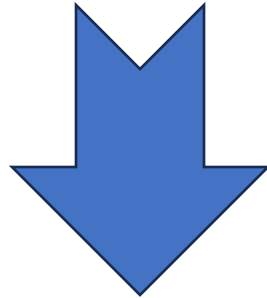


Harnessing the Heartland

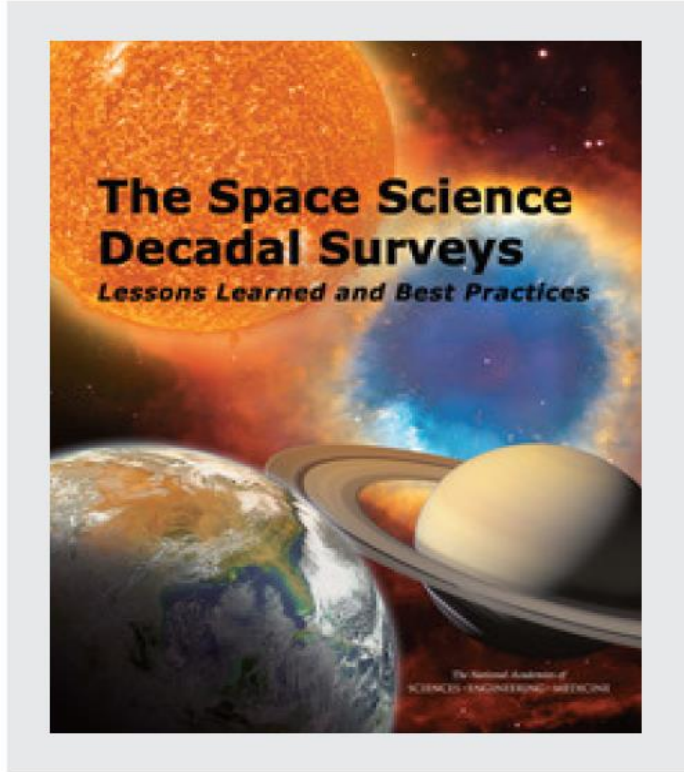


NASA + NOAA + USGS

Earth Sciences and Applications from Space Decadal Survey

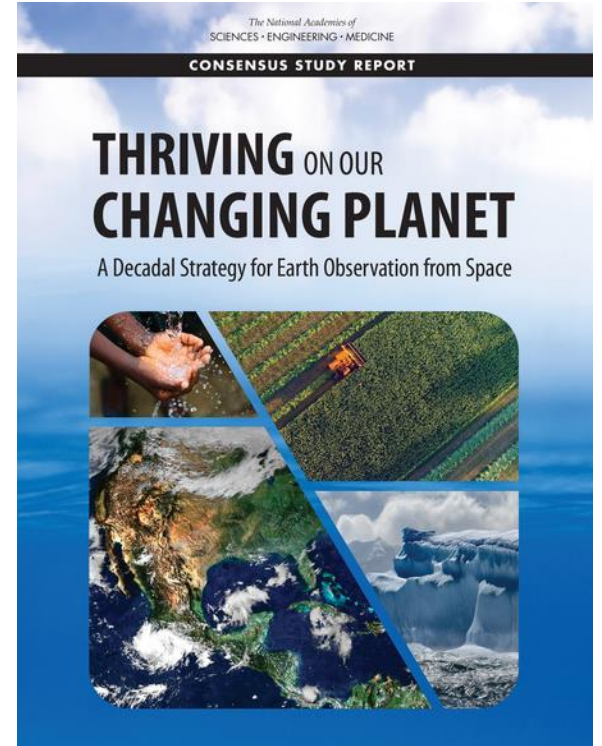
Mid-Term review
mandated by Congress
Others prompted by NASA etc

