# Naval Meteorology and Oceanography (METOC)

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**International/Interagency Division**

**Office of the Oceanographer of the Navy**
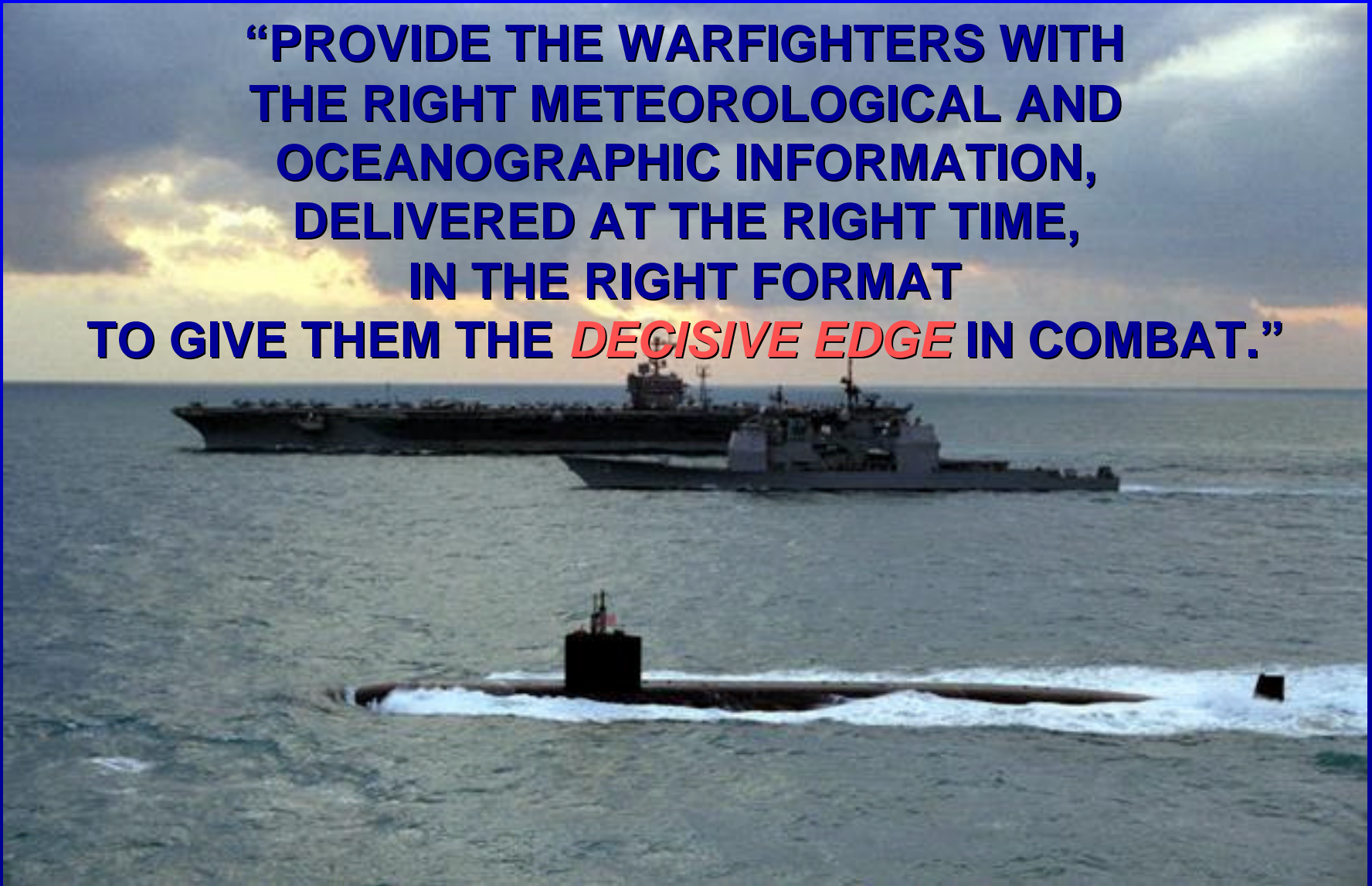
**Weather Information for Surface Transportation Symposium**

**30 November 1999**

# NAVY METOC MISSION

"PROVIDE THE WARFIGHTERS WITH
THE RIGHT METEOROLOGICAL AND
OCEANOGRAPHIC INFORMATION,
DELIVERED AT THE RIGHT TIME,
IN THE RIGHT FORMAT
TO GIVE THEM THE *DECISIVE EDGE* IN COMBAT."

