I interviewed 3 exports.

Task 1

I would like to briefly provide context regarding my own research.
My study focuses on the use of tree rings in the field of dendrochronology to study past climate conditions. Specifically, I am focused on reconstructing extreme climate events, such as flooding. The purpose of my research is to compare data stored in centuries-old trees to the limited weather and climate data recorded over the past 100 to 150 years. Furthermore, my research aims to uncover the reasons behind climate change and the occurrence of climate extremes, such as floods, in specific times and locations. I think it can hopefully aid in society's preparedness for future events and changes.

Name: Ebrahim Hamidi
Affiliation: PhD candidate at University of Alabama, Department of Civil Engineering
Discipline: Hydrology and Remote Sensing
Ebrahim's research primarily focuses on flood mapping in coastal regions. He employs remote sensing data, hydrological models, and hydrodynamic models to model flood drivers and assess coastal flood components. His work is vital in creating reliable flood forecasts and inundation maps for decision-making.

He focuses on flood mapping in coastal regions. He utilizes remote sensing data, hydrological models, and hydrodynamic models to simulate flood drivers such as river runoff and precipitation. Additionally, he examines coastal flood components and combine the results of remote sensing data with hydrodynamic models to provide reliable flood forecasts for the future. This includes creating flood inundation maps and predicting flood inundation depth. These insights are invaluable for decision-makers in urban planning and disaster preparedness, helping them protect property and make informed decisions regarding future development in flood-prone areas.

Ebrahim's research offers valuable insights that can complement my work in dendrochronology. While my research involves reconstructing historical floods, his expertise in flood mapping and modeling provides a contemporary context. His methods for flood prediction and risk assessment can enhance my understanding of current flood dynamics, helping me correlate historical flood records with modern data, ultimately improving the accuracy and applicability of my dendrochronological studies.

Ebrahim's research contributes significantly to my work by providing a modern framework for flood analysis. His methods for remote sensing data integration and hydrodynamic modeling can aid in validating historical flood events and assessing the reliability of dendrochronological records. By collaborating with Ebrahim, I can incorporate current flood data and models into my research, creating a more comprehensive and accurate picture of flood history in the region.

Task 2

Name: Fatemeh Rezaei
Affiliation: Department of Civil Engineering, University of Alabama
Discipline: Water Resource Management and Engineering
Fatemeh's research encompasses water resource management and engineering, with a particular focus on machine learning-based forecasting models for rainfall and flood prediction in urban areas.

Fatemeh is a Ph.D. student in the Department of Civil Engineering, focusing on water resource management and engineering. Her research revolves around the development of forecasting models, particularly utilizing machine learning and deep learning techniques, for short-term rainfall prediction. She has successfully applied these models to analyze 40 years of rainfall time series data with different time steps. Additionally, she is currently working on applying machine learning to create surrogate models for predicting floods in urban drainage networks, seeking to replace time-intensive hydrological models.

My research capability in dendrochronology and flood history reconstruction can offer valuable historical context to complement Fatemeh's work in urban flood prediction. By analyzing historical flood data and dendrochronological records, I can provide insights into the long-term patterns and trends of flooding in urban areas. This historical perspective can help validate and improve the accuracy of her machine learning models for flood prediction.

Through collaboration, I could contribute by providing historical flood records and dendrochronological data for urban areas. This data could be integrated into her models to enhance their performance and provide a historical context for flood prediction. Additionally, by combining my expertise in flood history with her machine learning models, we could develop more accurate and reliable urban flood forecasting systems, ultimately aiding in better flood preparedness and mitigation efforts. Having access to detailed historical data could significantly improve the accuracy of her models and contribute to more effective urban flood management strategies.

3. Interview with William Paul Miller:

Paul Miller
Service Coordinate Hydrologist
Paul.Miller@noaa.gov

Paul Miller is the Service Coordination Hydrologist at the CBRFC, where he has been for almost 9 years. Prior to joining the CBRFC, he worked for the Bureau of Reclamation in the Boulder Canyon Operations Office for approximately 7 years. He received his Ph.D. in Civil and Environmental Engineering from the University of Nevada Las Vegas, where he studied the impacts of climate change to the Colorado River Basin, in part, through the use of CBRFC hydrologic models and projected temperature and precipitation datasets.

Mahsa:
Could you describe your research or practice within the context of hydrologic forecasting?

William Paul Miller:
I work at the Colorado Basin River Forecast Center, which is part of the National Weather Service. We work with a wide variety of stakeholders to provide short-term (about 10 day) deterministic forecasts over the entire Colorado River Basin and eastern portion of the Great Basin. We also provide seasonal (usually April through July) probabilistic forecasts of volumetric flow over the basin as well. These forecasts have significant impacts to the operation of reservoirs throughout the basin.

Mahsa:
What specific research challenges or goals are you currently working on?

William Paul Miller:
We are constant trying to improve the skill and lead time associated with our forecasts. There are numerous challenges, but incorporating new datasets, particularly with regards to snow coverage and associated snow water equivalent amounts, is important right now. We're also trying to find ways to improve seasonal to sub-seasonal forecast skill. There are a number of other challenges, but those are among the higher priority ones.

Mahsa
Have you encountered any limitations or areas where additional expertise could be beneficial in your work?

William Paul Miller:
Lately, I think have expertise in machine learning and artificial intelligence would be helpful. Database management would also be helpful. It would also help to have folks familiar with distributed modeling.

Mahsa
How do you envision the field of dendrochronology being applied to enhance or support your research or practice?

William Paul Miller:
Dendrochronology is being actively used by the Bureau of Reclamation to identify vulnerabilities in long term reservoir operations. This is good information for us to be aware of in our forecasting paradigm. At our timescales, we don't use dendrochronology information, but it is good to be aware of.

Mahsa
Are you involved in any collaborative projects or initiatives where contributions from someone with expertise in dendrochronology would be valuable?

William Paul Miller:
We don't use dendrochronology explicitly, but the Bureau of Reclamation does, and we work with researchers, particularly at the University of Arizona, who are looking at it.

Mahsa

Could you provide examples of how interdisciplinary collaboration has benefited your work or the field of hydrologic forecasting in general?

William Paul Miller:

We work with policy makers and those without a traditional scientific background all the time. Being able to explain and describe our forecasts so that actionable decisions can be made by a broad audience is essential to what we do. We've worked with social scientists to improve our communications, meteorologists, climatologists, and others in efforts to improve our forecasts.