2007 Decadal Survey



<http://nap.nationalacademies.org/21788>

Published in 2015



Published in 2018

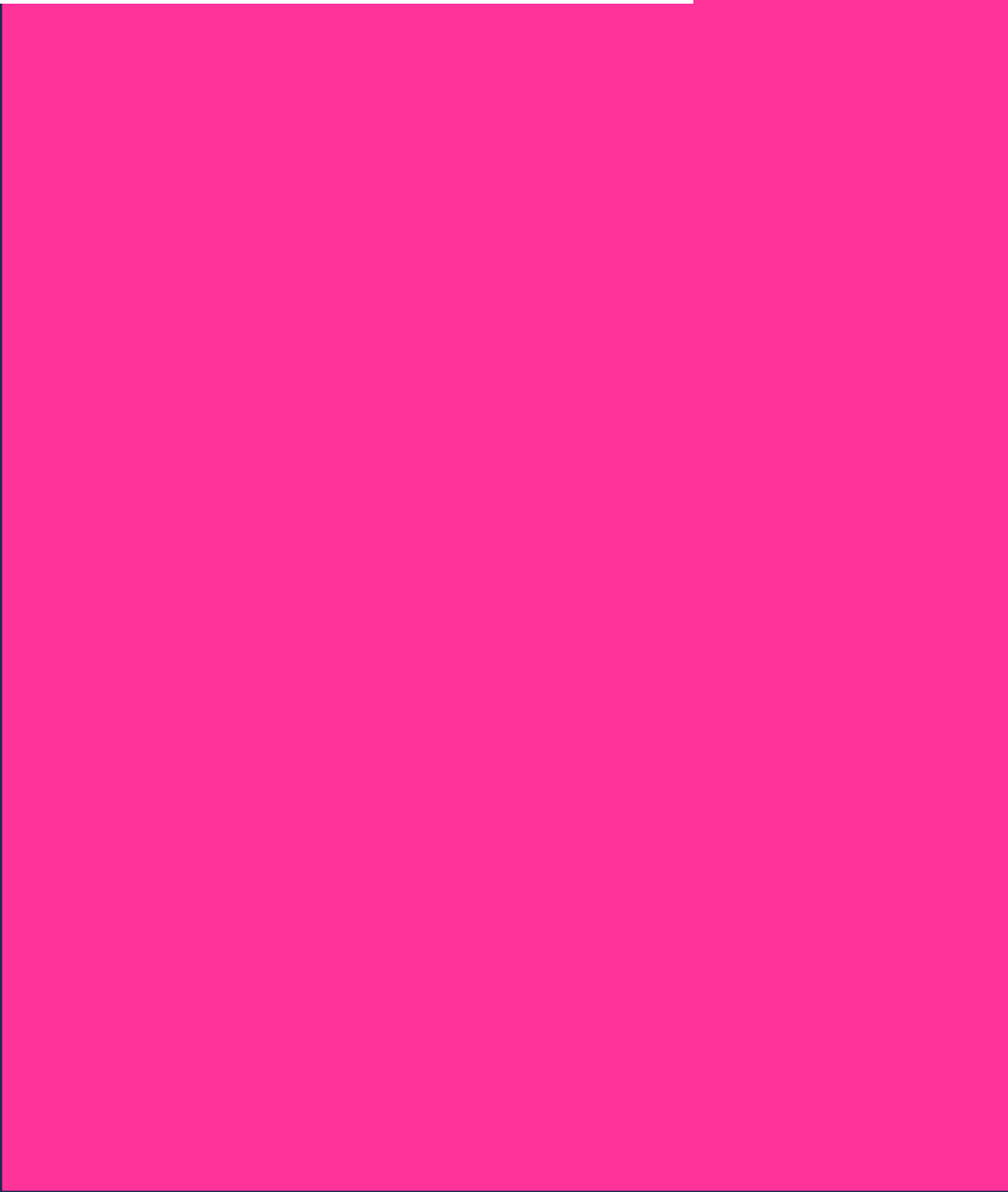
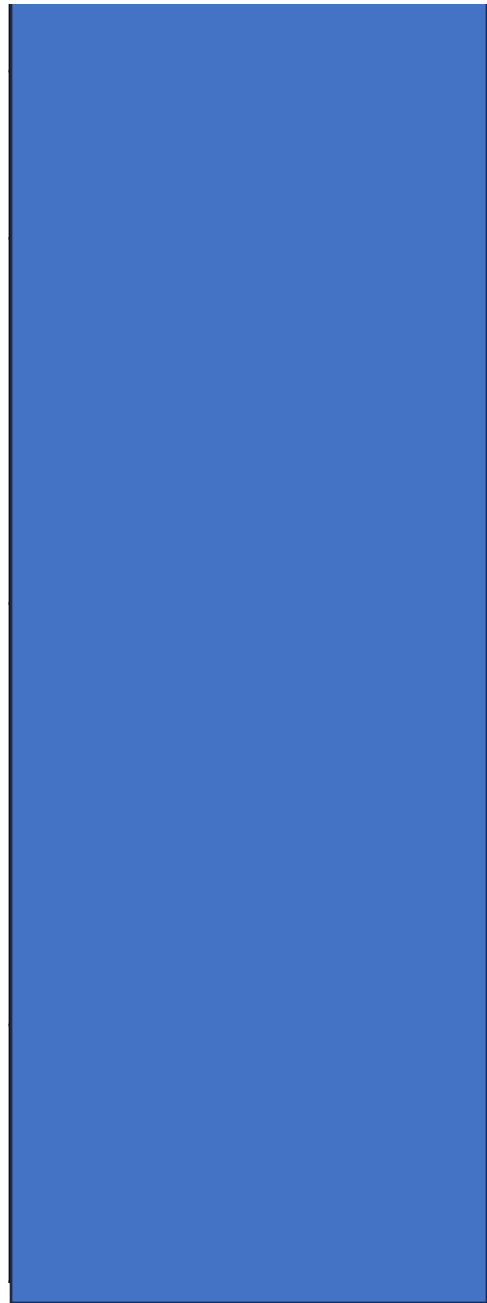
(Simplified) Process

