Summary of Results From the High-Resolution SST Workshop and the GODAE High-Resolution SST Pilot Project

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GODAE High-Resolution SST Workshop

- 30 October – 1 November, 2000
  Joint Research Center, Ispra, Italy
- ~30 International participants representing all fields of SST research and operations

Objective

- Openly raise all issues associated with the development of a global, high-resolution SST dataset
  - Content, operations, feasibility, requirements, distribution, validation, etc

Why?

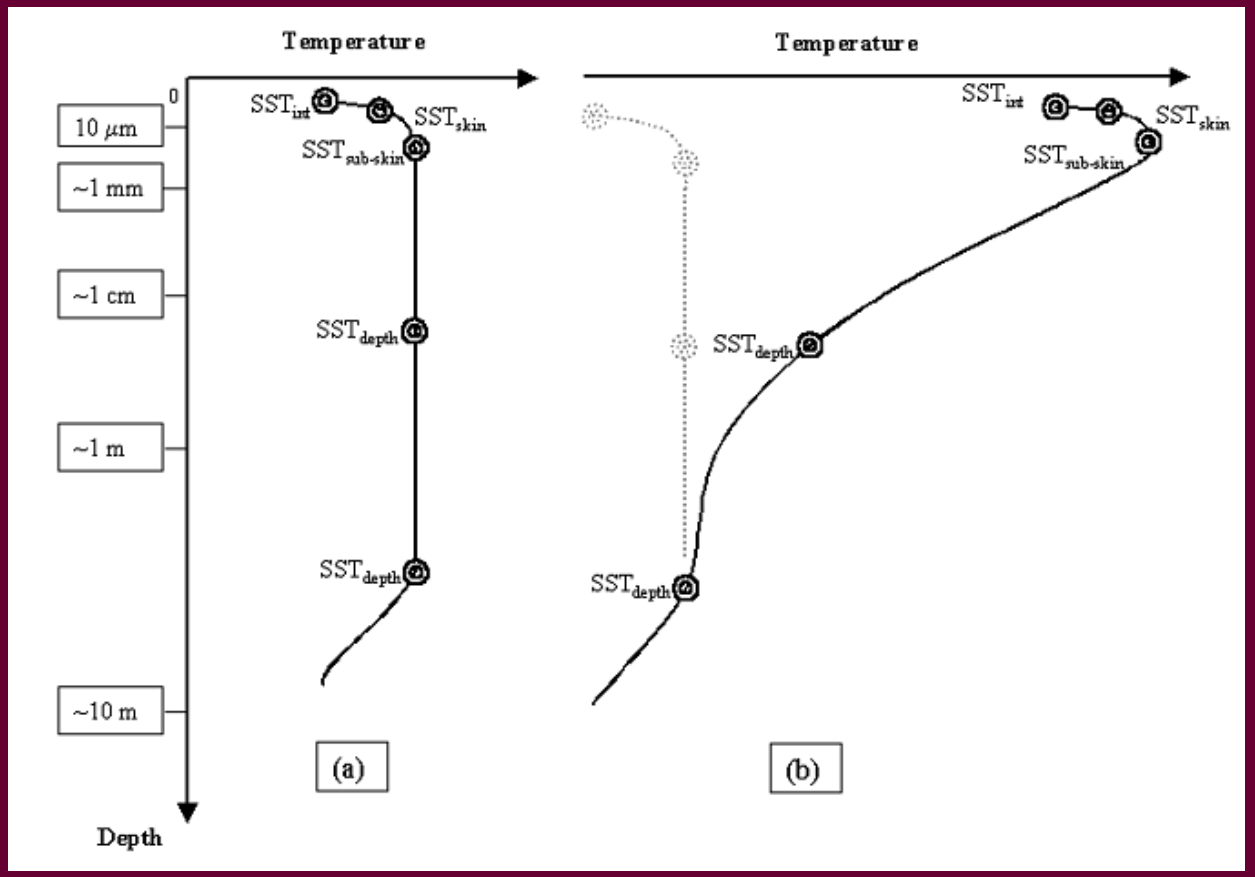
- International GODAE Steering Team concluded:
  - The temporal and spatial resolution of existing SST data sets do not fulfill the requirements of GODAE and are not adequate for NWP, data assimilation, and ocean forecasting purposes.
- OOPC/AOPC Workshop on global SST datasets:
  - A broad range of SST product requirements including accuracy, spatial, and temporal resolution are not being satisfied.

