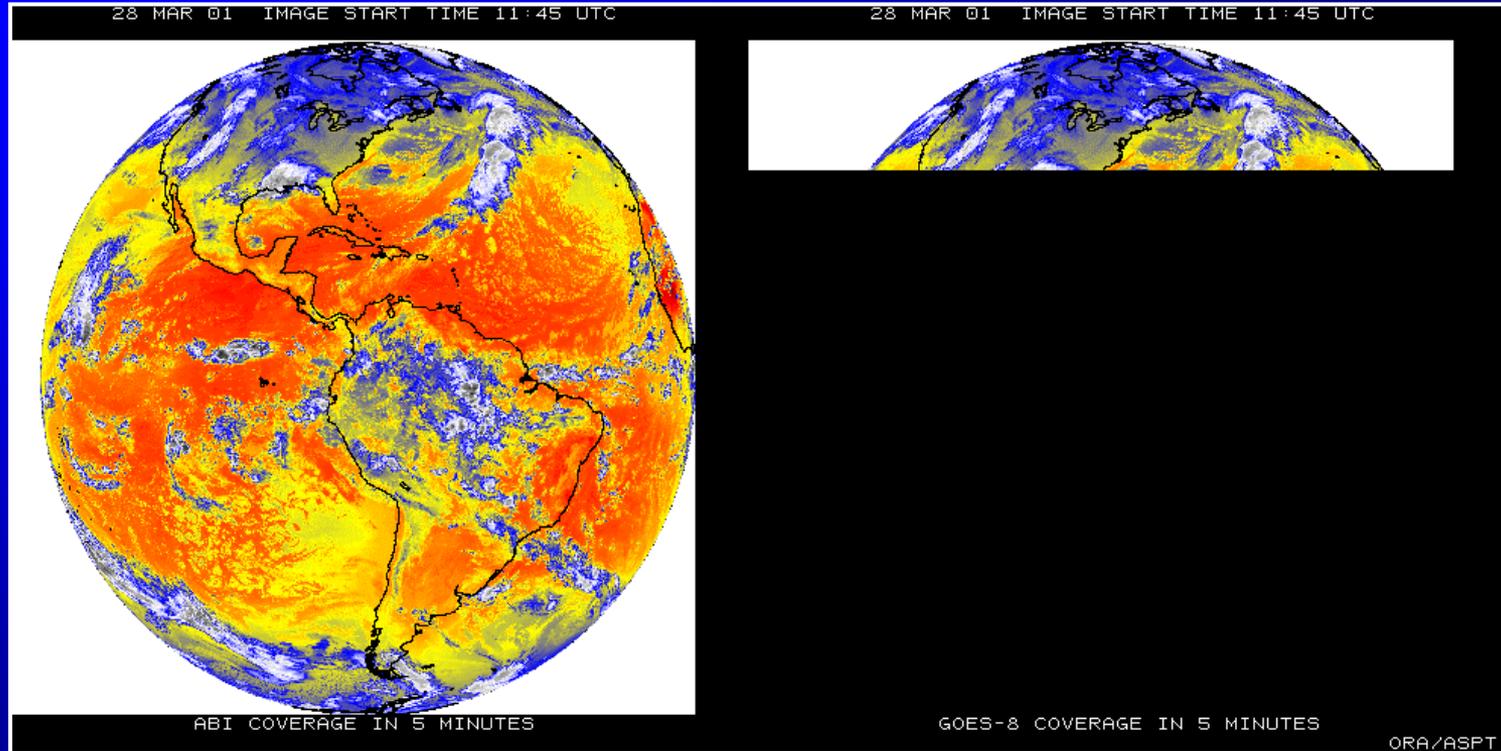


GOES Users' Conference I Recommendations: Advanced Baseline Imager

- At least 12 Imager channels, but recommend additional 2 to 4 channels to meet requirements of large user cross section
- Full disk Imager coverage every 5 minutes
- Rapid scan capability for severe weather events
 - ◆ 1000 km x 1000 km/ 30 sec



