WERA 1012

2020 CoCoRaHS IT Update

COLORADO CLIMATE CENTER

ATMOSPHERIC SCIENCE
COLORADO STATE UNIVERSITY

Project Portfolio

Breaking CoCoRaHS down into ‘manageable’ chunks

CoCoRaHS Portfolio

Projects (Have Start and End Dates)

- Azure Migration
- AI for Earth
- Mapping
  - Angular Mapping App
  - Static Mapping
- Modernization Projects
  - Website User Interface Overhaul
  - API Expansion
  - Data Export Improvements
  - Identity Management
  - Mobile App Improvements
- Mailchimp List Metadata Overhaul
- March Madness
- Observer Recruitment & Retention
  - Targeted Facebook Ads
  - Online training events
- Data Schema Improvements
  - Metric Support
  - Internationalization
- Data User Outreach
  - LinkedIn for Non-profits
- Expansion to Mexico?

Products (Tangible Output)

- www.cocorahs.org
- data.cocorahs.org
- api.cocorahs.org
- bulk.cocorahs.org
- cms.cocorahs.org
- maps.cocorahs.org
- Carto Data Sync
- QC Ticketing System
- Mobile Apps
- WERA Microsites
- DevOps Repositories and Pipelines
- Documentation

Operations (Continuous)

- Observer Support
- Data User Support
- Coordinator Outreach
- CoCoSchools
- Blog
- YouTube
- Facebook
- Twitter
- Fundraising
- Product Maintenance

Progress

What’s been done

Progress All components of CoCoRaHS' cyber-infrastructure now support Azure

- Web Applications
  - Updated .NET Framework to latest version of all web applications
  - Added HTTPS and TLS 1.2 support for all web applications
  - Rewrote CMS application to support file management from Azure cloud storage service
  - QC Ticketing system database and web application running in Azure
  - Every web app is now capable of running in Azure
- Database
  - Improved the handling of system times (affected almost all tables)
  - Schema and stored procedure updates to facilitate transfer to Azure
  - Performance improvements
  - Development copy of database working as an Azure SQL Database
- Azure Data Factory Pipelines for bulk data flow tasks
- Azure Logic Apps and Functions for managing automated processes like the Carto data sync and SciStarter integration
- DevOps
  - All projects in private Git repositories
  - DevOps pipelines set up for Continuous Deployment (CD) of development and production web applications to Azure AppServices
- Mapping Application Updates
- AI for Earth Project
- Mailchimp list management and metadata sync

Migration

What’s left to do

Migration What's left to do

Testing

- Internal testing
- External testing

Go Live Event

- Planned for June
- Minimize downtime, will require 2-3 hours of downtime, mostly for the database transfer

After Go Live Event

- Fix any problems that arise
- Monitor application usage
- Change resource allocation based on application usage