1. NASA Lead with input from NOAA, USGS and NRC/NASEM Staff and CESAS (Committee on Earth Science and Applications from Space) define **Task & Process**
2. Form Committee and Subcommittees; Issue RFI
3. RFI period (outreach to community)
Opportunity!!!!
4. Reading and Synthesis
5. Committee Meetings including Cross-Disciplinary Meetings
6. Writing & Review
7. Dissemination and Publication

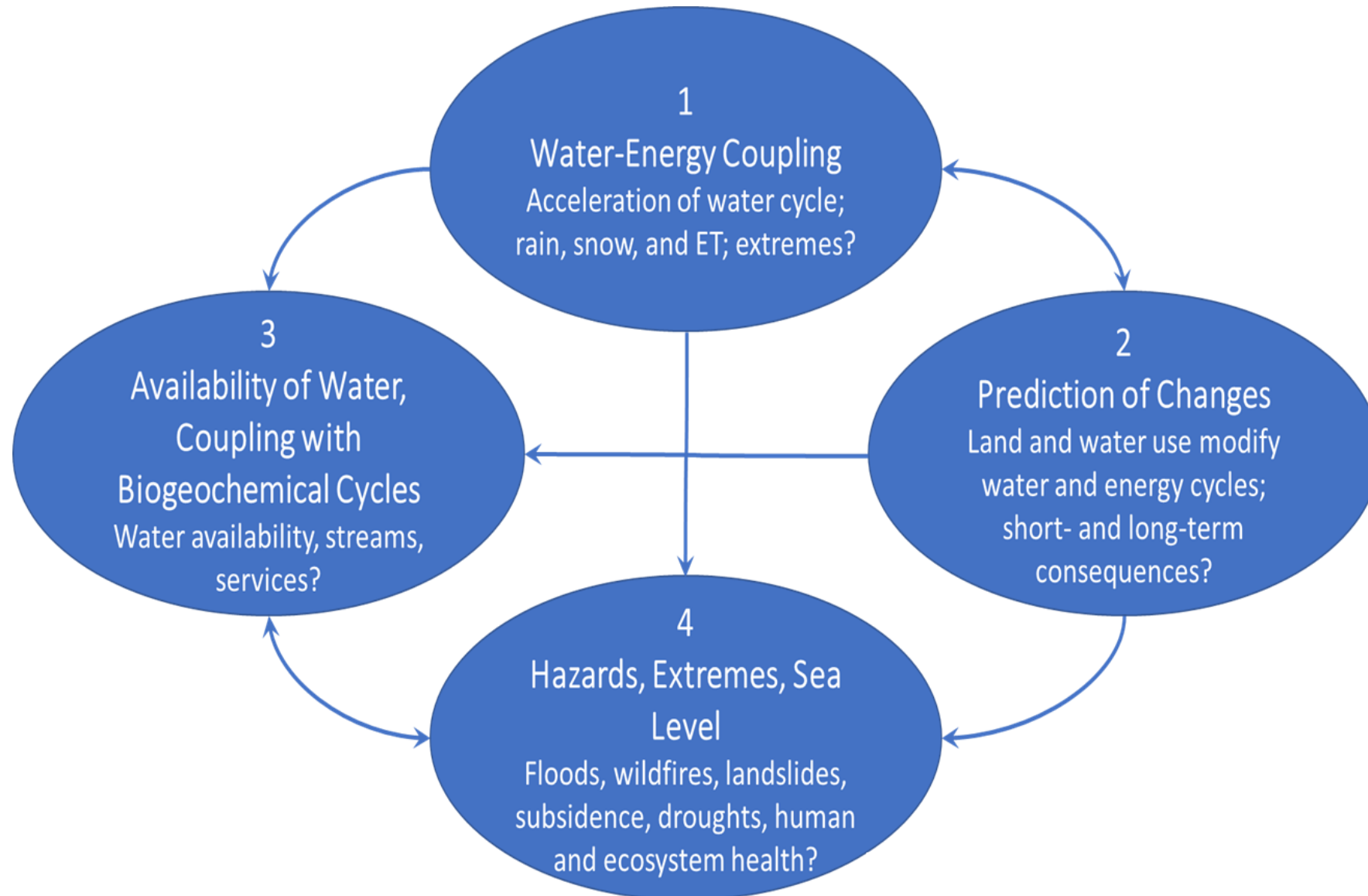
Ultimate Goal: Science & Applications Traceability Matrix (SATM)

