GLIMS

Global Land Ice Measurements from Space

(Newly revamped website! http://www.glims.org)

Glim: "A Glimpse of a Passing Phenomenon"

ASTER Science Team Meeting
Pasadena, California, March 2004

GLIMS

www.GLIMS.org

- **Programmatic developments**
  - **-- U.S. funding/projects**
  - **-- GLIMS consortium organizational development**
- **NSIDC mini-presentation**
  - **-- GLIMS Data archive**
  - **-- Data analysis quality assessment "round-robin"**
- **Sample results of ASTER/glacier science results, Himalaya**
- **New GLIMS-related collaborations (and *you* are invited)**
  - **-- HIGH ICE (High Asian Institutes of Glaciology: Hydrology, Ice, Climate, and Environment)**
  - **-- Siachen International Peace Park (Kashmir)**

NASA OES-02

ASTER Science Team Member Proposal

(funded)

Global Land Ice Measurements from Space (GLIMS) Core Functions: International Organization, ASTER Glacier Image Data Management, and Glacier Hazard/Emergency Response

PI, Jeffrey S. Kargel

New NSIDC GLIMS Funding

REASoN CAN: Detection and Evaluation of Change in Glacier Systems Using the Global Land Ice Measurements from Space (GLIMS) Database (PI: Richard Armstrong)

NRA-03-OES-02: GLIMS Core Functions (PI: Richard Armstrong)

Other funded GLIMS proposals

- **M. Bishop and J. Shroder, UNO/Omaha, OES-02, *"Climate Forcing and Glaciers in the Western Himalaya: Assessing Glacier Fluctuations using ASTER Data"***
- **G. Hamilton, U Maine, OES-02, *"High-resolution Satellite Image Mapping of Arctic Glacier and Ice-cap Fluctuations: Evidence for Regional Climate Change and their Contribution to Sealevel"***
- **A. Fountain, PSU/Portland, OES-02, Topic: *ELA and glaciers of Alaska and the Conterminous U.S.***

Global Land Ice Measurements from Space

GLIMS
www.GLIMS.org

GLIMS primary goal: Determine extent and changes of Earth's glaciers

PREVIOUS RESULTS AND CONTINUING TASKS:

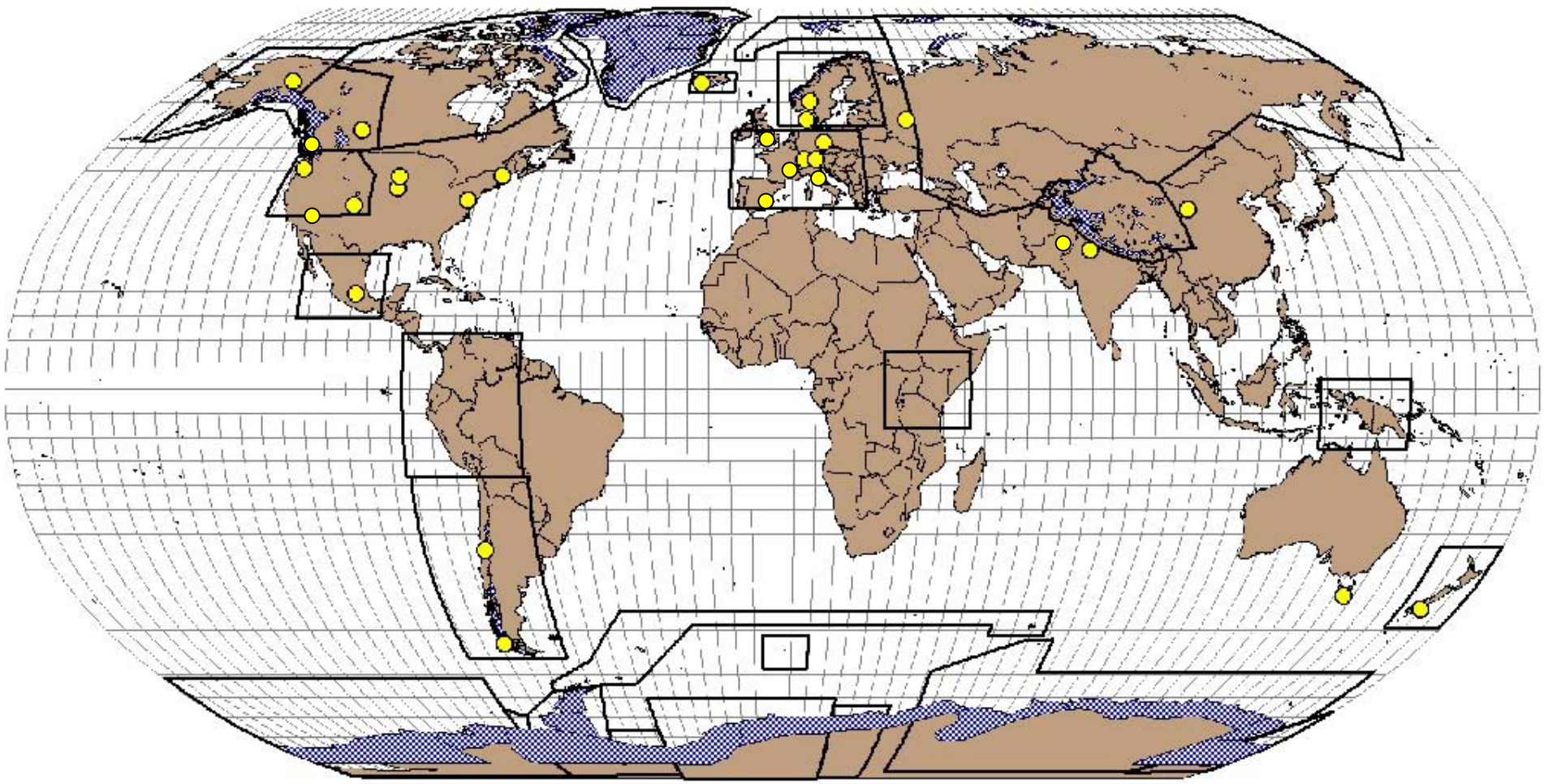
- Acquired ~40,000 ASTER L1A scenes (of any quality)
- Archived and distributed over 5000 L1B glacier scenes
- Timely ASTER imaging response to glacier hazard events
- Purchased 150+ Landsat ETM+ scenes for RC ftp download
- 25 Regional Centers producing digital maps of glaciers and glacier change
  - Mapping current extent of exposed land ice and debris-covered ice
  - High resolution surface displacement fields
  - Automating data extraction from ASTER
  - GLIMSView tool for glacier analysis
  - Glacier lake extent and temperature variations using multi TIR bands
- Designed GIS digital database for GLIMS glacier inventory (NSIDC)
- GLIMS book (Praxis-Springer) in the works!

FUNDING:

-- U.S. institutions funded by six NASA grants (Office of Earth Science), $1.6M/yr

-- GLIMS Coordination Center (USGS/Flagstaff) and ASTER Science Team membership funded by NASA and USGS Cryosphere Program.