Presentations

- Physical Character of SST
- Measuring and Estimating SST
- Processes Affecting SST Measurements
- Operational Implementation
  - Sampling, validation, and intercomparison
  - Assimilation and estimation
- Development of Plan

Definition of SST

- Interface SST
- Skin SST
- Sub-skin SST
- Near-Surface SST or SST_{Depth}



Workshop Conclusions

- Satellite and in situ SST measurements are fundamentally different and satellites offer the only practical means of producing a realistic global SST product
- Most appropriate method of providing high-accuracy SST products at high temporal and spatial resolution is by merging complementary satellite and in situ data
- Both skin and subsurface SST fields are required in both real-time and delayed modes at various temporal and spatial resolutions
- Although the datasets, knowledge, and tools are separately available, the formal combination of these resources needed is absent

Workshop Conclusions

- Agreed to develop a pilot project within the framework of GODAE

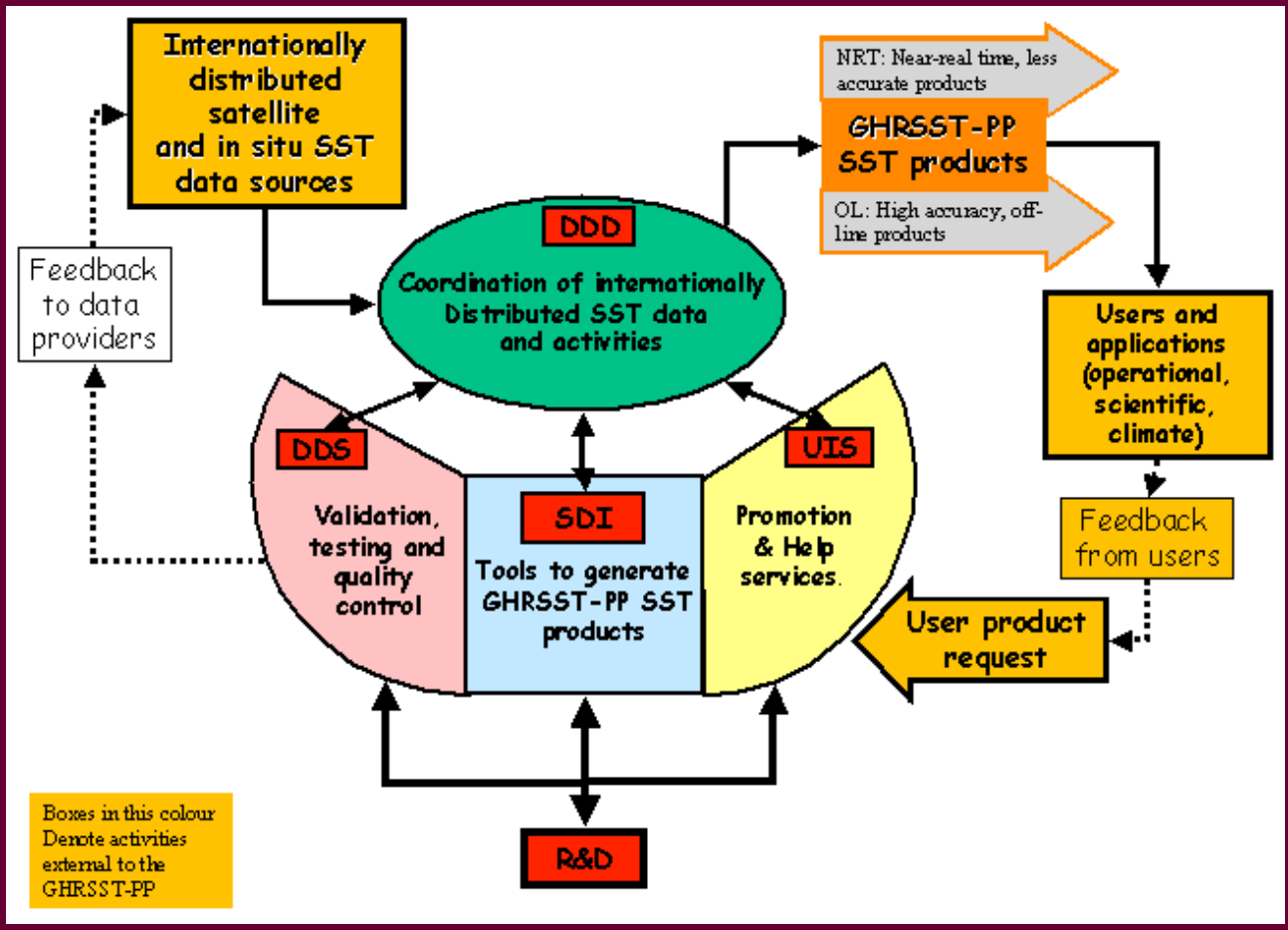
GODAE High-Resolution SST Pilot Project