# Three Primary Mission Areas

- **<u>Safety</u> of the Fleet and the Navy Shore Establishment**

- **Application of Meteorology and Oceanography (METOC) to <u>optimizing performance</u> of Navy Platforms, Weapons, and Sensors**

- **Application of Geospatial Information and Services <u>(GI&S)</u> and Precise Time and Astrometry <u>(PTA</u>) Data <u>to Navigation, Communications, and Targeting</u>**

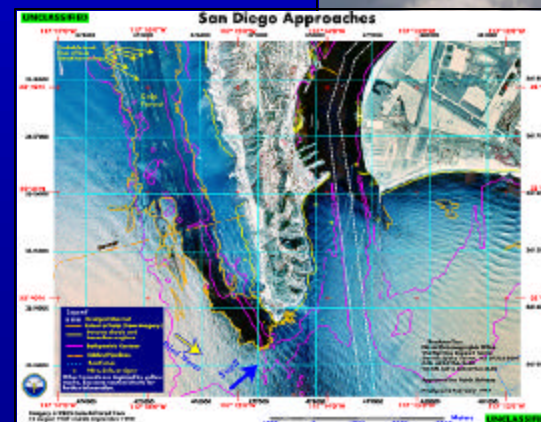# Mission Application

- **Oceanography**

  - **Amphibious /Special Operations**

  - **Acoustics for ASW, Mine Warfare**

- **Meteorology**

  - **The Navy's Weather Service**

  - **DoD Numerical Weather Products**

  - **Regional METOC Centers**

- **Hydrography**

  - **Digital seafloor data**

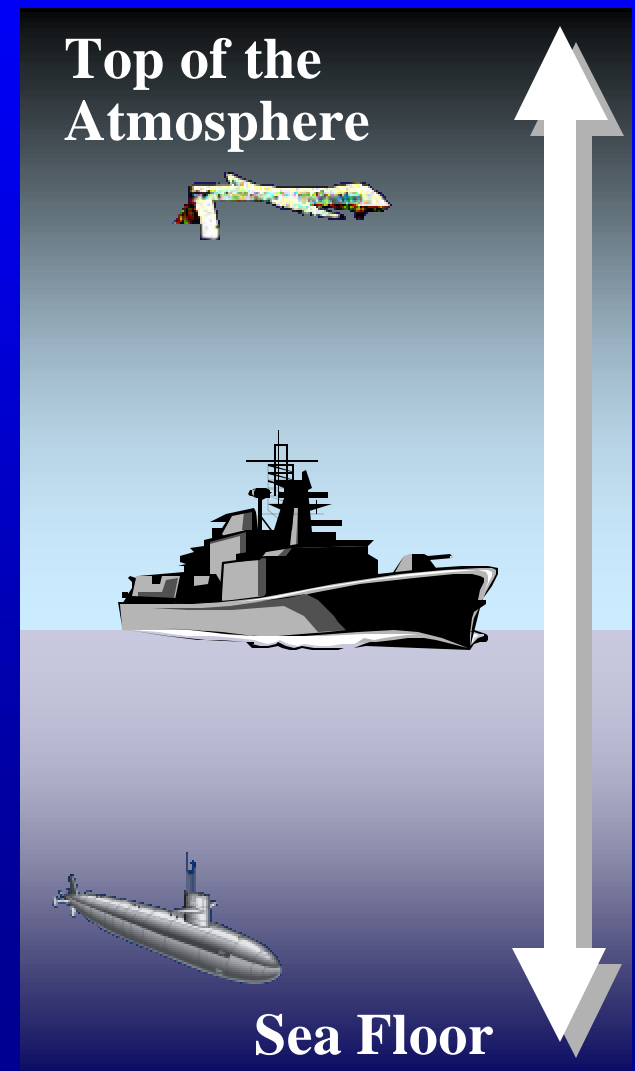  - **Supporting mapping, charting and geodesy**

# EXTENT OF NAVY METOC

## FY 99 ASSETS:

7 REGIONAL & PRODUCTION
   CENTERS

8 MILITARY SURVEY SHIPS

3074 TOTAL END STRENGTH

**Global**

**Top of the Atmosphere**

**Sea Floor**

# Navy Meteorological Models

**NOGAPS:**
- Fleet Numerical Meteorology & Oceanography Center (FNMOC) spectral model, T159/L24
- Data assimilation; 0-10 day guidance
- Provides boundary conditions for COAMPS coarse mesh

**COAMPS:**
- FNMOC nonhydrostatic regional model, <9 km/L30
- Globally relocatable; Data assimilation
- Explicit moist physics; 0-72h guidance

# COAMPS

- Developed by the Naval Research Laboratory

- High resolution mesoscale model

- Can integrate ocean and atmospheric conditions to allow surface fluxes of heat and moisture to exchange across the air-ocean interface ("coupled")

- Can be run with any number of nested grids.