ABI spatial coverage goal versus the current GOES Imager

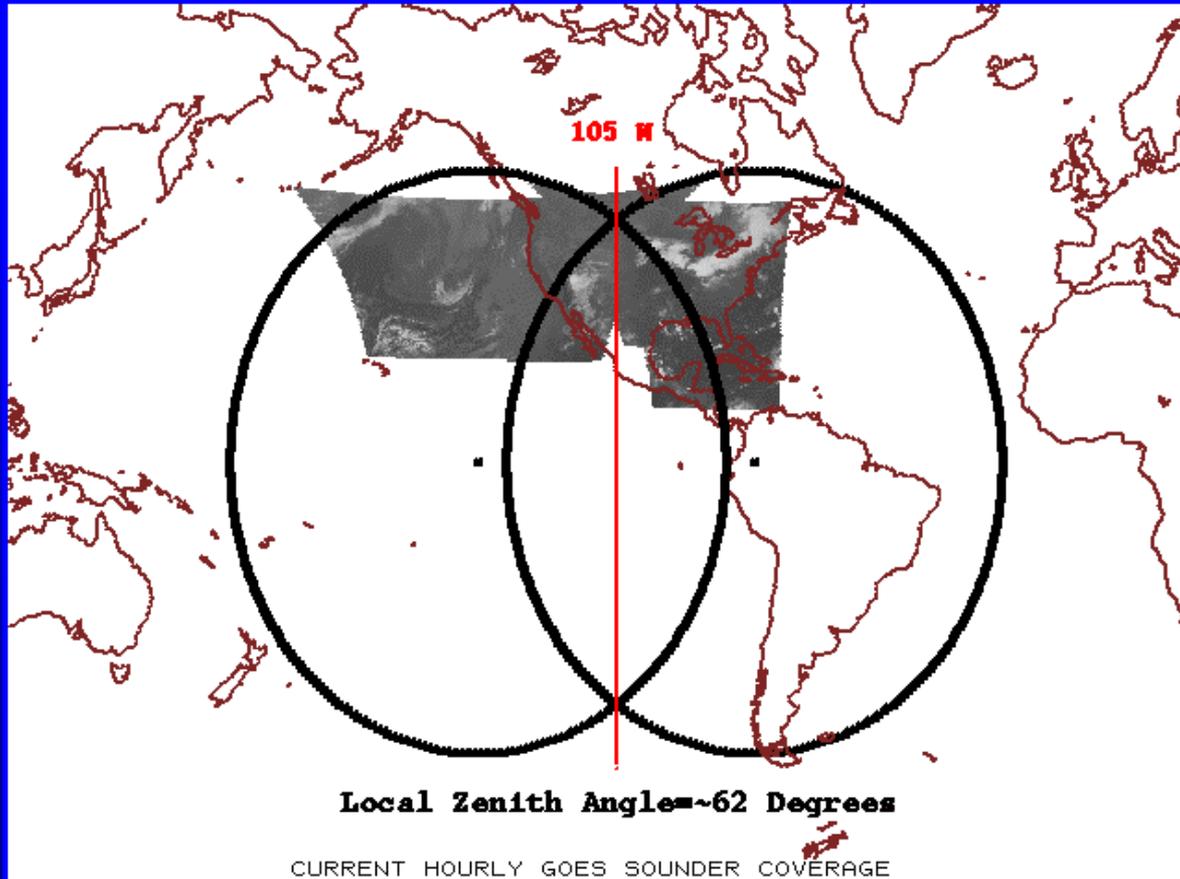


ABI coverage in 5 minutes
(Goal)

Present GOES coverage in 5 minutes

**Notional baseline for ABI: full disk images
every 15 minutes plus CONUS images every 5 minutes plus rapid scan.**

Hyperspectral Environmental Suite (HES): Coverage



GOES Users' Conference I Recommendations: HES

- 4 km footprint needed for Sounder
- Rapid Scan option needed for Sounder
- Soundings needed in cloudy areas
 - ◆ Soundings above cloud deck
 - ◆ Supplement soundings with microwave from polar or
 - ◆ Microwave soundings from Geo orbit



Clear Turbulence?

Temp NAST Near Fairbanks AK (3/21/01; 1-2 GMT)

