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Weather Perceptualized

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Current or future weather is scientifically described by a multitude of observed or modeled parameters. Part of this information is then conveyed to the general public or specialized users either directly, or via a suitably chosen narrative. The objectively available and the received information are different due to the subjective selection of parameters and the verbalization of weather conditions by the provider, and the potential mischaracterization of the data (often described through complicated definitions) or misinterpretation of the narrative by the recipient.

This presentation will explore an alternative approach avoiding some of the limitations of the data or narrative driven approaches to conveying now- and forecast weather conditions. We introduce a raytracing algorithm called Simulated Weather IMagery (SWIM) that makes weather attributes including cloud cover, precipitation, visibility, and surface conditions readily perceptible by visual senses. As observing, Numerical Weather Prediction (NWP modeling and data assimilation - DA), and computing systems undergo vast improvements, we anticipate that high quality and high spatiotemporal resolution gridded NWP analyses fusing observations from all platforms including geostationary satellites will become prevalent. Visualization packages like SWIM can then make such high quality digital analyses and forecasts readily accessible by experts and lay audiences alike.

Such changes bring us to the dawn of NWP-based nowcasting, opening up uncharted opportunities for forecasting and the communication of future weather. Traditionally, visibility, for example, is often measured with the single value of prevailing visibility at observing sites, while forecast visibility is typically described by tunable scalar values at selected sites. In contrast, SWIM can quantitatively assess analyzed or forecast visibility between any two arbitrarily chosen points within the atmosphere that can be graphically conveyed with realistic, photo-quality simulated images. In general, now- and forecast weather, including visibility, clouds, precipitation, and ground surface conditions can be viewed from any vantage point from the surface, in the 3D atmosphere, or above.