- Grid size is determined by users needs - Grids can be relocated anywhere.

# Naval Integrated Tactical Environmental Environmental Subsystem (NITES) 2000

- Navy METOC information storage and management suite.

- Each NITES is a set of meteorology and oceanography forecast, database, and decision aids tailored for specific platforms and uses,

- Five variants exist to support a variety of operators and platforms:

    - (1) large METOC forecast sites
    - (2) command and control systems
    - (3) aviation forecast sites
    - (4) mobile users
    - (5) foreign military users

- Open system design will provide complete interoperability with other DoD, Federal, and Allied command and control systems connected to the new Global Command and Control System (GCCS)

# NITES 2000

A Scalable library of, predominantly DII COE compliant, Meteorology and Oceanography applications, services and servers that include data, forecasting and sensor performance prediction capabilities:

Collect, Process, Store & Automatically Distribute **METOC Data**

**Forecast** tools for Wx & Ocean Conditions

Visualize **Sensor Performance Prediction** by making Graphical, User-Friendly Pictures

**ENHANCE OPERATIONAL DECISION MAKING**
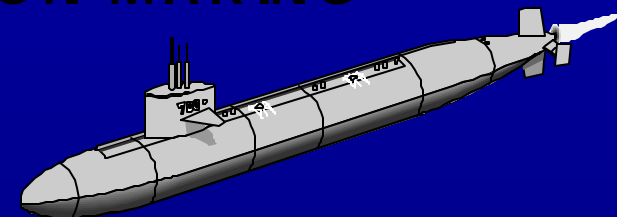
# TACTICAL ENVIRONMENTAL DATA SERVER (TEDS)

- Centerpiece of METOC data management for NITES

- Receives and stores observations, gridded forecast model output, and satellite imagery in a dynamic regional database

- TEDS is separate from models and applications

- Uses common extraction/merge routines for all applications

- Supports known Navy client applications & models. Can support other users' applications & models as well

# TEDS

TEDS DATA includes historical data (what was) which is stored in flat files and dynamic data (what is) which is stored in a relational database. Dynamic data includes air and ocean measurements, observations, imagery and satellite data.

