

Time Series Support for Flood Forecasting

Matt Ables - Esri GIS Hydro Meeting 2019

Time Series Support for Flood Forecasting

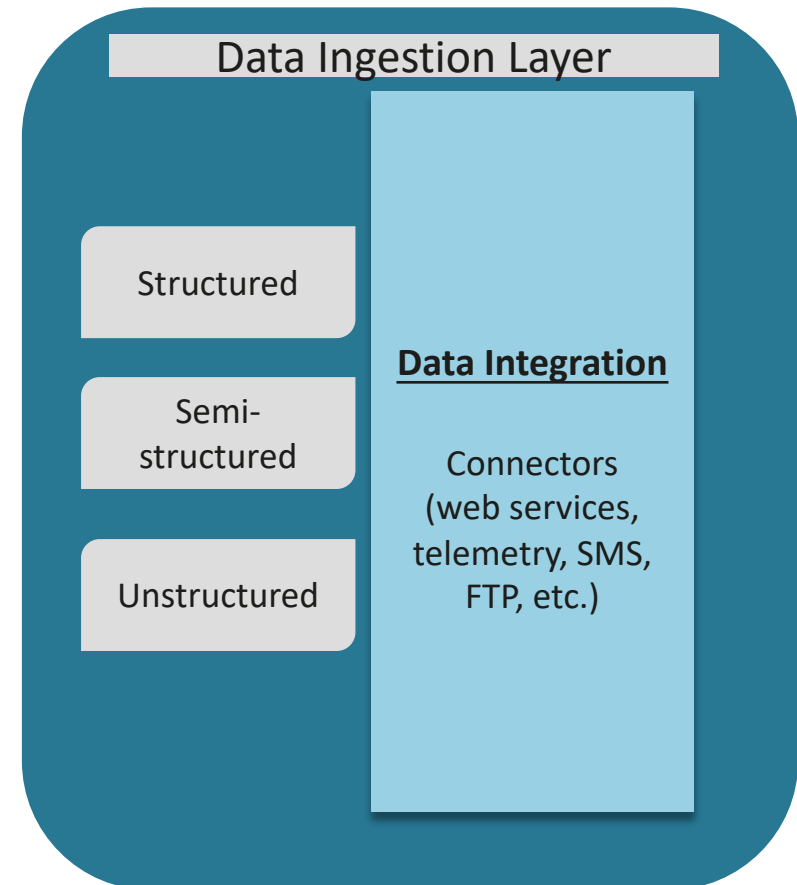


Time Series Support for Flood Forecasting



Collect data from all available sources – Building the Data Lake

- Build on and use work done by CUAHSI and OGC
- Build collectors / importers based on most common formats and protocols.
- e.g. HTTP, FTP, web services, telemetry, SMS, IP, SCADA, NetCDF, etc.
- Quickly and reliably send data to the storage layer or catalog.