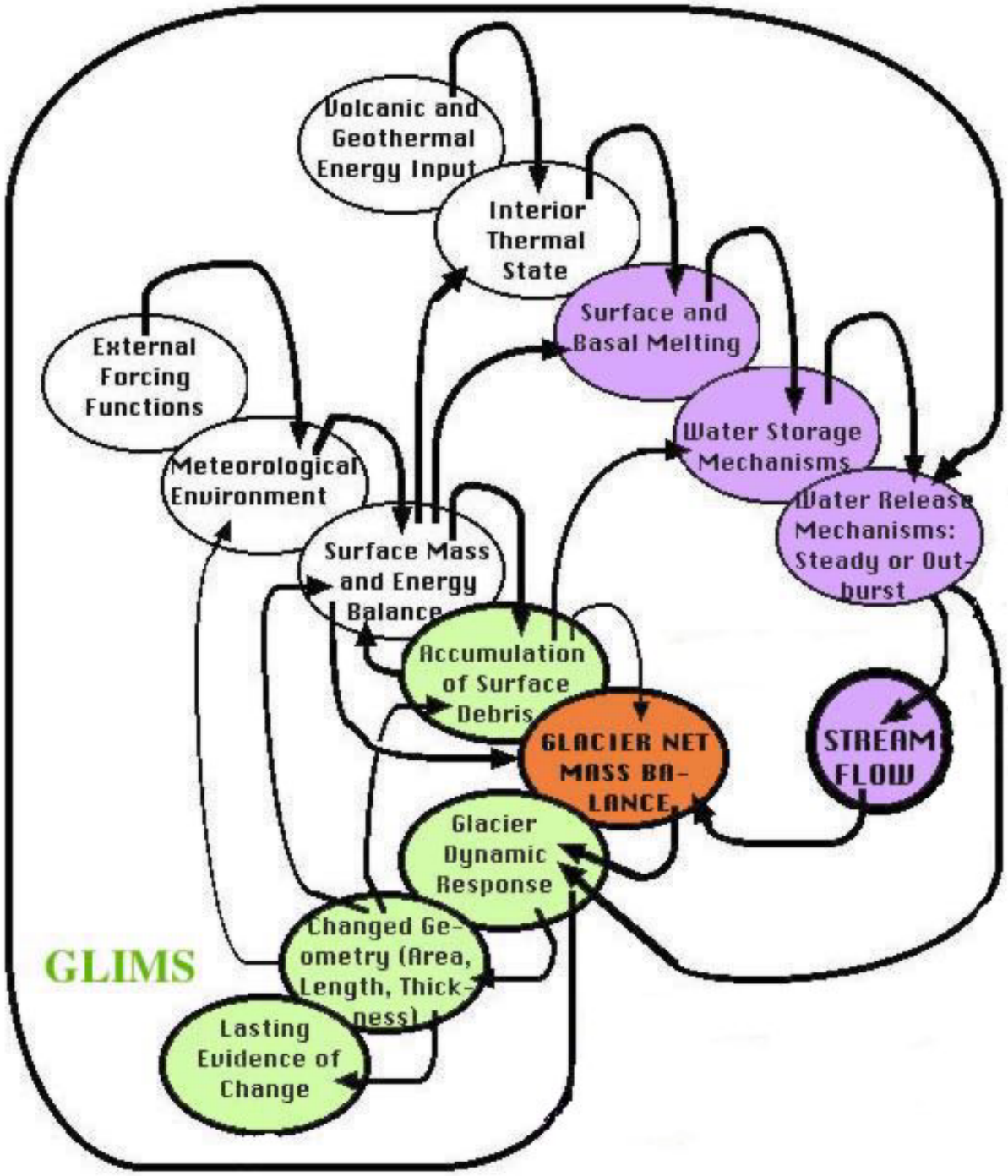
GLIMS Regions and Regional Center locations