GEOPHYSICS numerical models are required to find current environmental values at places other than at those which are directly measured. TEDS uses global, regional and local models. Global and regional models are run on supercomputers and model output is imported into the TEDS relational database. Local, high resolution, models can be run locally and stored in the relational database.
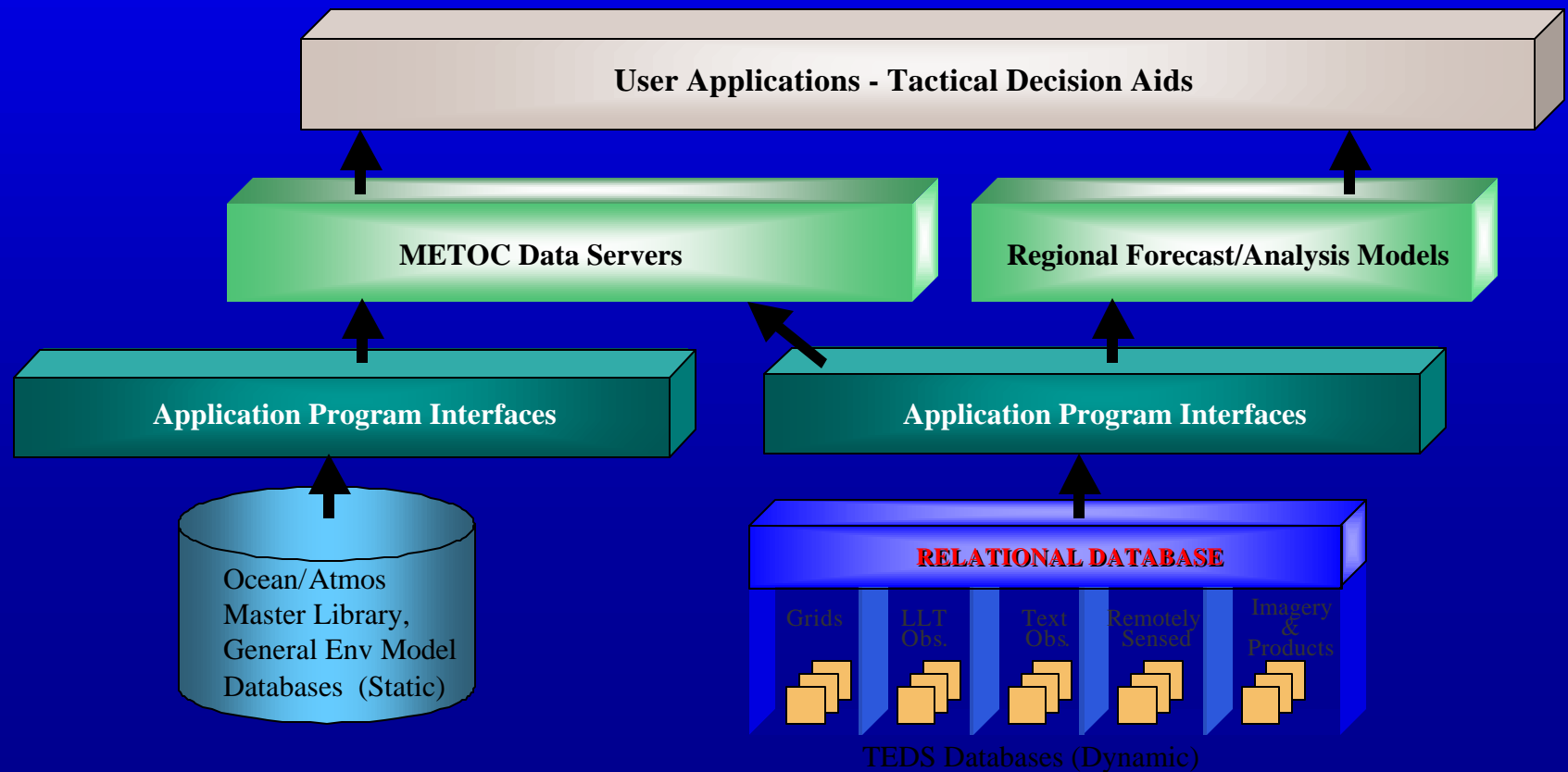
TEDS is the key data segment of the Naval Integrated Tactical Environmental System (NITES) 2000. NITES 2000 is a scalable collection of applications and services which provide environmental data, forecasting, sensor performance prediction, and meteorology and oceanography capabilities.

# TEDS ARCHITECTURE

Provides Common Access to the Climatological, In-Situ and Synoptic Databases

Uses Common Extraction/Merge Routines for all Applications

**User Applications - Tactical Decision Aids**

**METOC Data Servers**

**Regional Forecast/Analysis Models**

**Application Program Interfaces**

**Application Program Interfaces**

Ocean/Atmos Master Library, General Env Model Databases (Static)

**RELATIONAL DATABASE**

Grids | LLT Obs. | Text Obs. | Remotely Sensed | Imagery & Products

TEDS Databases (Dynamic)

# TEDS Performance Specs

Platforms – HP, Sun and NT

Operating Systems

- HPUX 10.20,

- Solaris 2.7

- NT 4.0

Sizes of Current TEDS DII COE Segments

| | | | | |
|---|---|---|---|---|
| – MDDBV | 88.5 MB | MADBV | 2 MB |
| – MDLLT | ≥80 MB | MALLT | 8 MB |
| – MDGRID | ≥80 MB | MAGRID | 14 MB |
| – MDIMG | ≥40 MB | MAIMG | 11 MB |
| – MDTXT | ≥10 MB | MATXT | 2 MB |

# METCAST

- A communication system to distribute information and let subscribers receive up-to-date data and updates.

- Information can include satellite images, product grids, observation reports, software updates, presentations, data sheets, etc.

- METCAST channels can contain one or several channels, each channel with one or more documents.

- METCAST channel system is comprised of:
  - clients (send requests to server)
  - server (takes request, parses it, sends products)
  - database of products to be delivered

# SO WHAT?

- Bottom line is that the U. S. Navy develops and disseminates state of the art atmospheric models and products, in support of our mission.

- Many of these can be used to support surface transportation as well.

- We at the Navy will continue to work with the National Weather Service and OFCM to make these available for surface transportation purposes, and look forward to seeing the developments that result from this symposium.