

EARTH EXPLORATION TOOLBOOK

Tamara Shapiro Ledley, LuAnn Dahlman

Carla McAuliffe, Nick Haddad

TERC, Cambridge, MA



Cathy Manduca, Sean Fox

Carleton College, Northfield, MN

Robert Downs

CIESIN, Columbia Univ., Palisades, NY



Denise Blaha, Rita Freuder

Complex Systems Research Center

University of New Hampshire, Durham, NH



NSF Grant Number: DUE-0226199

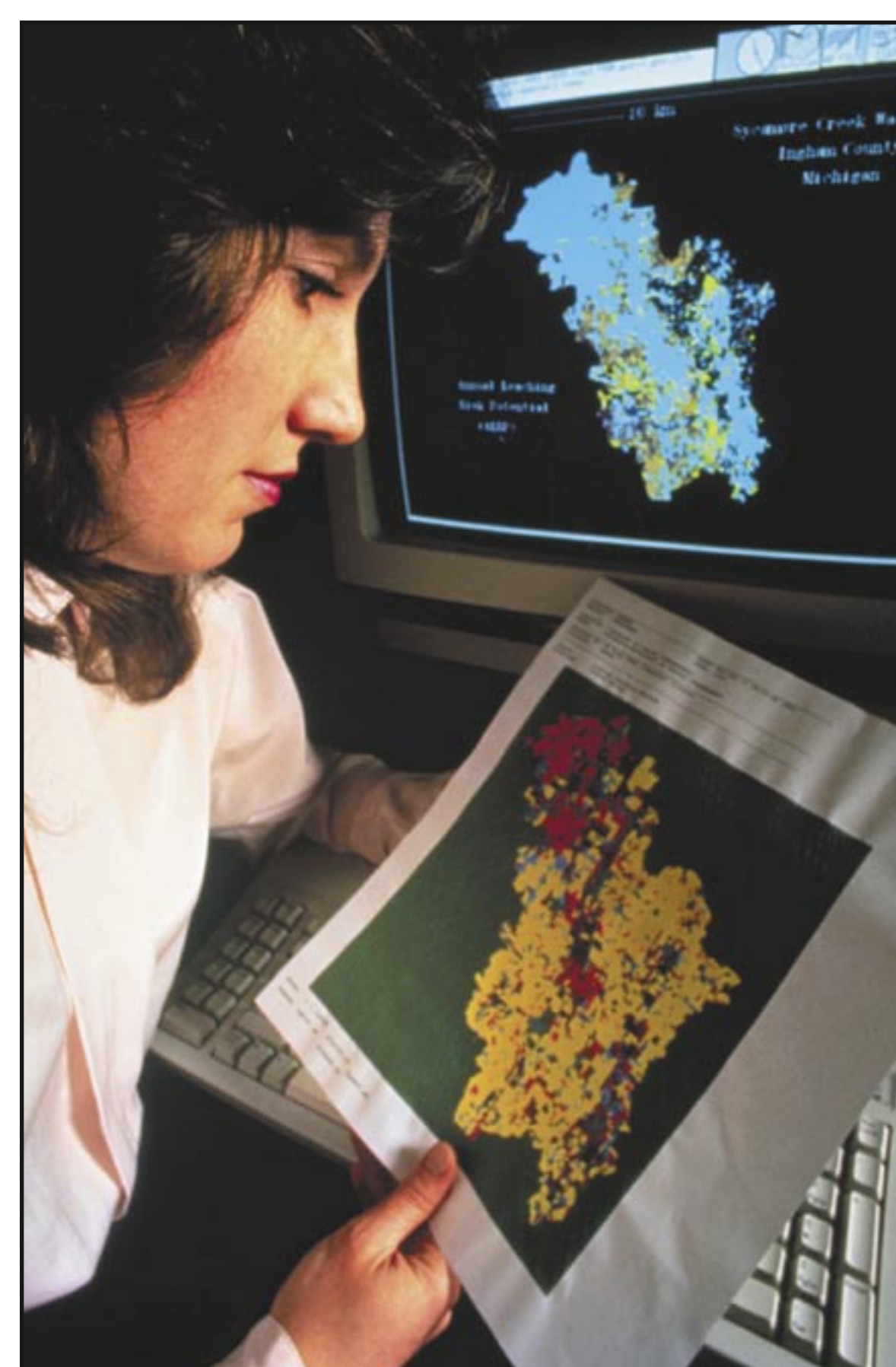
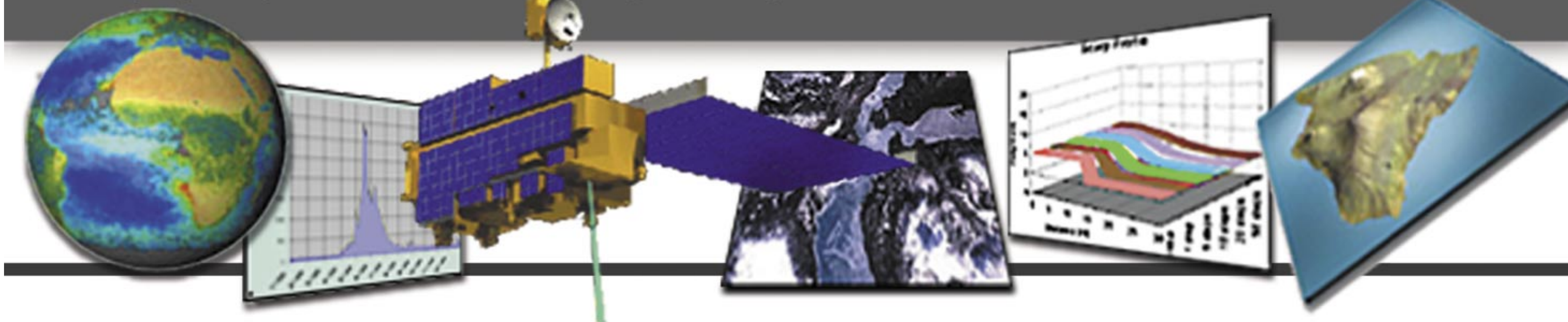