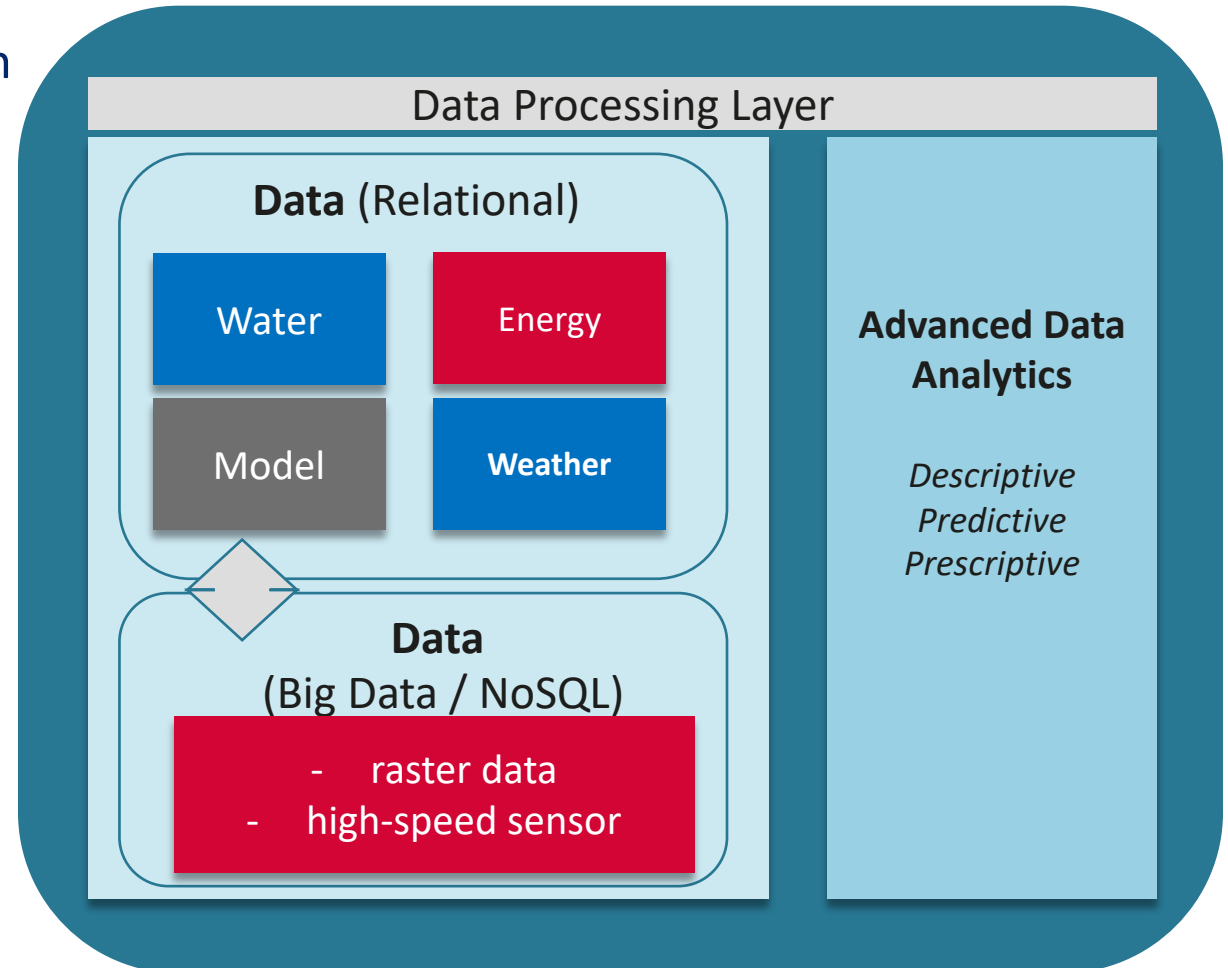


Time Series Support for Flood Forecasting



Automated Plausibility Checks and Data Validation

- Basic Checks Include:
 - Gap detection and filling, threshold exceedance, rate of change, spike removal.
- Intermediate Checks Include:
 - Spatial comparison, trend analysis, user defined checks and algorithms.
- Advanced Checks Include:
 - Gage adjusted radar precipitation
 - Pattern recognition and machine learning
 - Broad spectrum of methods (ANN, ALN, ARIMAX, Kalman,)