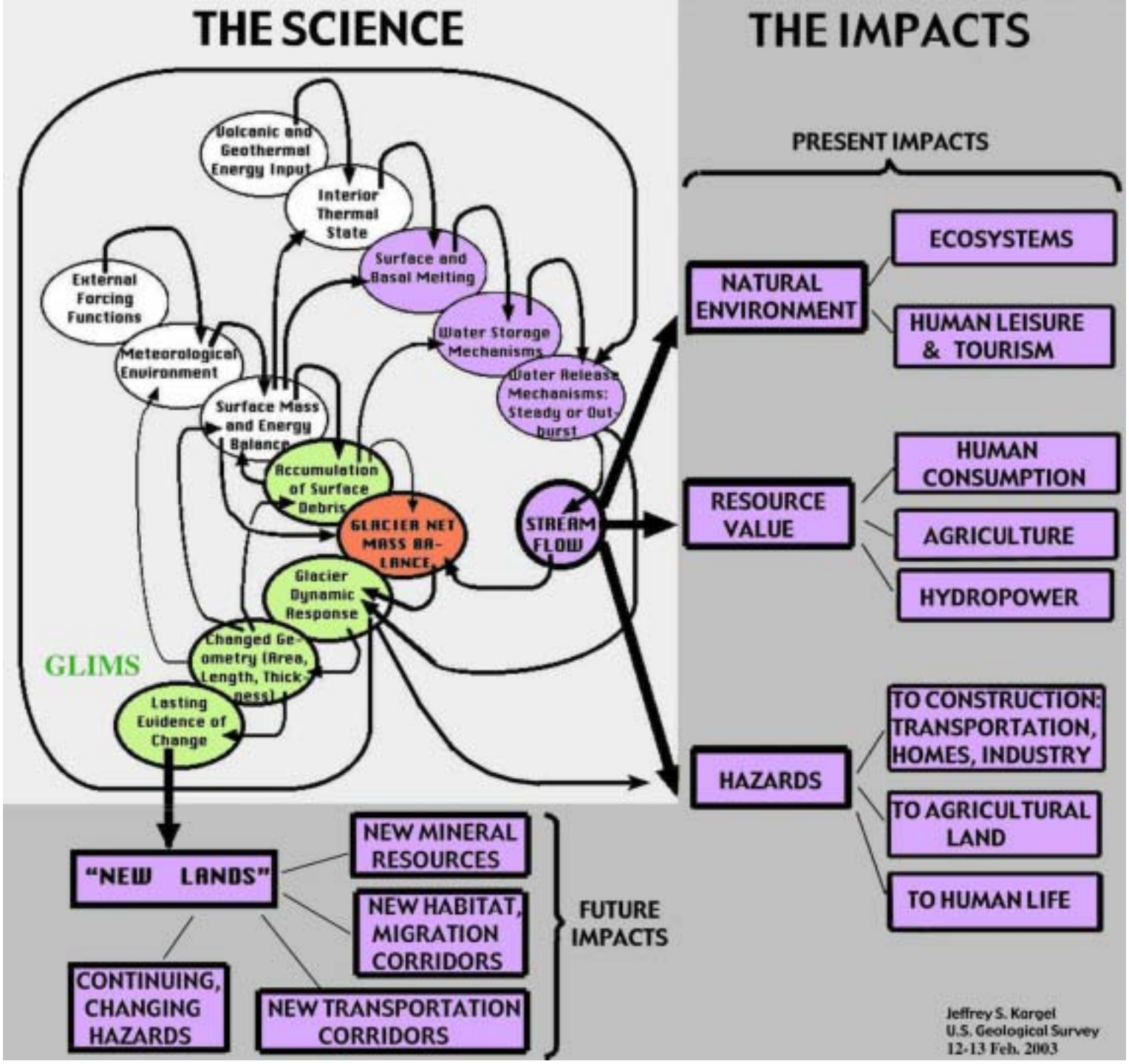


- GLIMS is an international consortium of 25 regional centers
- 82 cooperating institutions worldwide
- Coordinated by U.S. Geological Survey - Flagstaff