Moisture



200 km
Weak Turbulence Signatures at 150 mb

Downdrafts: Warm & Dry Updrafts: Cold & Moist

Temp

Moisture



Strong Turbulence Signatures at 300 mb

Temp

25.5

26

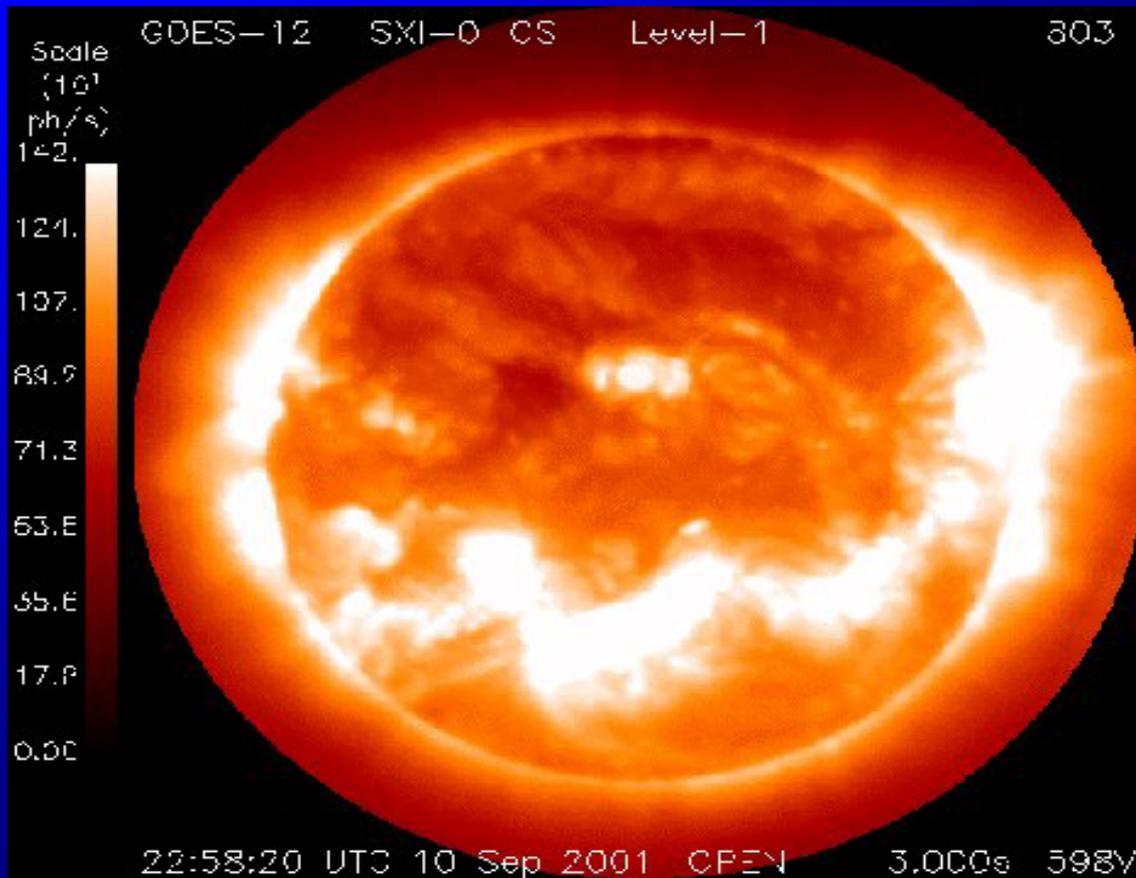
No Turbulence Signatures at 500 mb

GOES Users' Conference I Recommendations: Space Weather and Solar X-Ray Imager

- Proposed improvements include:
 - ◆ Dynamic range and sensitivity of SXI
 - ◆ More channels on Solar EUVS
 - ◆ Dynamic range and threshold of Solar XRS



GOES Users' Conference I Recommendations: Space Weather and Solar X-Ray Imager



GOES Users' Conference Recommendations: Data & Product Access

- Different tiers of data access to support wide spectrum of user needs;
- Timely with low data rate/ low cost options;
- Possible options;
 - ◆ Commercial satellite broadcast;
 - ◆ Direct broadcast from GOES;
 - ◆ Internet;
 - ◆ Dedicated land lines;
 - ◆ User access from central server;
 - ◆ Subscription service
 - ◆ Broadcast subset of data via decommissioned GOES
 - ◆ Optimal combination of above options;
- Studies to evaluate options ongoing



GOES Users' Conference Recommendations: Data and Product Access: Archive Needs

- Need full spectrum of data from raw data to highly processed products, for applications from the global scale to the mesoscale;
 - ◆ User friendly
 - ◆ Easy remote access
 - ◆ Low cost
 - ◆ Prompt user access
 - ◆ Users need metadata
 - ◆ Browse capability with request submission via Internet