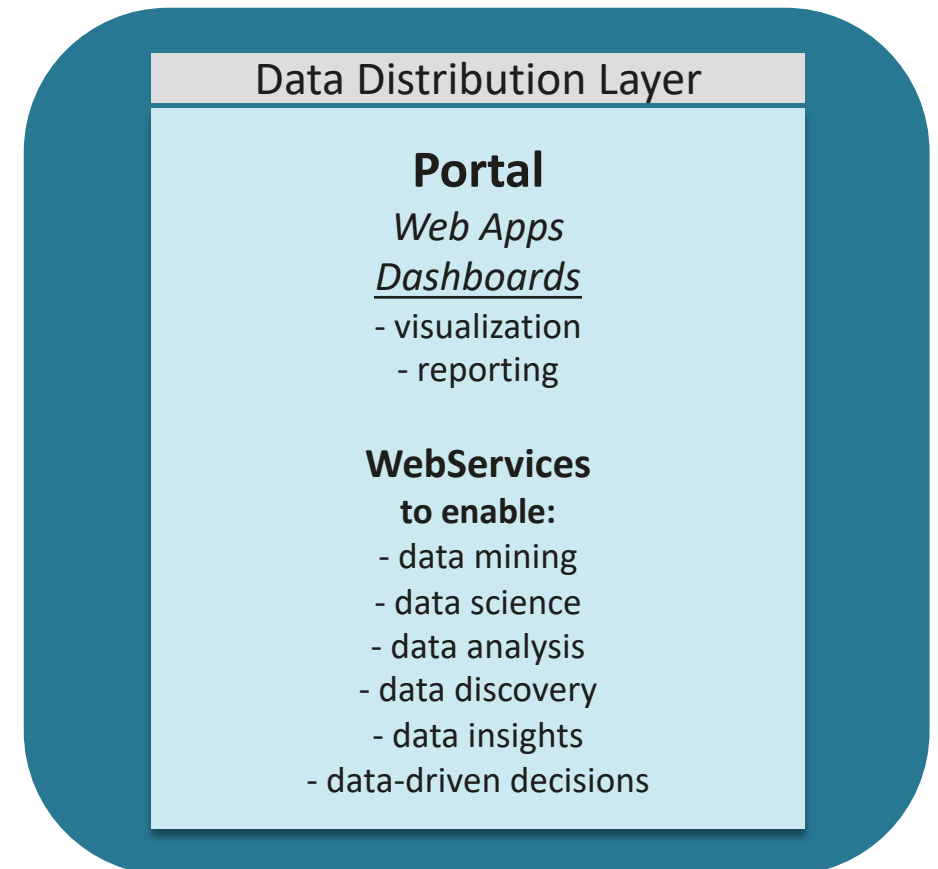


Time Series Support for Flood Forecasting



Publish data to internal and external users

- Internal Users Include:
 - Operations, Scientists, Management
 - Models and Forecasters
- External Users Include:
 - Public
 - Consultants
 - Other Agencies
 - Models and Forecasters

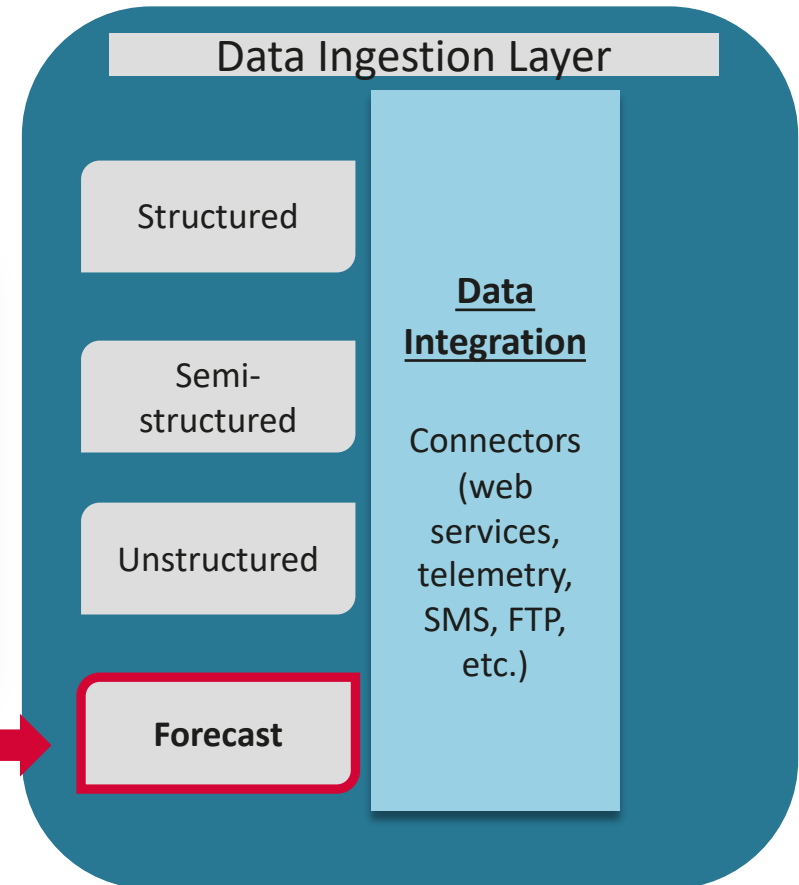
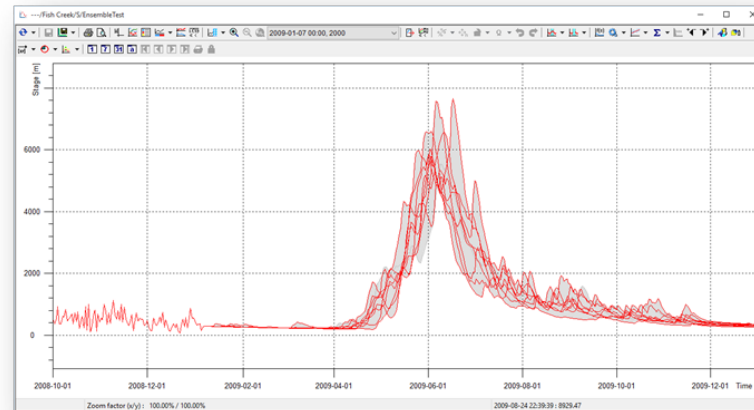