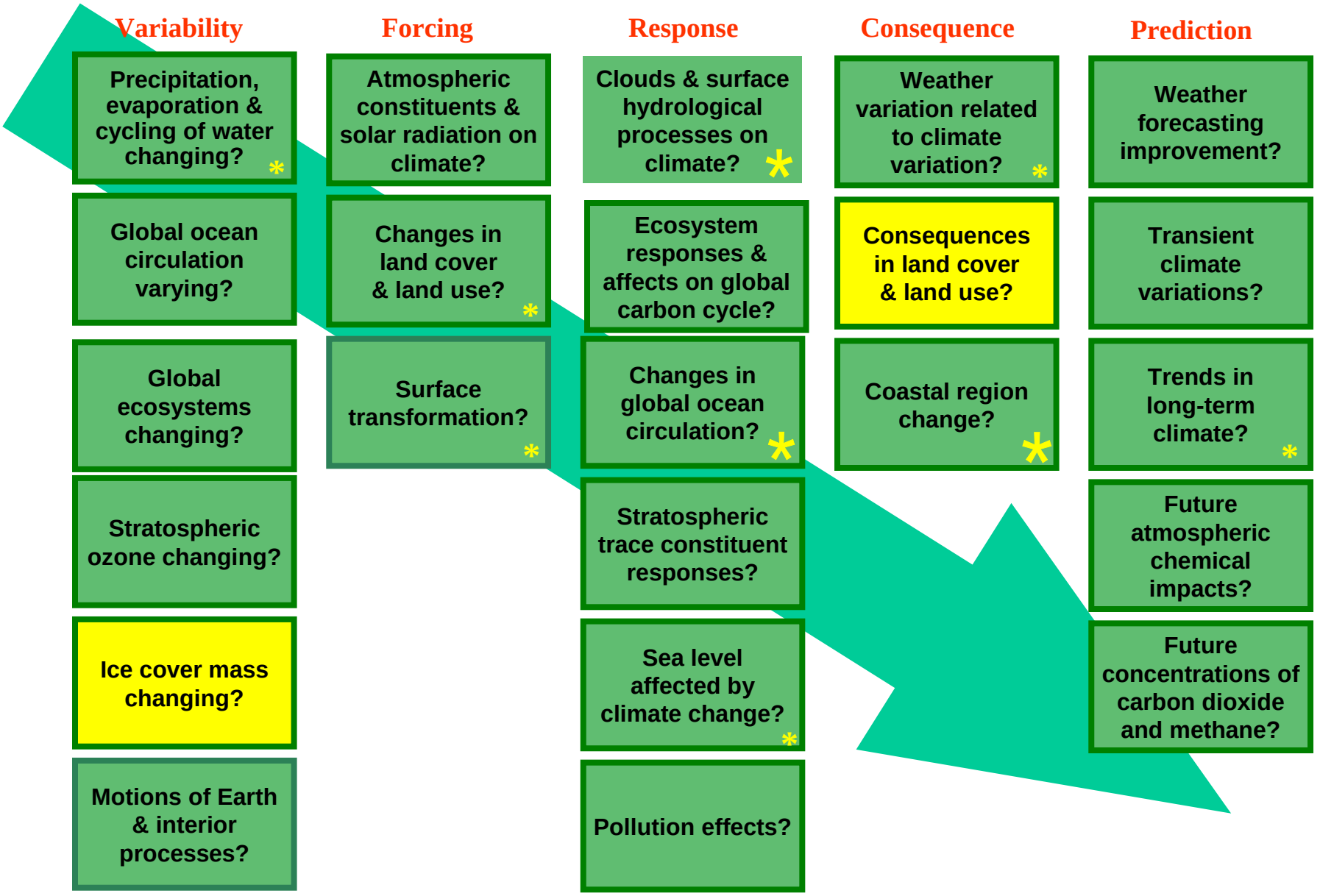
GLIMS

Science of glaciers




THE SCIENCE
THE IMPACTS
Volcanic and Geothermal Energy Input
Interior Thermal State
Surface and Basal Melting
External Forcing Functions
Water Storage Mechanisms
Meteorological Environment
Water Release Mechanisms: Steady or Outburst
Surface Mass and Energy Balance
Accumulation of Surface Debris
GLACIER NET MASS BALANCE
STREAM FLOW
Glacier Dynamic Response
Changed Geometry (Area, Length, Thickness)
GLIMS
Lasting Evidence of Change
PRESENT IMPACTS
NATURAL ENVIRONMENT
ECOSYSTEMS
HUMAN LEISURE & TOURISM
RESOURCE VALUE
HUMAN CONSUMPTION
AGRICULTURE
HYDROPOWER
HAZARDS
TO CONSTRUCTION: TRANSPORTATION, HOMES, INDUSTRY
TO AGRICULTURAL LAND
TO HUMAN LIFE
"NEW LANDS"
NEW MINERAL RESOURCES
NEW HABITAT, MIGRATION CORRIDORS
NEW TRANSPORTATION CORRIDORS
CONTINUING, CHANGING HAZARDS
FUTURE IMPACTS
Jeffrey S. Kargel
U.S. Geological Survey
12-13 Feb. 2003

