

**Report 33: Novel Modeling Techniques in Environment and Health Science**

**Convener:** Wendy Marie Thomas

**Brief History:**

Many terabytes of Earth's health exist at NOAA, NASA, EPA and other agencies. In the continuum of health—from planet, insect, animal, and human—the well-being of each reflects or influences another. This inextricable link of life on this planet drives the need to better merge physical and biological sciences in order to truly promote health. Reaching this level of understanding, however, is currently hampered by the vastly different modeling techniques between the sciences, ultimately creating many disconnects and gaps of knowledge. The next phase of exploration should involve novel modeling methods that merge the parameterized physical world with the non-parameterized biological world.

**Discussion Highlights:**

- Merging data in a thoughtful, strategic way will first require partnerships between agencies and their decision-makers. Steps are needed to erase agency-envy or mistrust, and to replace it with transparency.
- Today's fiscal climate was created from old thinking and actions. It's time to think and do differently. Revolutionizing the nexus point between health and environmental sciences requires new thinking and new actions.
- Recognize that the federal policy framework is *not* currently structured to create a purposeful exchange of information, and that a single agency can initiate a paradigm shift.
- More to the point above, the current policy framework rewards agencies that deliver findings or results, and not necessarily the ones that worked to deliver critical information (e.g., temperature, moisture, toxicant data). Creating a sustainable partnership requires addressing this obstacle to progress.
- NIEHS will need to work with other agencies to identify the areas of data intersection and to work together to develop new modeling techniques, as no one agency holds a monopoly on this knowledge.
- Recognize that human health is also a marker for planetary health, and that NIEHS should take the initiative to open channels of communication to help inform environmental science agencies on the possible implications for Earth (e.g., pollutant loads on aquatic systems, heat/cold stress on agriculture, solar radiation stress on life, etc.).

**Recommendations:** (to be performed in tandem)

- (1)** NIEHS should initiate a new paradigm of cross-agency cooperation that is built on and cultivates a spirit of genuine partnership. To reach this point NIEHS should consider the following:
  - a.** Address Congress and the Administration on the need to reward agencies that funnel key knowledge to NIEHS for research, this step will support be a visible sign of change. Cross-agency advocacy is more effective than other means of informing federal decision-makers.
  - b.** Work with NGO partners in both the health and environment disciplines, as these organizations can repeat the message to agency-leaders on the need and benefit of cooperation.
  - c.** Write MOUs and Cooperation Agreements with other agencies to open the door for information exchange, and use examples where these agreements have worked well in the past.
- (2)** Create focused workshop series (over a year-long period, keep it short and focused to maintain momentum and interest) on the following themes:
  - a.** Exploration of current data/data formats
  - b.** Discussion on data/data formats that are useful to environmental health information
  - c.** Investigate Artificial Intelligence and other data mining techniques that might be helpful in joining the physical and biological sciences
- (3)** Issue joint-agency grants in order to reach a broad audience of talented researchers. (This activity would necessarily connect agency program managers, which also helps strengthen cross-agency collaborations and understanding of data needs).
- (4)** Celebrate successful agency collaborations with letters of appreciation and thanks (as friends would do to acknowledge each other, and thereby deepen and continue the friendship). This step could also support the continuation of cooperation during Administration changes.

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