Time Series Support for Flood Forecasting



Provide a stable data source and destination for all models

- Model Input:
 - Web and REST Services
 - Text Files
 - ODBC
 - WML2
 - Raster
- Model Output
 - Web and REST Services
 - Text Files
 - ODBC
 - WML2
 - Raster

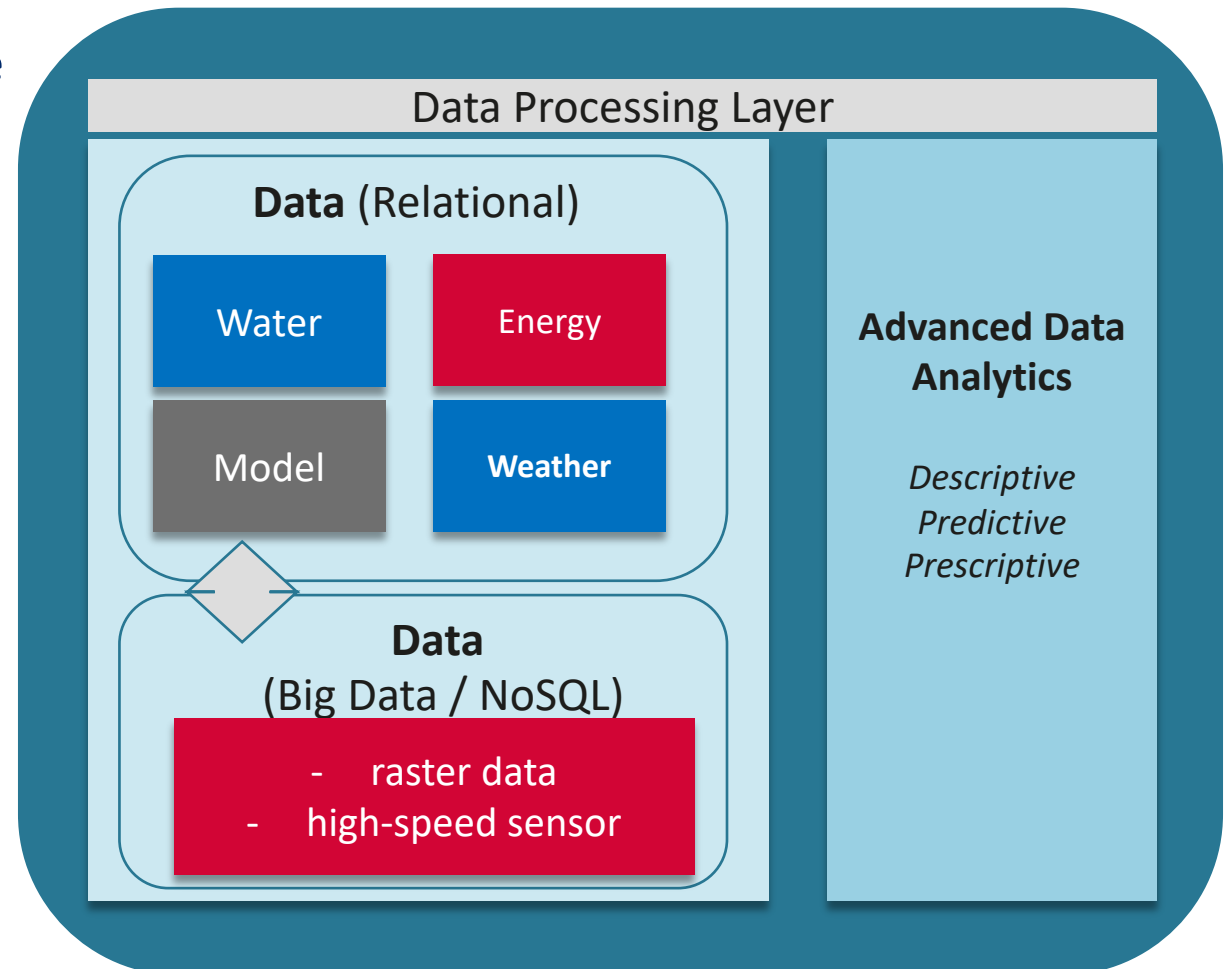


Time Series Support for Flood Forecasting



Evaluate the Model Results with the Same Engine as Sensor Data

- Basic Checks Include:
 - Agreement with gage / sensor data.
- Intermediate Checks Include:
 - Spatial comparison, trend analysis, user defined checks and algorithms.
- Advanced Checks Include:
 - Gage Adjusted Radar Precipitation
 - Pattern recognition and machine learning
 - Broad spectrum of methods (ANN, ALN, ARIMAX, Kalman, ...)