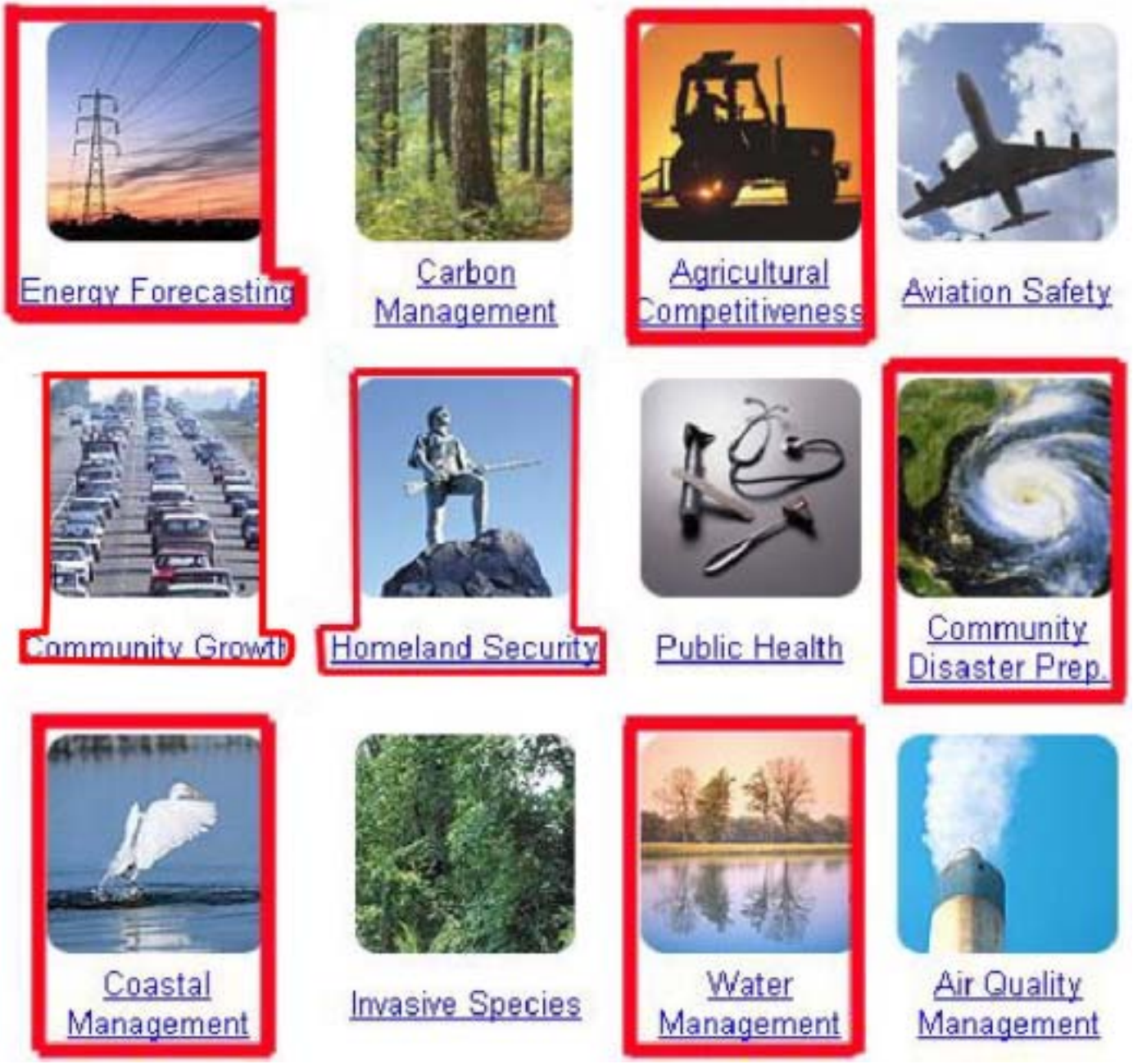
Science Questions from the Research Strategy