NASA Strategic Goals	Earth Science Decadal Survey Priorities
1.1: Understand the Earth system and its climate	Water & Energy Cycle H-1. How is the water cycle changing? <i>(Most Important)</i>
	H-1c. Quantify rates of snow accumulation, snowmelt, ice melt, and sublimation from snow and ice worldwide at scales driven by topographic variability. <i>(Most Important)</i>
	H-4. Influence of water cycle on natural hazards and preparedness <i>(Very Important)</i>
	Weather & Air Quality W-3. Influence of Earth surface variations on weather and air quality <i>(Very Important)</i>
	Climate Variability & Change C-6. Can we significantly improve seasonal to decadal forecasts of societally-relevant climate variables? <i>(Very Important)</i>
	C-8b. Improve understanding of high-latitude variability and mid-latitude weather linkages <i>(Very Important)</i>
	Earth Surface S-4b. Quantify weather events, surface hydrology, and changes in ice/water content of near-surface materials that produce landscape change. <i>(Important)</i>

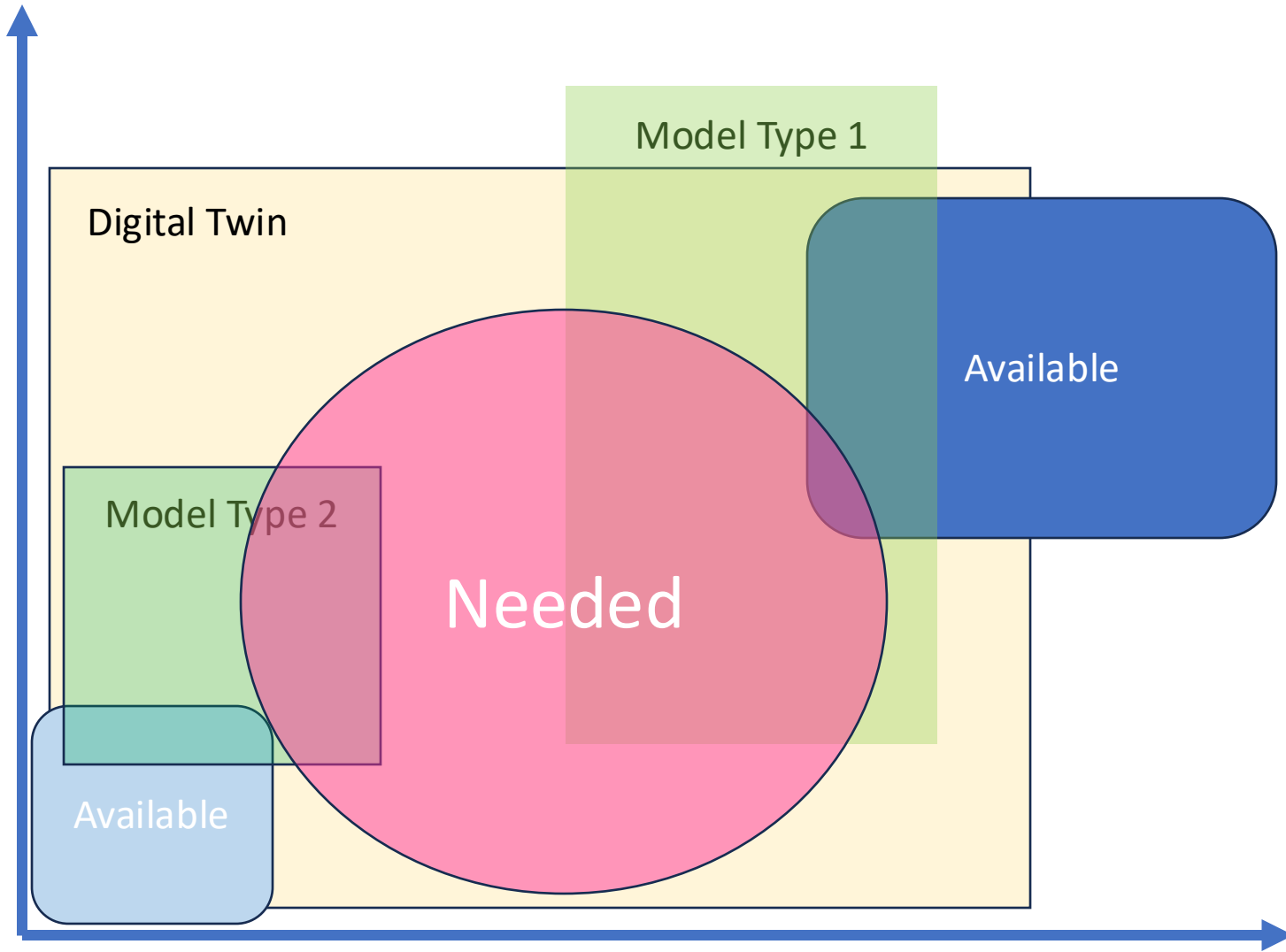
SnowGlobe Science and Application Objectives	
SnowGlobe Science Goal: Discern the role of seasonal snow in the Earth's water and energy cycles	S1 Reduce uncertainty in global snow mass estimates