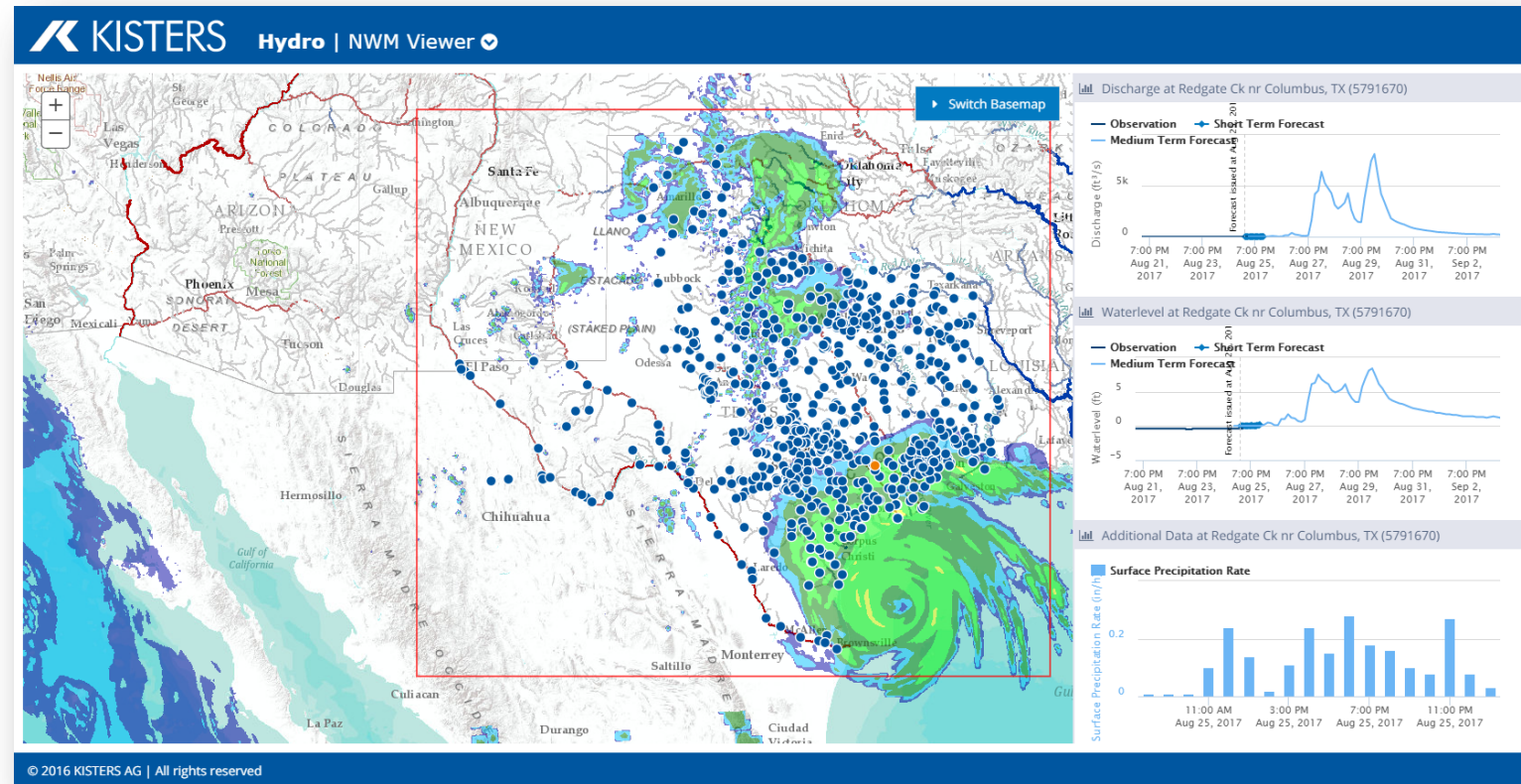


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