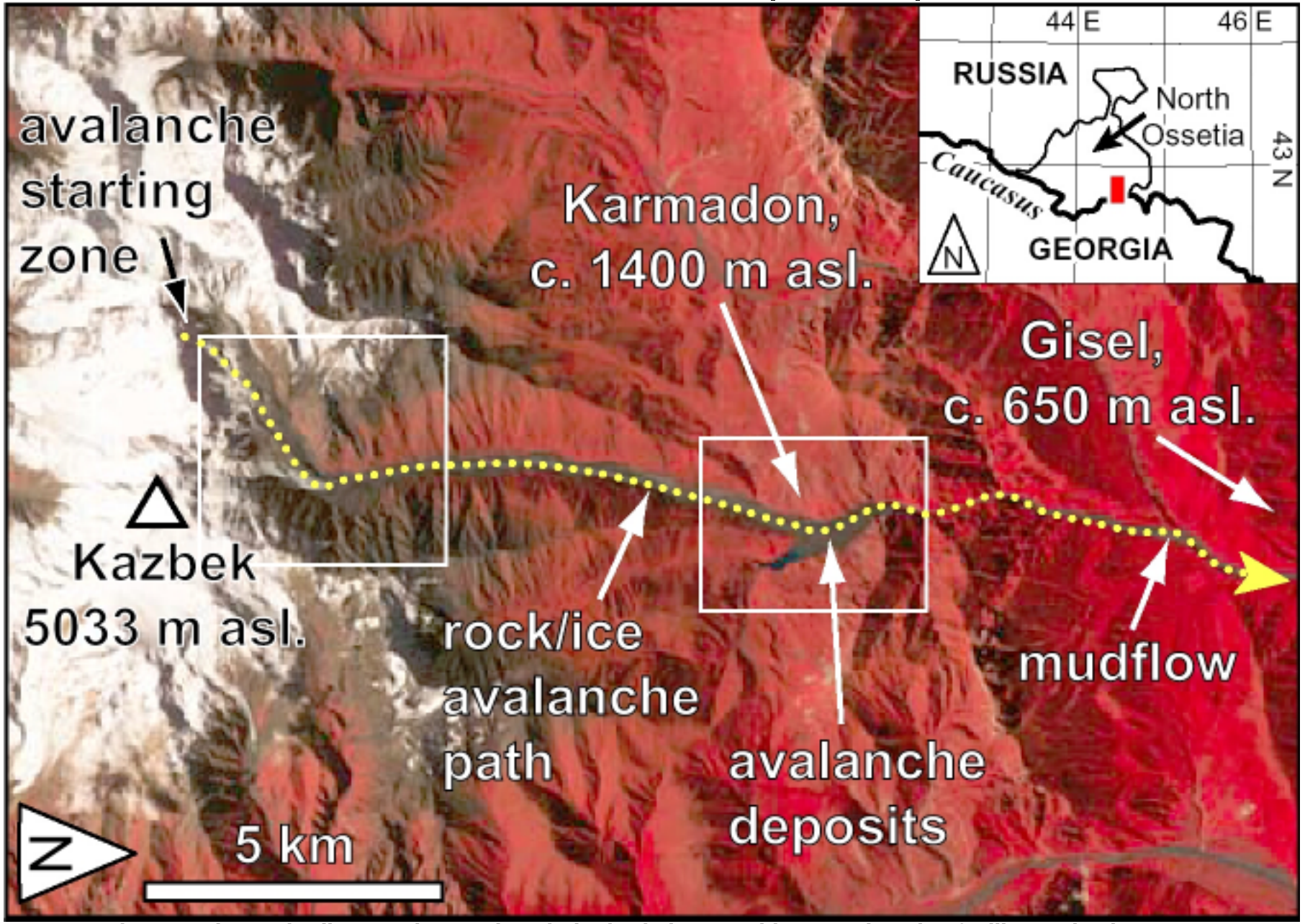
Glaciers in the context of 12 major national research applications

Major research applications

Potentially significant research applications



Kolka Glacier disaster - ASTER rapid response



From: Kääb, Wessels, Haeberli, Huggel, Kargel, and Singh Khalsa. Rapid ASTER imaging facilitates timely assessment of glacier hazards and disasters, in press, EOS

Kolka Glacier disaster

- 80 million cubic meter rock/ice avalanche and subsequent debris/mud flows on September 20, 2002
- Overran Karmadon village 18 km down valley
- Over 120 killed
- Mudflow continued 15km further down valley
- Rapid ASTER imaging response over several days following emergency.
- ASTER data used by emergency response teams