- Provide rapidly and regularly distributed, global, multi-sensor, high-quality SST products at a fine spatial and temporal resolution that meet the diverse needs of GODAE, the scientific community, operational users and climate applications at a global scale
  - Most promising solution to combine complementary infrared and passive microwave satellite measurements with quality controlled in situ observations from ships and buoys

Strategic Objectives

- Identify data providers and users and establish data access and exchange procedures
- Characterize quality of existing satellite and in situ data and identify fundamental differences
- Develop innovative data integration and assimilation methods
- Identify and promote needed research and development
- Implement user responsive demonstration system

Project Components



Thematic Strategy

I. Specification and delivery of SST products for diverse users and applications

II. Characterization and identification of differences between SST fields from existing satellite and in situ data sources

III. Targeted research and development

IV. Generation of improved, multi-sensor SST products through integration and assimilation

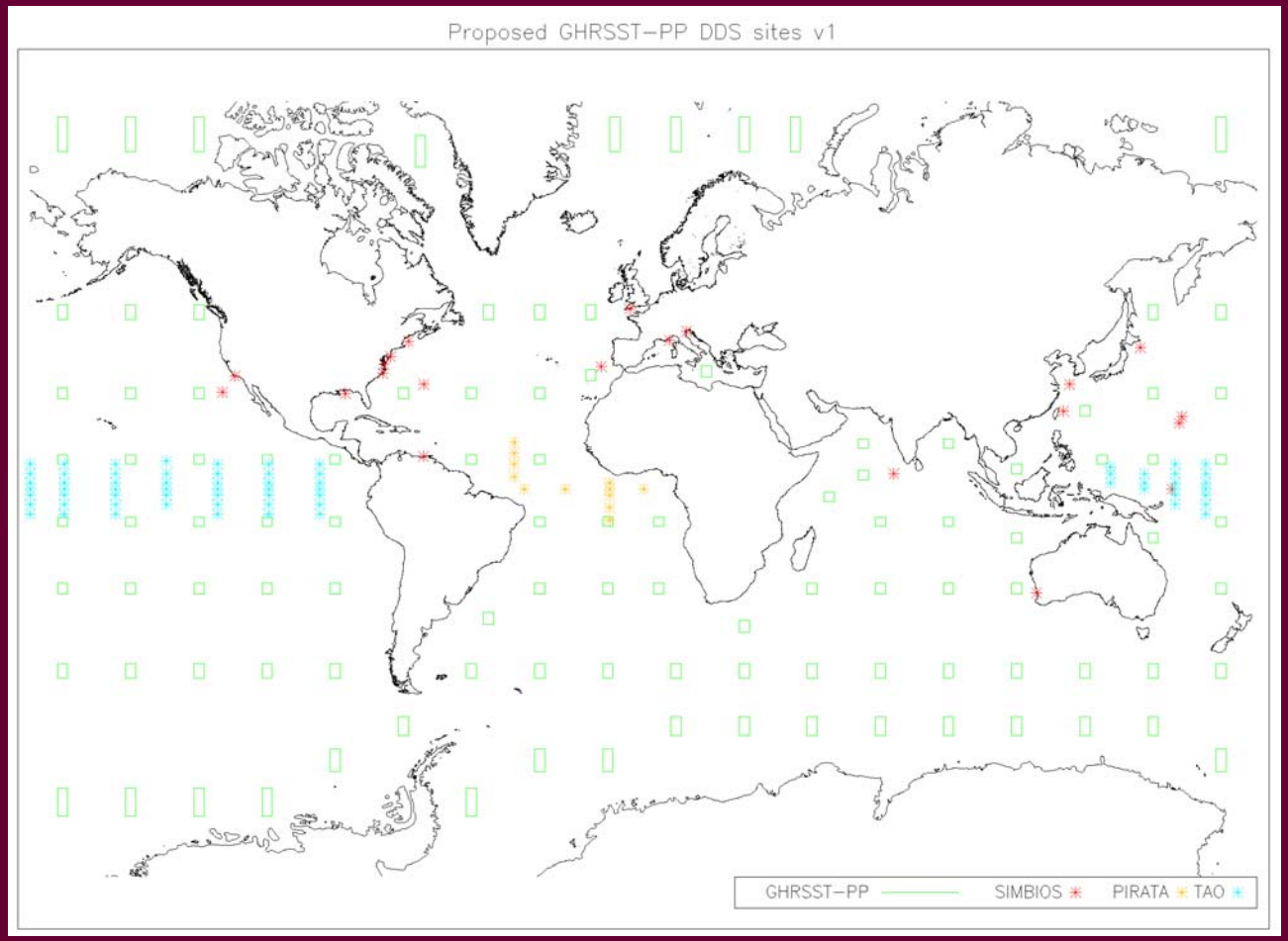
Specification and Delivery of SST Products