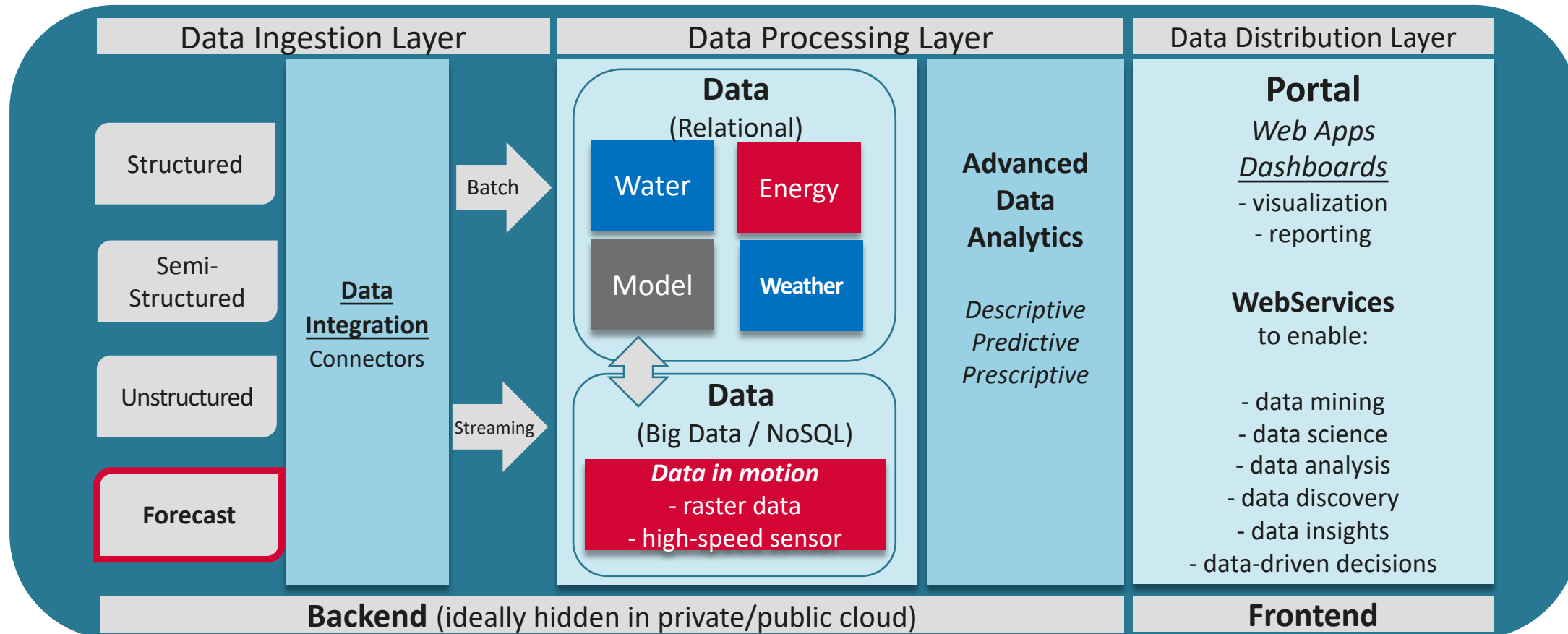


