AQPI System Requirements and Development Process and Possible Outcomes

AGU 100 FALL MEETING

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Introduction

The Advanced Quantitative Precipitation Information System is a collaboration between federal, state, and local agencies to develop and deliver a state-of-the-art system for improved monitoring, prediction and alerting of precipitation events in the San Francisco Bay Area to aid water resource managers in their operational response.

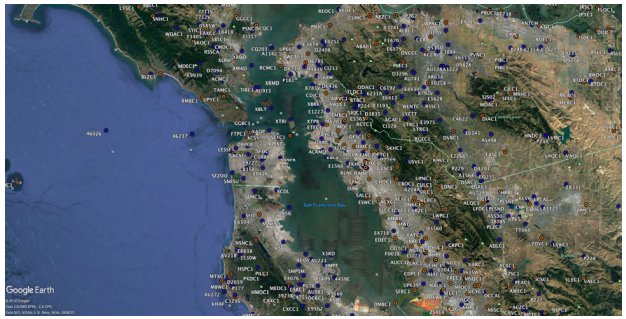
Approach

1. Improved Monitoring
   - Leverage existing networks.
     Poster: "AQPI: California Observing Networks in Support of AQPI and EFREP"
   - Fill gaps in existing networks.
     Poster: "AQPI: California Observing Networks in Support of AQPI and EFREP"
   - Added improved monitoring systems.
     Poster: " AQPI: Radar-Derived Quantitative Precipitation Estimation in Complex Terrain over the San Francisco Bay Area"
   - Improve quality checking of observations.
2. Improved Science
   - Improved monitoring used to initialize models.
   - Improvements to models focused on initialization, SF Bay area orography, and types of precipitation events.
   - Tightly couple atmospheric, watershed, and coastal models.
     Poster: "AQPI: Precipitation forecasts over the San Francisco Bay Area from the High-Resolution Rapid Refresh model during an atmospheric river event on 21-23 Mar 2018"
     Poster: "AQPI: Distributed Hydrologic Modeling for Flood Mitigation"
   - Model improvements compared to current local and national capabilities.
     Poster: "AQPI Integrated Water Management Modeling : Case Studies Using Local Models in the San Francisco Bay Area"
3. Improved delivery
   - Centralized access to observations and model outputs.
   - Automated alerting based on thresholds set by user.
   - Products tailored to meet water agency requirements and directly feed agency applications.
4. Iterative refinement

Rapid prototyping using spiral process of:
- Gather requirements.
- Design
- Develop
- Test
- Evaluate
- Start over with refining requirements

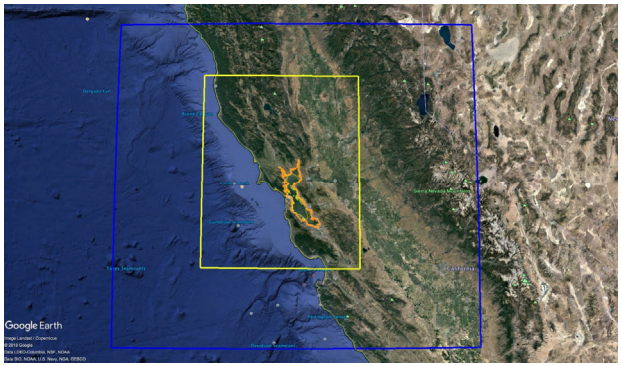
First Steps

Monitoring



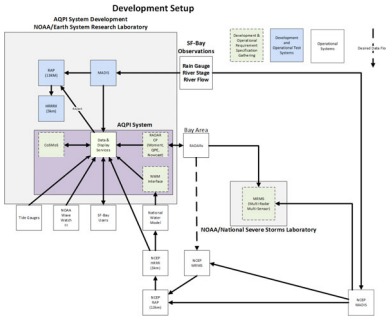
- Leverage the NWS' operational MADIS (Meteorological Assimilation Data Ingest System) for the collection, integration, quality control, and delivery of SF-Bay area in situ observation networks.
- Work with local agencies to determine what monitoring networks are missing.
- Start work on adding missing networks to MADIS.

QPE, Nowcast, and Modeling



- Establish AQPI product domains for QPE, nowcast, and model outputs working with model developers, radar system developers, and AQPI water agency users.
  Orange area is Coastal Storm Modeling System (CoSMoS) output.
  Yellow Rectangle is the QPE and Nowcast output from the new radar systems.
  Blue Rectangle is the Atmospheric model and the National Watershed model output.
- Work with local water agencies on creating, and delivering first AQPI QPE, nowcast, and modeling products to agency applications. Once communications and formats are put in place based on established output domains improvements to QPE, Nowcast, and modeling products can continue to the end of the project without impacting agency applications.
- Start identifying and reducing risks associated with project.
- Work with model developers and radar system developers to establish development environment and operational environment requirements.

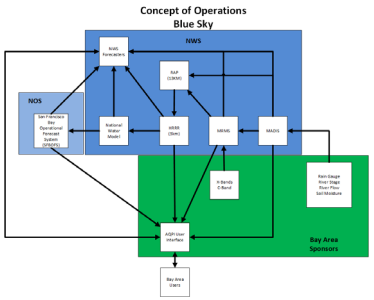
Risk Reduction

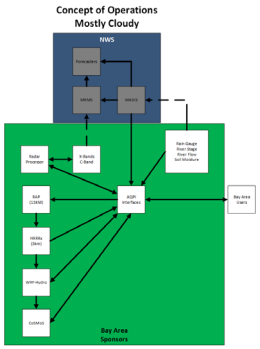


- White boxes are the desired operational components of the AQPI system.
- Blue boxes are components of the AQPI system that are being enhanced by the development team and the enhancements are planned to be transitioned to their operational counter part.
- Green boxes are components of the AQPI system that may not make it to NOAA operations and may need to be operationally maintained by SF-Bay water agencies.
- The black dashed line is the desired data pathway for ensuring the data provided by the 5 additional radars is properly assimilated for the atmospheric models initialization process.
- Risk reduction for the AQPI system is minimizing the green boxes and replacing dashed line data flows with solid line data flows.

- To replace the dashed data flow line with a solid line from the radars to the NCEP MRMS application the AQPI development team and management will be working with MRMS developers at the National Severe Storms Laboratory (NSSL) to show that the radars add value to precipitation products generated by the MRMS system will little cost to NOAA operations.
- The first step with reducing risk for the Coastal Storm Modeling System (CoSMoS) and the Radar Control and Processor system is to get them working and operationally stable as part of the AQPI system. For CoSMoS this will also require getting all required inputs ingested into the AQPI system and formatted correctly for CoSMoS usage.
- Development of the data, display, monitoring, and alerting services will continue to evolve over the life cycle of this project with continued refinements to the system based on the AQPI spiral development process. We will be working with local NWS Weather Forecast Offices and the California/Nevada River Forecast Office to help ensure consistent messaging from the AQPI system and the Forecast Offices.

Possible Operational System Outcomes





We believe that Bay area sponsors should maintain operational control of the radar systems being installed as part of this project and currently any concept of operations between blue sky and mostly cloudy are possible operational scenarios.