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A Virtual National Laboratory for Predicting Hurricane Impacts

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The 2005 Atlantic hurricane season was the most active in recorded history. Collectively, the 2005 hurricanes caused more than 2,280 deaths and record damages of over 100 billion dollars. Of the storms that made landfall, Dennis, Emily, Katrina, Rita, and Wilma caused most of the destruction. Accurate predictions of water level, wave height, and inundation can save lives and reduce recovery costs, provided the information gets to emergency responders in a timely manner. The information must be received well in advance of a storm making landfall, so that responders can weigh the costs of unnecessary evacuation (estimated at over 1 million dollars per mile of coastline) against the costs of inadequate preparation. Tracking large storms is already challenging; predicting the impacts days before the storm makes landfall imposes enormous new challenges. This requires an entirely different approach than is usually involved in producing the single best forecast for a specific event. Hazard planning requires an estimate of the uncertainty in the forecast. Calculating such probabilities requires that computer simulations be run not once, but many hundreds or thousands of times—once for each plausible outcome—creating huge computational demands. Add the requirement for real-time observations needed to increase predictive capability and the complexity of the information flow grows to include a wide variety of ocean-based sensor platforms. From ocean-bound sensors to supercomputers to the decision-maker's desk, the predictions must be turned around in a matter of hours if they are to affect decision-making. Scientists from universities across the Southeast are creating a cyberinfrastructure—a virtual and distributed laboratory – that combines the knowledge, data-integration capacity, and computational power necessary for real-time environmental prediction and hazard planning. This vision supports a national, multi-agency initiative called the Integrated Ocean Observing System. For more information on this remarkable partnership, visit <http://scoop.sura.org/>.