DOCKETED	
Docket Number:	19-ERDD-01
Project Title:	Research Idea Exchange
TN #:	248248
Document Title:	Tom DeFelice Comments - Follow-on comments to Staff Workshop on Advancing Precipitation Enhancement discussions
Description:	N/A
Filer:	System
Organization:	Tom DeFelice
Submitter Role:	Public
Submission Date:	12/29/2022 11:07:20 AM
Docketed Date:	12/29/2022

Comment Received From: Tom DeFelice
Submitted On: 12/29/2022
Docket Number: 19-ERDD-01

Follow-on comments to Staff Workshop on Advancing Precipitation Enhancement discussions

Incomplete knowledge of the natural variation of each relevant observed independent or non-derived variables (e.g., see â€œ1)â€ below) contributing to the situation in California and the western US.

Sure, we collectively might have an idea about such, but not sufficiently and certainly not with current technologies. CEC might not be interested in this topic directly, but addressing this gap goes beyond this study and will serve many CEC efforts and beyond. Climate is the average of the weather in space and time. The errors at the smallest process scales contributing to weather are propagated to climate scales, often â€˜cloudingâ€™ the clear distinction among the factors contributing to climate change. Available observations, especially in the western US, are barely made at synoptic scales. We need finer scale observations to address the hundreds of relevant scientific questions for example.
1) Observations of independent variables or non-derived parameters made at the appropriate process-level sampling frequency in space and time. This route has traditionally been overlooked due to cost, primarily. Technology advancements are starting to make their way toward reducing some of the cost. Soliciting help from within California, other state and federal observation networks and organizations can also help reduce such cost. U Wyoming is soon to receive, if not already has, an upgraded Research aircraft which might prove useful, and UCSD has relevant modeling (see "2)"), airborne and ground based observational capabilities and resources. The researchers at UCSD certainly know California well in the areas of interest to the CEC. There may be others, such as county, local and other (western US) state (e.g., NV, AZ) organizations including water districts/watersheds.

What observations, specifically? Start with non-derived variables; meteorological, precip amount, aerosol sizes and their composition (dry air and interstitial), cloud hydrometeor sizes, streamflow, soil moisture and temp, spectral surface reflectance in vicinity of surface obs. Do not include bulk or derived values such as Rainfall or snowfall rates, liquid water content, supercooled water content, radar reflectivity values for this effort. Naturally if they are available in concurrence with the aforementioned, then so be it. We also should be able to get NOAA, USGS, USDA DOE, and National Interagency Fire Center (nifc.gov) organizations, for example, to provide â€˜tokenâ€™ observational support through their national observation networks for example.

These should collectively help reduce the burden of standing up such an observational need. They all have a stake in this and can use the data too to support their organizationâ€™s mission goals. It can be done well within the CEC and State guidelines too. Yes, organizing such and then managing them is a necessary, less than straight-forward consideration but some are available to help in that regard too.

2) Modeling proposals must be included and must have a rigorous observational component, with a plan to convert their developed models to an operational form. Models contain inherent assumptions and parameterizations to accommodate computational throughput and capacity to understand or to simulate a very particular or well-behaved atmospheric situation, for example. Increasing the observation nodal density can improve accuracy of model outputs from WRF through global model, such as GALWEM, scales. There are plenty of examples to support this statement in the literature. I can provide some if needed.
The intent is not to have the models drive the observations nor the representation of the actual or â€˜trueâ€™ situation. They are uniquely biased by their original application, assumptions and software frameworks, engineering and development. Simply models are to simulate this reality, not redefine it. Observations have become the most effective means from which these models can advance to their next level of accuracy. AI/ML routines or additions to weather forecast models will also need such data for training.