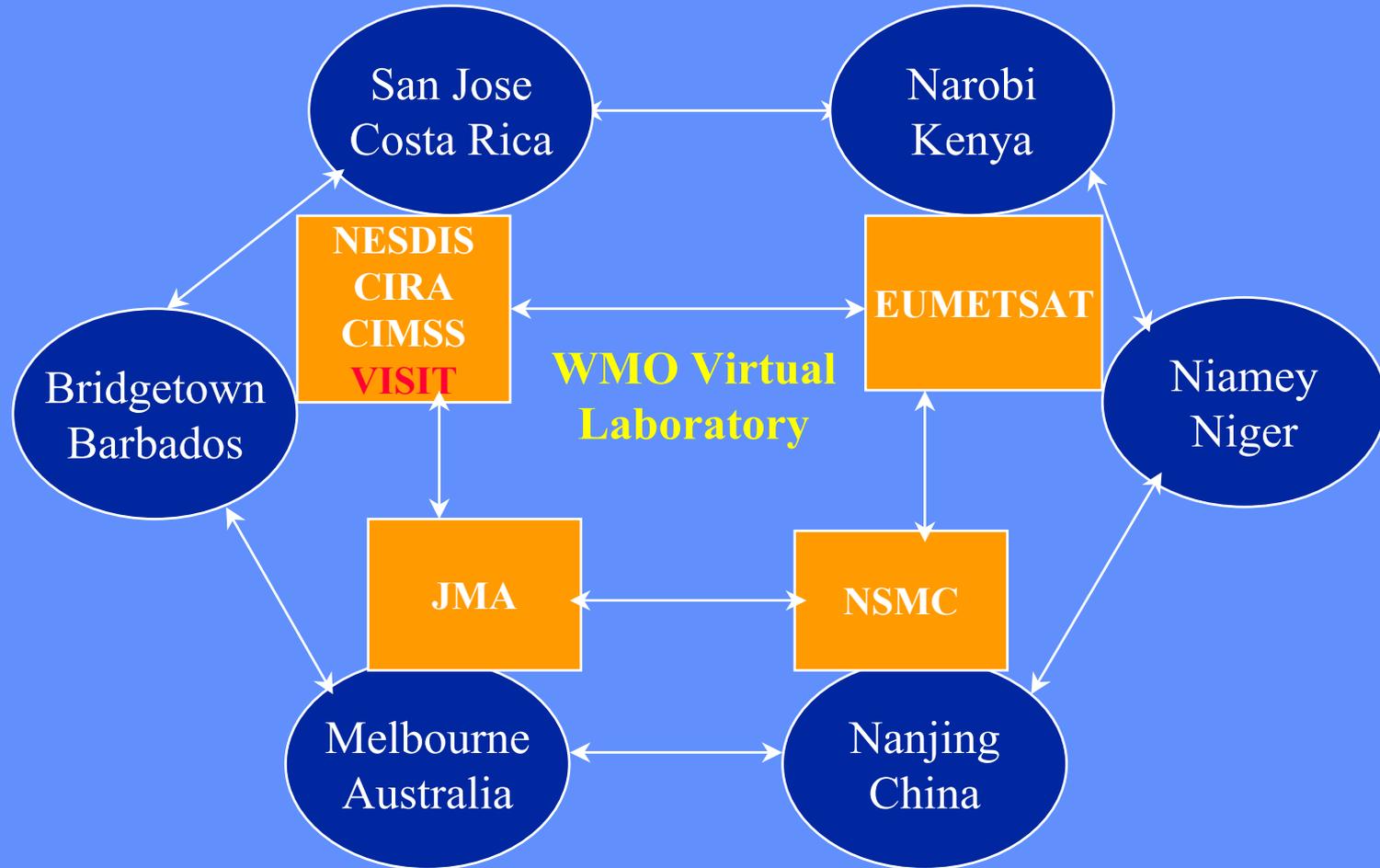
GOES Users' Conference Recommendations...

Data Utility: User Education

- Comprehensive education program needed for:
 - ◆ Forecasters;
 - ◆ Emergency managers;
 - ◆ Recreational users;
 - ◆ Academia;
 - ◆ Media;
 - ◆ Industrial users;
 - ◆ Commercial users



Collaboration is the Key to Success



GOES Users' Conference I Recommendations: Communication with User Community

- Two way dialogue should continue between GOES User Community and NESDIS via:
 - ◆ Regular conferences, such as the GOES Users' Conf.
 - ◆ Working groups to deal with specific issues;
 - ◆ Provide a Bulletin Board for information exchange;
 - ◆ Informational special sessions at end user conferences;
 - ◆ Provide information via e-mail;
 - ◆ Make an expert team available to all users and instrument developers;



GOES Users' Conference II Recommendations:

- Need for 4 km footprint on sounder
 - ◆ Allows for partial view through thin cirrus
 - ◆ Provides information in some hurricane eyes
 - ◆ Provides more information between clouds in convective situations
 - ◆ Identify clear air turbulence signature



GOES Users' Conference II Recommendations:

- Strong recommendation to explore feasibility of passive microwave instrument in Geo orbit
 - ◆ Precipitation estimation (real time and climate applications)
 - ◆ All weather temperature and moisture profiles
 - ◆ Need a six month program to define pathway to deployment of a Geo microwave instrument
 - Identify voids in current and planned GOS to be met by Geo microwave instrument
 - Determine incremental benefits
 - Define detailed development plan with implementation options



GOES Users' Conference II Recommendations:

- Strong recommendation for operational lightning mapper
 - ◆ With flexible scanning for near full disk coverage
 - ◆ Provides locations of convective storms
 - ◆ Provides indication of storm intensity
 - ◆ Optical more efficient than radio



GOES Users' Conference II Recommendations:

- Data from experimental satellites should be used operationally to prepare for GOES-R
 - ◆ Develop ways to deal with “firehose of data”
 - ◆ GIFTS is critical for HES preparation
 - Will be over Indian Ocean after 1 year
- Vis channels must be calibrated
 - ◆ Need rigorous on-ground and adequate on-board calibration
 - ◆ Need cross calibration with other instruments



GOES Users' Conference II Recommendations:

- Hyperspectral vis and IR observations preferred over discrete broad channels
- Benefits include:
 - ◆ Algorithm transferability
 - ◆ Channel adaptability
 - ◆ Application growth
 - ◆ Inter satellite calibration
 - ◆ Stable climate record
- Ultimate strength of hyperspectral: simultaneous and adaptive retrievals of atmos and sfc features.



GOES Users' Conference II Recommendations: Climate Issues:

- Why GOES is important for climate:
 - ◆ Must understand diurnal and annual cycle
 - ◆ Recent atm warming is associated with change in the diurnal amplitude of near surface temperatures
 - ◆ GOES-R will provide better understanding of sfc/ atm processes leading to better climate parameterization
 - ◆ Geo satellites are only tools capable of resolving the precipitation process at proper space-time scales
 - ◆ Better climate assessments and forecasts result in large economic benefits



GOES Users' Conference II Recommendations: Climate Issues:

- Calibration is critical for climate applications:
 - ◆ Must be correlated with other satellite radiometers
 - Cross calibrate with other GOES/ NPOESS/ and international
 - ◆ Must include all spectral bands
 - ◆ Must be consistent across the spectrum and over the field-of-regard, before and after launch
 - ◆ Should be a formal GOES calibration working group
 - ◆ Calibration info must be included in the data and archive process



GOES Users' Conference II Recommendations: Oceanographic Issues:

- Oceanographic benefits should be in CBA:
 - ◆ \$100M/ year loss to Hawaii due to closure of large swordfish region
 - ◆ Marine transportation (e.g. fuel savings due to wind and currents)
 - ◆ Harmful Algal Blooms (e.g. decision to close fisheries and beaches)
- Need ocean color observation
- Observe mesoscale features at hourly intervals and 1 km resolution (greater resolution needed in coastal zone)



GOES Users' Conference II Recommendations: Numerical Modeling

- GOES Sounder vs Polar:
 - ◆ 6 hr interval OK for global models
 - ◆ 1 to 1.5 hr needed for mesoscale
 - ◆ 15 minute desired for severe storms and aviation wx
 - ◆ WRF spatial resolution: 1-2 km by 2012
 - 4 km...minimum for sounder resolution



GOES Users' Working Group (GUWG): Subcommittees

- Data and New Product Needs
 - ◆ Tim Schmit, Paul Menzel;
- Numerical Weather Prediction
 - ◆ Ralph Petersen, Mark DeMaria
- New Data Integration into Operations
 - ◆ Dave Helms, Reggie Lawrence
- New Technology
 - ◆ Paul Menzel, Jim Purdom



GOES Users' Working Group (GUWG): Subcommittees

- User Education and Outreach
 - ◆ Tony Mostek;
- Instruments of Opportunity
 - ◆ Don Hillger
- Data and Product Archiving
 - ◆ Ben Watkins
- Data and Product Distribution
 - ◆ Dick Reynolds, Steve Short



Summary:

- Valuable input from GOES Users' Conferences
- Recommendations from 1st Conference Documented
- Report from 2nd Conference: Jan. 03
- GOES Users' Working Group:
 - ◆ Evaluating recommendations
 - Led to trade studies
 - ◆ Recommending path to implementation if feasible



Summary:

– For more information:

◆ www.osd.noaa.gov/announcement/index.htm

– For Bulletin Board:

◆ www.osd.noaa.gov/index.htm

– For Power Point Presentations:

◆ <ftp://ftp.osd.noaa.gov/goesuser/>