- Define scope and extent of the user community
- Develop a user information system
- Develop a distributed dynamic database system

Characterize SST Fields

- Develop methodology for testing, intercomparison, and validation of SST products
- Creation of Diagnostic Data Set infrastructure
- Generation of Diagnostic Data Sets
  - High resolution
  - Regional
  - Global

Diagnostic Data Sets



Research and Development

- Developing optimal assimilation methods
- Determining optimal procedures for relating and merging measurements of the different SST quantities
  - Different depths
  - Different times
  - Different resolutions
- Ensuring accurate and consistent retrieval of SST from different sensors

Expected Users

- Numerical weather prediction
- Global/regional ocean applications
- Climate and long-term monitoring
- Oceanographic and meteorological research and technology
- Coastal, local, and regional industrial activities

Product Specifications

- Global, cloud-free SST fields with high temporal (daily or better) and spatial (at least 10 km) resolution and accuracy better than 0.5 K

- Properly account for skin effect
- Account for temporal variability due to diurnal stratification
- Available in real-time and delayed modes at various resolutions
- Include estimates of uncertainties

Specific Products

- SST_{skin}: 6 hourly and 4 km grid + error statistics
- $SST_{subskin}$: 6 hourly and 4 km grid + error statistics
- SST_{Depth}: 12 hourly and 4 km grid + error statistics

Product Uncertainties

- Error statistics and confidence flags to help assess uncertainties in SST values
  - Data source
  - Proximity to cloud detection thresholds
  - Number of pixels used in averaging

Validation Strategy

- Objective to obtain a coincident, long-term, cost effective suite of SST observations from a wide variety of in situ and satellite sensors for a range of atmospheric and oceanic conditions
  - Moored buoys
  - Drifting and profiling buoys
  - Ships of Opportunity (infrared radiometers)
  - Volunteer observing ships

Implementation Plan

- Preparation phase (2001-2002)
  - Targeted research
  - Establishment of infrastructure
- Operational phase (2002-2005)
  - Product production
  - Product delivery
  - Product validation

Expected Scientific Benefits

- Understanding systematic differences between diverse SST products
- Development of cross- and inter-satellite calibration strategies
- Inclusion of diurnal stratification and skin effects in global SST products