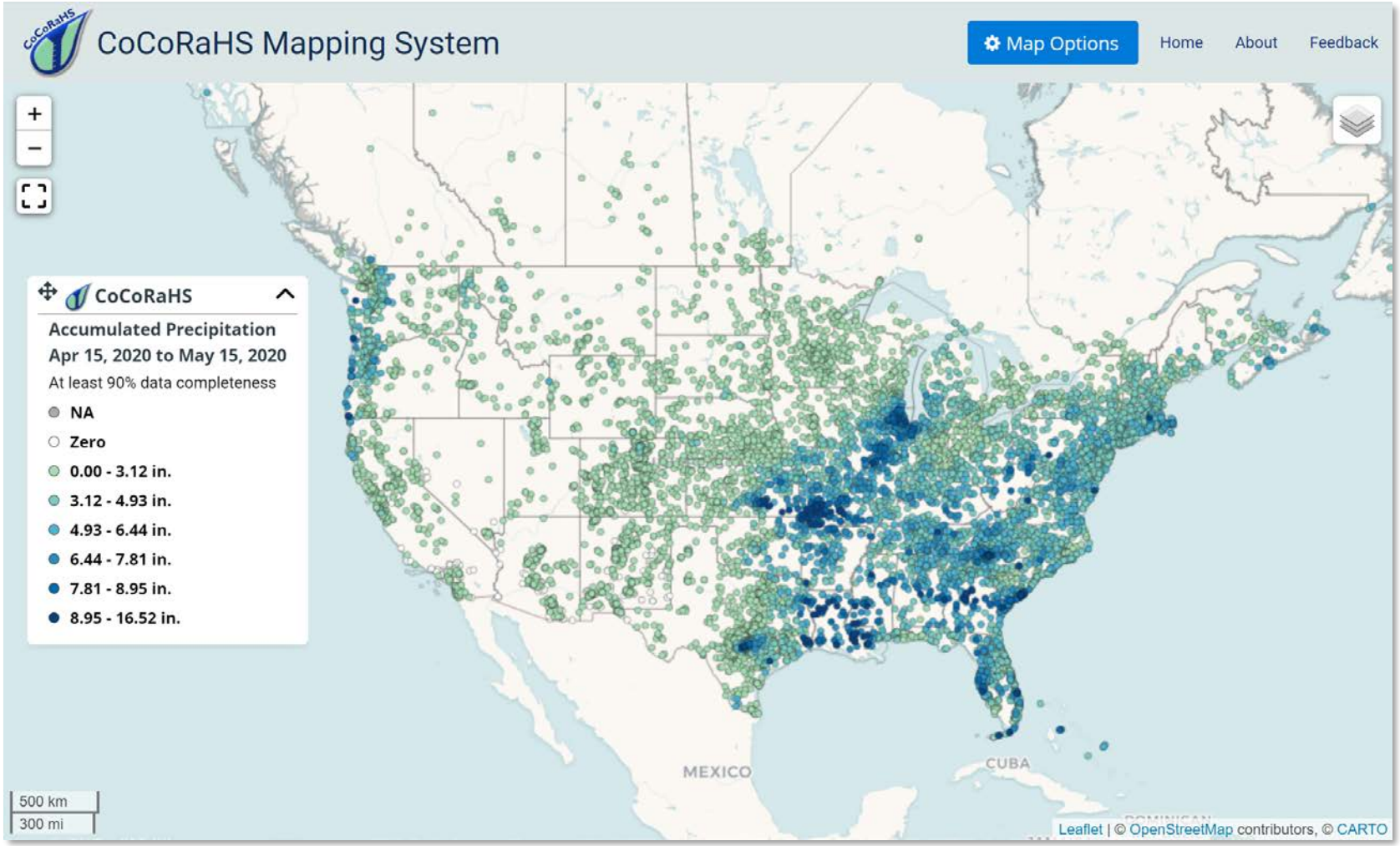
Mapping

Where in the world is CoCoRaHS mapping?

(hint: it’s at maps.cocorahs.org)

Mapping

Updates to the Carto Mapping App



- Updated to Angular 9
- Support for all 50 million+ daily precipitation reports while maintaining performance
- Myriad bug fixes and feature enhancements
- Improved user experience (UX) on mobile devices
- Updated data sync app to improve performance and reliability
- Increased browser support
- Ready for release to coordinators and then the public

AI for Earth

Microsoft support of CoCoRaHS data analysis and IT operations

Microsoft AI for Earth Grant Update

Exploratory Data Analysis and Machine Learning Platform Development

Daily Precipitation Reports

- Understanding weather terms used in notes.
- Application of unsupervised learning models, LDA and K-Means Clustering, to develop topic models on the notes collection.
- Topic visualization, distribution and interpretability.
- Using topic models to tag or categorize new notes.
- Prototyped an approach to extract hail size and hail duration from notes.