Photo by Keith Weller, ARS/USDA

The Earth Exploration Toolbook (EET) provides step-by-step instructions for using Earth science datasets and scientific tools in educational settings. Chapters in the EET walk users through case studies in which they use data and analysis tools to explore important issues and concepts in Earth system science. Clear instructions guide users through the steps to access and analyze data. Screenshots are available to help novice technology users complete detailed operations. Chapters also offer suggestions for further exploration of the data and other ways to use the tool.

Chapters are designed for use by K-12 teachers, undergraduate faculty, and their students. Each chapter features specific datasets and analysis or visualization tools, and provides enough experience and in-depth knowledge of the resource to enable an educator to use it, apply it to other teaching contexts, or help students use the resource to explore and investigate aspects of the Earth system. The purpose of the Earth Exploration Toolbook is to support the use of scientific datasets, data access and analysis tools, and other products by the broader educational community.

serc.carleton.edu/eet

How Can I Use the Earth Exploration Toolbook?

Chapters in the EET are similar to recipes in a cookbook—each chapter walks the user through gathering the necessary “ingredients” and putting them together in a specific way to produce a map, image, graph, or other data product. The EET is useful to many groups.

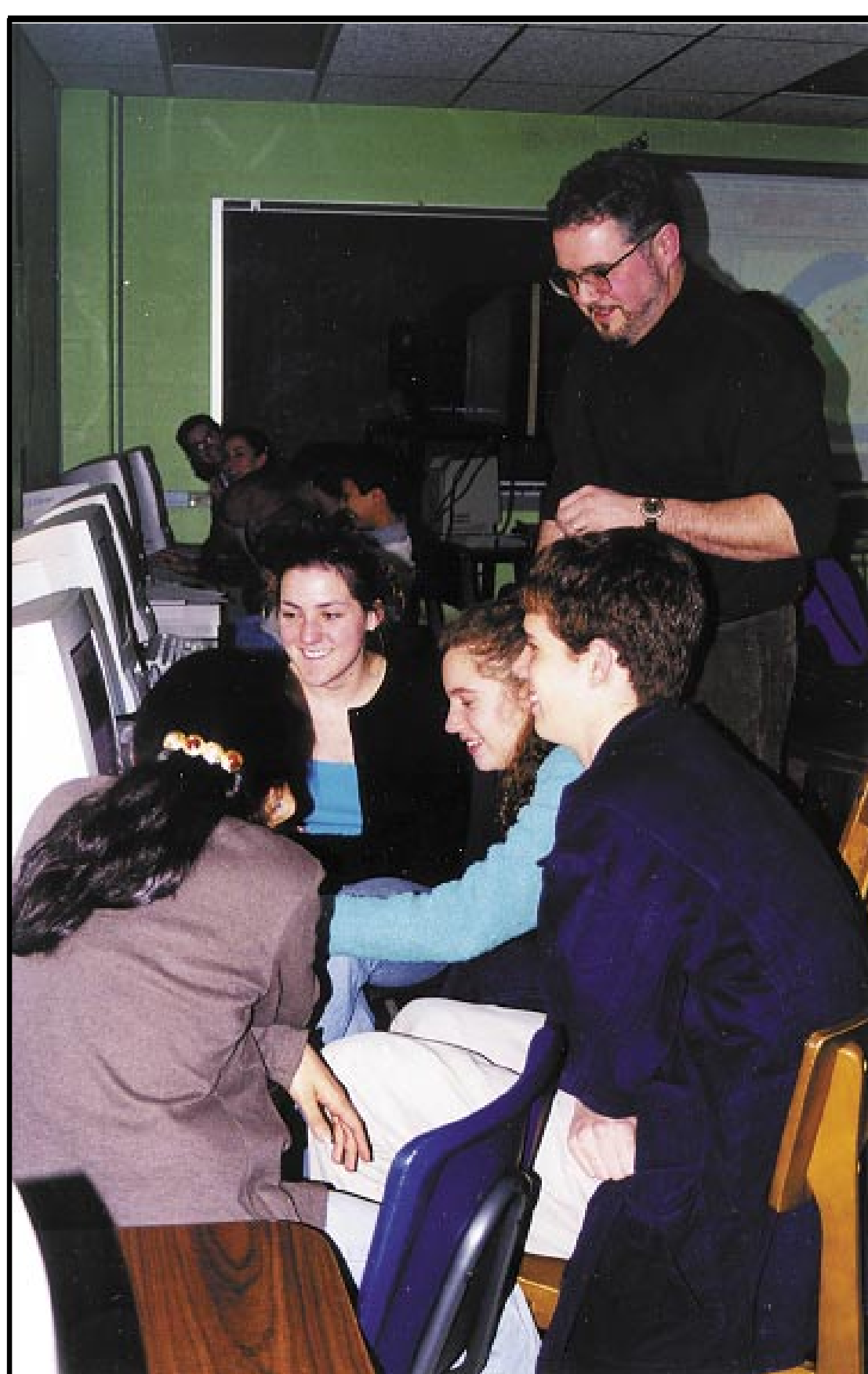


Photo by Tamara Ledley, TERC

Teachers can:

- Learn techniques for accessing, interpreting, and analyzing Earth science datasets
- Get authentic practice using software tools to explore data
- Enable students to tap into the wealth of satellite imagery, GIS-based maps, and tabular data available over the Internet
- Meet national and local science education standards for analyzing data and designing experiments
- Assign individuals or groups of students to complete a chapter and present their findings



Photo by Nick Haddad, TERC

Students can:

- Learn to use software tools to explore and interpret datasets, so they can understand the changing status of our planet
- Learn techniques of analyzing satellite data and creating graphics for research projects or science fairs
- Investigate human-induced change across our globe.
- Examine scientific data for evidence of global warming



Photo by Scott Bauer, ARS/USDA

Researchers can:

- Learn about data analysis tools and techniques, and see examples of using them in case studies
- Assess the suitability of a tool or dataset to answer specific questions
- Use an EET chapter as a tutorial to get started using a new tool or dataset



Photo by Scott Bauer, ARS/USDA

Tools Developers and Data Providers:

- Will eventually be able to contribute new chapters that feature the use of their own data or tools
- Can increase educators' and students' awareness of and ability to use their data, ultimately resulting in an increased public demand for Earth science data and tools

