USING CLIMATE INFORMATION

1. END-TO-END FORECASTING
   ▶ CLIMATE INFORMATION
   ▶ IMPACTS
   ▶ APPLICATIONS

2. OBSTACLES TO END-TO-END FORECASTING

3. INSTITUTIONS FOR END-TO-END FORECASTING
   ▶ A NATIONAL CLIMATE SERVICE
   ▶ REGIONAL CLIMATE CENTERS
   ▶ IRI
   ▶ ALL THE ABOVE

4. RESEARCH FOR END-TO-END FORECASTING
GENERAL PRINCIPLES:

► ANY KNOWLEDGE ABOUT THE FUTURE SHOULD BE BETTER THAN NO KNOWLEDGE ABOUT THE FUTURE

► CLIMATE INFORMATION IS ANY INFORMATION (PAST, PRESENT, AND FUTURE) THAT GIVES US INFORMATION ABOUT THE FUTURE.

► THE FORECAST MUST COME WITH MEASURES OF UNCERTAINTY

► UNCERTAIN FORECASTS IMPLY INCREMENTAL RESPONSES

► THE FORECAST HAS TO BE RELEVANT, UNDERSTANDABLE, AND ACTIONABLE

► DEFINITION: AN APPLICATION OF A FORECAST IS AN INFLUENCE ON A DECISION.

► THE APPLICATION OF THE FORECAST MUST BE DEMONSTRABLY BENEFICIAL.

► THEREFORE WE HAVE TO UNDERSTAND HOW DECISIONS ARE MADE.
END-TO-END FORECASTING

- **CLIMATE INFORMATION**
- **PAST CLIMATE INFORMATION**
  - INSTRUMENTAL
  - PALEO
- **NOWCASTS**
- **FORECASTS**
Figure 10.4. Multi-model means of surface warming (relative to 1980–1999) for the scenarios A2, A1B and B1, shown as continuations of the 20th-century simulation. Values beyond 2100 are for the stabilisation scenarios (see Section 10.7). Linear trends from the corresponding control...
CLIMATE IMPACTS

THE NORMAL WORKINGS OF THE SYSTEM

VULNERABILITY

EXPOSURE
SENSITIVITY
RESILIENCE

COPING: INFRASTRUCTURE
HEDGING
RESPONSE

OPPORTUNITY

INTEGRATED IMPACTS
APPLICATIONS

- IDENTIFY APPLICATION
- UNDERSTAND NORMAL DECISION PROCESS
- IDENTIFY USEFUL CLIMATE INFORMATION
- CONVEY CLIMATE INFORMATION
- RECEIVE THE SAME CLIMATE INFORMATION CONVEYED
- MAKE APPROPRIATE DECISION
- EVALUATE DECISION
- ITERATE
2. OBSTACLES TO END-TO-END FORECASTING

► INAPPROPRIATE INFORMATION
► INFORMATION MISCONVEYED
► INFORMATION MISUNDERSTOOD
► INFORMATION IGNORED
► DECISION INAPPROPRIATE
► BAD LUCK—FIRST APPLICATION BLOWN
► LOCALIZED (NOT DIFFUSED)
► DISTRIBUTIONAL INEQUITIES
► LEGAL ISSUES
3. INSTITUTIONS FOR END-TO-END FORECASTING

▶ A NATIONAL CLIMATE SERVICE

THE CLIMATE SERVICE IDENTIFIES, DESIGNS, AND PRODUCES AUTHORITATIVE AND TIMELY CLIMATE INFORMATION FOR USE IN SUPPORTING POLICY AND MANAGEMENT DECISIONS IN THE PUBLIC AND PRIVATE SECTORS, ON REGIONAL, NATIONAL, AND INTERNATIONAL SPACE SCALES.

▶ DESIGNS, ESTABLISHES, AND MAINTAINS U.S. COMPONENT OF A GLOBAL CLIMATE OBSERVING SYSTEM

▶ MAKES GLOBAL ANALYSES AND FORECASTS

▶ ARCHIVES INSTRUMENTAL, PALEO, AND MODEL DATA
SHAPES, DOWNSCALES, AND DELIVERS TIMELY AND AUTHORITATIVE INFORMATION TO REGIONAL CLIMATE CENTERS

PERFORMS THE RESEARCH NEEDED TO SUSTAIN ABOVE

REGIONAL CLIMATE CENTERS

KNOWS THE CUSTOMER

MAINTAINS REGIONAL OBSERVATIONS

DISTRIBUTES CLIMATE INFORMATION

PRODS THE NATIONAL CLIMATE CENTER

INTERFACES WITH SECONDARY DISTRIBUTORS (PRIVATE SECTOR)

IDENTIFIES RESEARCH NEEDED IN THE REGION
THE IRI: A PILOT INSTITUTION TO DEMONSTRATE END-TO-END FORECASTING

RISK MANAGEMENT

4. RESEARCH FOR END-TO-END FORECASTING

- PRODUCTION AND DISTRIBUTION OF CLIMATE INFORMATION
- CLIMATE IMPACTS
  U.S. REGIONS
  INTERNATIONAL REGIONS
- PUBLIC PERCEPTIONS OF CLIMATE
- DECISIONMAKING IN ORGANIZATIONS AND PUBLIC BUREAUCRACIES
  DESCRIPTIVE
  NORMATIVE-PRESCRIPTIVE
- EVALUATION OF APPLICATIONS
- BOUNDARIES BETWEEN PHYSICAL SCIENCES, SOCIAL SCIENCES, AND POLICYMAKING
DIFFUSION OF INNOVATIONS

**DEFINITION**: AN INNOVATION IS ANY IDEA OR TECHNOLOGY PERCEIVED TO BE NEW.

**DEFINITION**: DIFFUSION IS THE PROCESS BY WHICH AN INNOVATION IS COMMUNICATED OVER TIME AMONG THE MEMBERS OF A SOCIAL SYSTEM.

► **DIFFUSION IS A COMMUNICATION PROCESS.**

► **IT IS A SOCIAL PROCESS.**

► **DIFFUSION SUCCEEDS OR FAILS BY COMMUNICATION WITHIN SOCIAL PROCESSES.**

IN TIME, THE INNOVATION IS EITHER ADOPTED OR REJECTED.
WHAT LEADS TO SUCCESSFUL DIFFUSION AND THEN ADOPTION?

1. INNOVATIONS

   A. RELATIVE ADVANTAGE
   B. COMPATIBILITY
   C. COMPLEXITY
   D. TRIALABILITY
   E. OBSERVABILITY

2. THE DECISION IN TIME

   THE S CURVE

3. COMMUNICATIONS

   A. HOMOPHILY OF COMMUNICATORS
   B. SUITABLE COMMUNICATION CHANNELS
      NETWORKS
      MEDIA
   C. CHANGE AGENTS
4. THE DECISION IN A SOCIAL SYSTEM

CHARACTERISTICS OF INNOVATORS

CHARACTERISTICS OF ORGANIZATIONS

CHARACTERISTICS OF CHANGE AGENT

CONSEQUENCES OF DIFFUSION

WHAT’S NOT COVERED?

OBSTACLES TO DIFFUSION AND HOW TO OVERCOME THEM