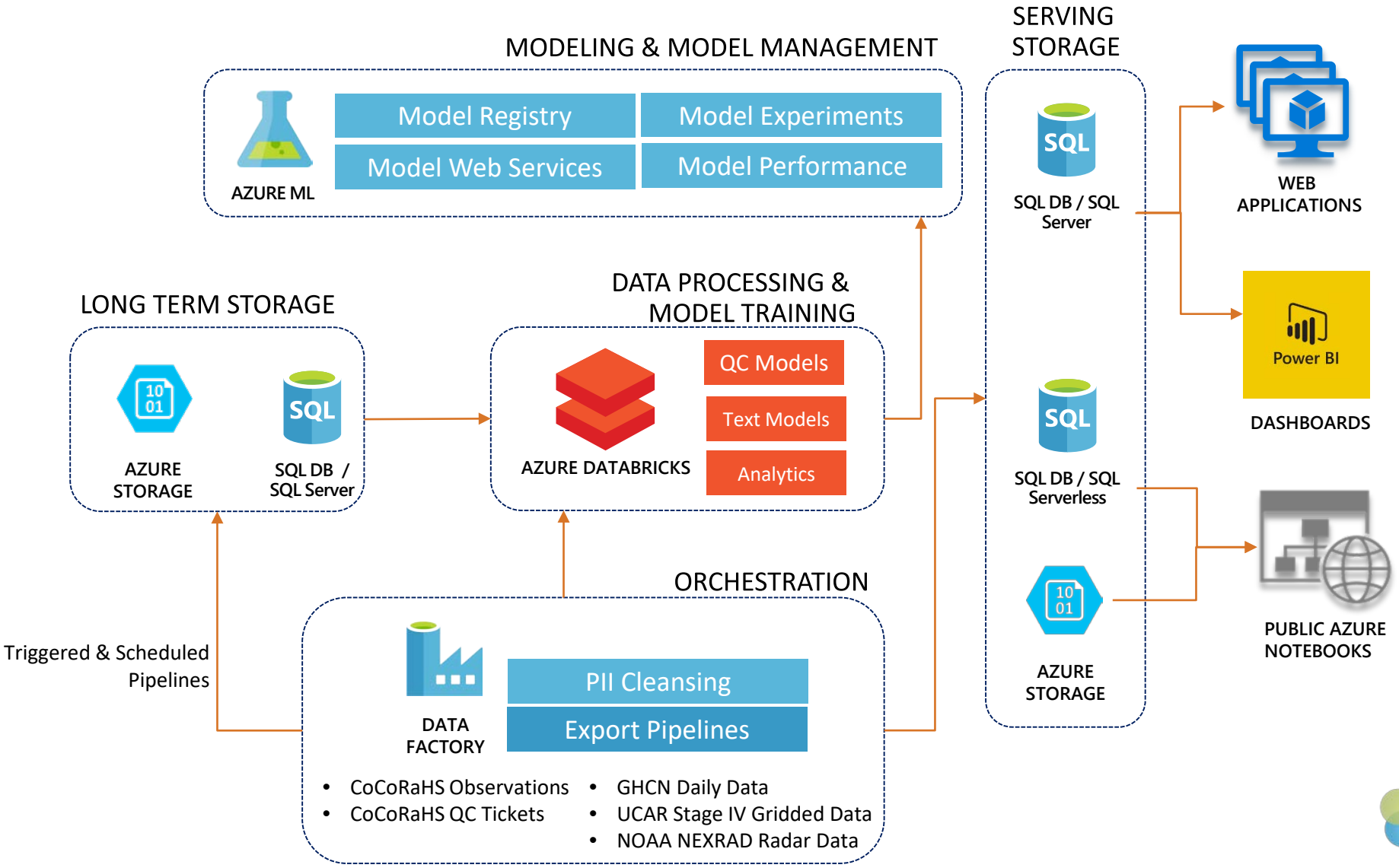
Condition Monitoring Reports

- Developed topic model for the descriptions in the report.
- Understanding relationship between topics and corresponding Scale Bar values.
- Recommended an approach to develop supervised model to flag discrepancies between provided descriptions and Scale Bar values.
- Developed analysis and visualizations in python notebooks to understand extreme weather conditions using time and geography dimensions.

Visualizations - All visualizations developed in python notebooks

- Word cloud
- Box and whisker plot
- Heat map
- Map – state and county Level

Internal architecture to support next generation QC processes, NLP based analytics and public export at scale



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Microsoft AI for Earth Grant Update

Next Steps

- The AI for Earth Grant has been renewed for another year with the possibility of further renewals
- CoCoRaHS has received permission to extend the scope of the grant to include operational hosting expenses
- Solliance will continue to support CoCoRaHS in developing our machine learning capacity and integrating successful models and analysis products into daily operations

Project Profile:
https://ai4edatasetspublicassets.blob.core.windows.net/grantee-profiles/Colorado%20State%20University_Climate%20Change_US_AI4E%20Grantee%20Profile.pdf

Roadmap

Where do we go from here?

Roadmap After migration and mapping comes modernization

- Too much to do at one time, we need to prioritize
- Website UI Modernization
- Data export and API expansion and improvement
  - Add JSON support
  - Make all data analysis products available as
  - Add all observation protocols to API to support mobile app improvements
- Rebuild the QC Ticketing System to be fully integrated into the CoCoRaHS database
- Rebuild the static mapping to match the Carto maps look and feel
- Identity management
- Improved mobile applications
- Improve requirements documentation
- Improve cyber-infrastructure documentation
- AI for Earth improvements and integration into daily operations
- Expand data analysis and visualization offerings
- Improve metric and internationalization support
- Expand to Mexico?
- Some of the more visible improvements are dependent on less visible foundational improvements such as the database, API, and identity management

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Thank you

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