グローバル
環境データベース

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Global environmental change research

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Data needs

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Many projects of global data production & missions of earth observations

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Rather independent, Less integrated

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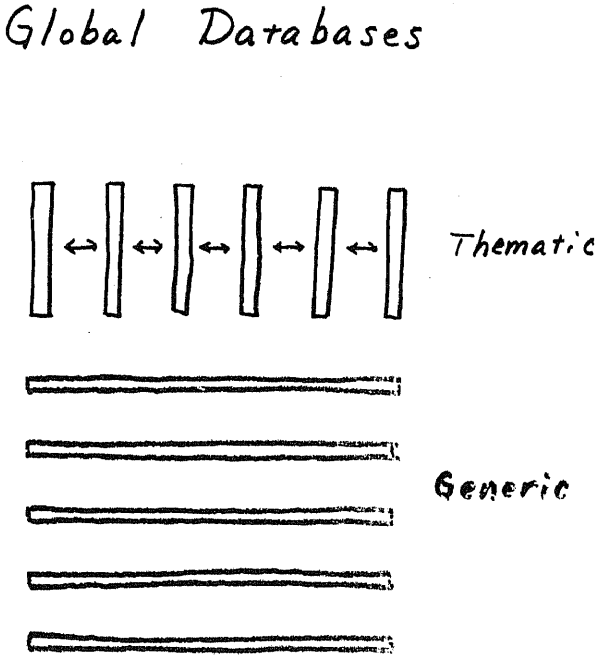
Needs

to survey **existing** global datasets /databases and to observe their **trend**,

to identify **obstacles** in global datasets/databases and their usage, and

to find the **better solutions** to remove these obstacles.



International Society for Photogrammetry and Remote Sensing (ISPRS)

- Established in 1910 as the International Society for Photogrammetry(ISP)

- Renamed in 1980 from ISP to ISPRS

- 100 Ordinary Member

- 7 Commissions

- Approximately 50 Working Group
  7 WG in each Commission

- ISPRS Congress in the Olympic year, the next Congress is 2004 in Istanbul, Turkey

- The WG IV/8 (2000 - 2004) on Global Environmental Databases is publishing a series of books on "Global Environmental Databases"

Global Environmental Databases

- Present Situation; Future Directions -

Edited by Ryutaro Tateishi and David Hastings
Published by the ISPRS WG IV/6 (1996-2000)

Contents

Global Environmental Databases
- Present Situation; Future Directions -

US$30.00
Copies of this book are available from:

Geocarto International Centre
G.P.O. Box 4122, Hong Kong
Tel: +852-2546-4262 Fax: +852-2559-3419
Email: geocarto@geocarto.com

Part 1 Thematic domains

- climatic data
- cryospheric data
- socio-economic data
- population / urban
- livestock data
- land use data
- land cover - biophysical parameters
- others

Part 2 Cross-cutting issues

- spatial representation / map projection
- quality control / validation
- data archiving / distribution
- spatial information infrastructure
- terrabyte technologies
- remote sensing data
- cultural bias
- others

Recruit convenors: Nov. 2000 (contact Tateishi)
Publish: the end of 2001

5 LARGE-AREA LAND COVER CHARACTERIZATION

Thomas R. Loveland, John E. Estes,
Timothy W. Foresman, Joseph Scepan,
Karen D. Kline and Jeffrey Hemphill

1. INTRODUCTION

the international focus on **global environmental change research** and the corresponding **data needs.**

while land cover data are the single most important and universally used terrestrial dataset, land cover data did not exist on a coherent long-term basis (IGBP, 1990).

factors that helped trigger the progress in land cover characterization.
- global environmental change requirements
- low-cost AVHRR Landsat data
- rapid advances in environmental modeling throughout the 1990s

2. ROLE OF LAND COVER IN ENVIRONMENTAL RESEARCH

Land cover data are used to partition the landscape into geographic units corresponding to a broad suite of environmental parameters, such as

surface roughness,
albedo,

latent and sensible heat flux, and
associated biogeochemical processes and cycles.
habitat condition that relates to biodiversity and other biogeographic phenomena.

Land-Atmosphere Interactions

Land surface parameterization models such as
Simple Biosphere Model (SiB) by Sellers et al., (1986) and
Biosphere Atmosphere Transfer Scheme (BATS) by Dickinson et al. (1986)
Land cover data are used to parameterize land surface boundary condition fluxes of **energy, moisture,** and **momentum** associated with climate models.

Biogeochemical Processes

community composition or vegetation types
(e.g., the **CENTURY model; BIOME-BGC**)

Net Primary Productivity

3. RECENT LARGE-AREA LAND COVER STUDIES

3.1 Coarse Resolution Land Cover Characterization

Loveland et al. (1991)
a detailed land cover characteristics database of **the United States** using 1990 monthly NDVI composites.

Cihlar, et al. (1996)
a 6-month sequence of AVHRR composites data, transformed using principal components analysis, to map **Canada** land cover.

tone et. al. 1994
outh America by 34 1-km AVHRR single date scenes and a
ıree-year AVHRR GVI dataset (16-km)

riedl et al. (2000)
'orth America based on 1995 AVHRR composites.

aston, et al., (1994)
ıe former Soviet Union using a 4-year set of AVHRR GVI data.

he first AVHRR 1-km Asia land cover dataset
y the Land Cover Working Group of the Asian Association on
emote Sensing and Chiba University (Tateishi et al., 1999; Wen
: al., 2000).

he Pan European Land Use and Land Cover Monitoring
?ELCOM) project
-km 1992-1994 multi-temporal AVHRR (Mücher et al., 1998).

loyd (1990)
lobal scale mapping of land cover
sing multi-date AVHRR GVI

)efries and Townshend (1994)
ıonthly averages of GAC AVHRR data resampled to
ne degree cells.
supervised maximum likelihood classification based on six
ıonths of 1994 AVHRR-NDVI.

'he University of Maryland team
global training dataset derived from approximately 200
,andsat MSS and TM, and the Linear Imaging Self-Scanning
ensor (Defries, 1998).
supervised classification methodology with a decision tree

4. FUTURE DIRECTIONS

In order to meet future challenges, we believe that the philosophy for the next generation of land cover products is **"globally consistent and locally relevant data"**.

toward the development of **user driven land cover datasets.**

Regardless of approach, it is likely that future large-area land cover initiatives will be based on:
(1) **data independence**;
(2) use and reuse of land cover knowledge; and
(3) generation of **quantitative landscape variables** (e.g., fraction of absorbed photosynthetically active radiation, leaf area index, canopy density) for both direct use in applications, and as inputs to the refinement of land cover classifications.

An improved strategy should also focus on **quantifying key landscape variables** that are critical for both **biophysical parameterization** and for forming **specific land cover classes.** For example, percent tree cover.

need to be based on **libraries of reference data** that can be used in a variety of classification strategies (i.e., supervised, unsupervised) to **calibrate, train, label, and validate** land cover data, including both thematic and quantitative variables. This **library of reference sites** must provide information on traditional **floristic** and **physiognomic** land cover attributes, **land use** practices, and key **biophysical phenological variables.**