Earth Exploration Toolbook Chapters Currently Available



Annotating Change in Satellite Images

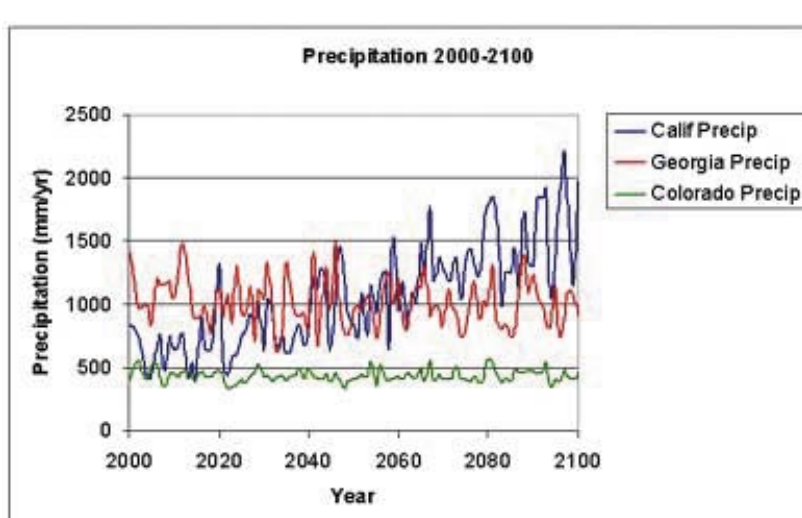
Use image processing software, *Image J*, and *Landsat images* to produce a map documenting change over time. Document how human activities have changed a river delta.

Analyzing Populations with Maps

Use the *United States-Mexico Demographic Data Viewer* to generate a series of maps. Analyze the maps to compare how people live in different urban and rural settings.

Exploring Regional Differences in Climate Change

Access data from *EOS-Webster* and produce graphs in a *spreadsheet application* comparing climate change among states in the U.S through the year 2100. Analyze the graph to interpret regional trends in climate change.

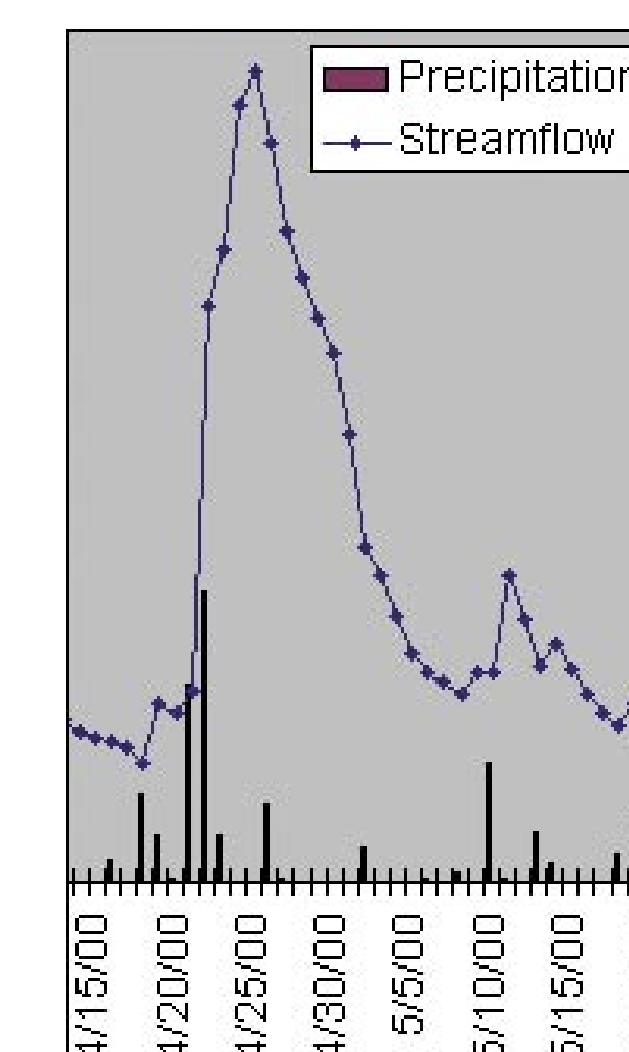


Investigating the Streamflow-Precipitation Relationship

Request specific datasets from the *USGS* and the *National Climatic Data Center (NCDC)*, and use a *spreadsheet application* to produce a graph comparing them. Analyze the graph to interpret conditions that affect streamflow.

Investigating Earthquakes: GIS Mapping and Analysis

Download lists of recent and historical earthquakes from *USGS*, then use a *spreadsheet application* to prepare the data. Import the data into *ArcVoyager*, a freely available *Geographic Information System (GIS)*. Use the GIS to analyze the data and predict where the next big earthquake will occur.



Contributing to the Earth Exploration Toolbook

Tool developers and data providers will eventually be able to contribute chapters that feature their own tools or data. Using a web-based template, authors will enter instructions into clearly described fields to generate chapters in the EET format. The capability to contribute EET chapters is under development; it is expected to be available in the last quarter of 2003.