	S2
	S3
	A1
	S4
	S5
A2	



Toward an Earth Observing System (Digital Twin Earth) framework using satellite observations and models



Time



Digital Twin

Model Type 1

Model Type 2

Available

Needed

Available

Global

Local,
Sparse

Space

Opportunity for Impact

It does not have to be about specific missions/architectures/technologies

1. Most Important - Focus on **(1) Science and, or (2) Applications**

Why remote sensing measurements are necessary (and transformative)

What measurements are desired

What measurements are sufficient

Coverage, resolution in space and time, accuracy, uncertainty

2. Very Important and Important

(a) Technical Readiness
“Landscape” Analysis

(b) Evaluation

What would it take for you to be convinced S&A reqs are met?

How?

Ground Validation (GV), Suborbital Campaigns, Operational Demo, etc

SnowGlobe -Global Snow Water Equivalent Observations from Space



<https://snowglobe.illinois.edu>

Ana P. Barros, Paul Siqueira, Michael Durand, Carrie Vuyovich,
Batuhan Osmanoglu, Leung Tsang,
Hans-Peter Marshall, Edward J. Kim, Joel Johnson, Sujay Kumar,
Paul Houser, Dorothy Hall, Martin Perrine,
Mark Raleigh, Michael Goldstein, Mehmet Kurum, James Garrison