Provide Notifications, Alarms, and Qualified Results to the Decision Makers

- Web Portals
- Dashboards
- Email / Text
- Web Services
- Standard Reports
- Etc.



Time Series Support for Flood Forecasting



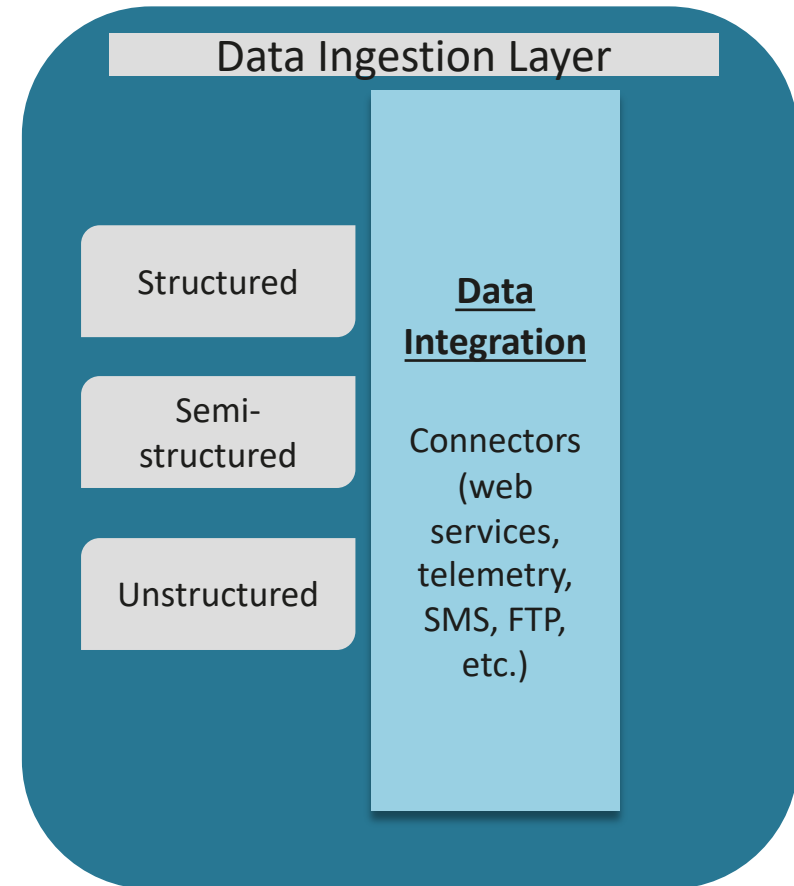
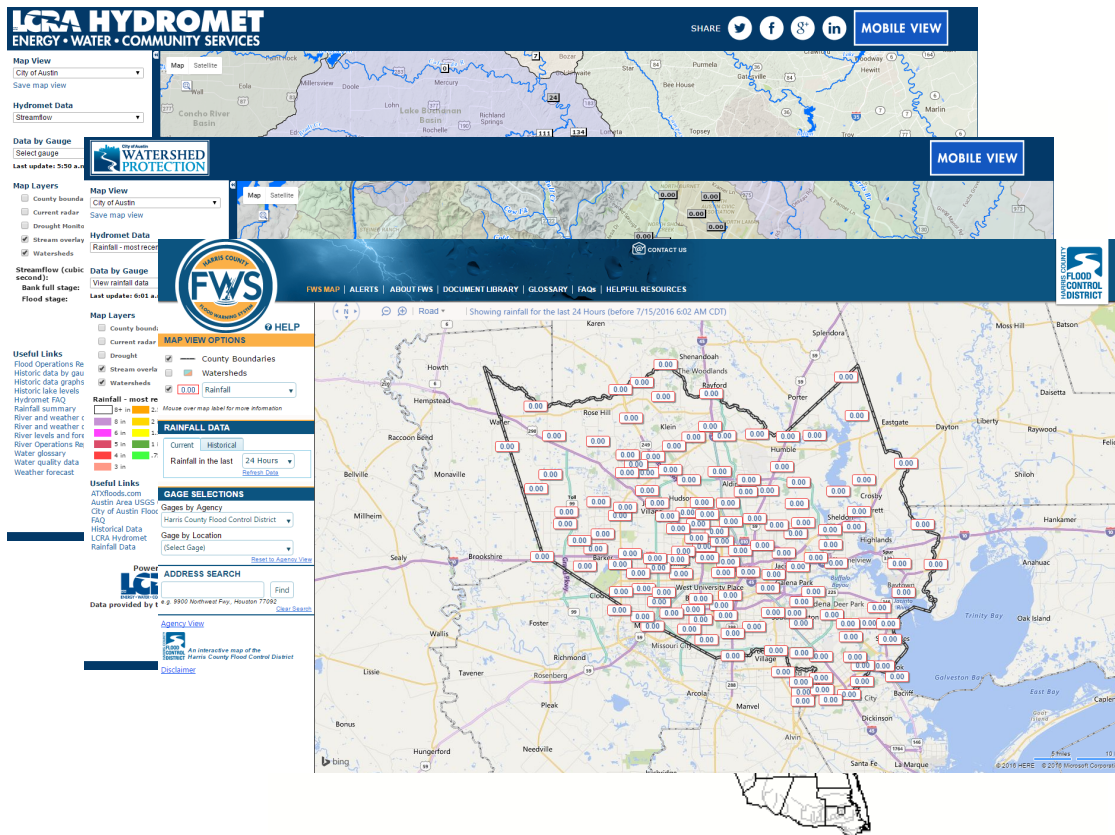
The Process in Action: Texas Case Study



Time Series Support for Flood Forecasting



Collect data from all available sources – Building the Data Lake



Time Series Support for Flood Forecasting



Collect data from all available sources – Building the Data Lake

Process Analytics Dashboard

Overview | Messages | Daily Overview | KPI (demo)

Daily Overview

00:00 - 01:00	01:00 - 02:00	02:00 - 03:00	03:00 - 04:00	04:00 - 05:00	05:00 - 06:00	06:00 - 07:00	07:00 - 08:00	08:00 - 09:00	09:00 - 10:00
72	72	72	72	36	72	72	72	36	72
0	0	0	0	0	0	0	0	0	0
2.888	3.480	3.480	3.480	2.480	2.740	3.480	3.480	2.329	2.888
72	72	72	72	36	72	72	72	36	72

Task Summary

1 Timeseries | 0 Retries

Task Duration Time: 05:47 min

Task Duration Time by Component:

- KIDSM: FetchData: 00:03
- kirolling: FileExporter-Optimi...: 00:00
- KIDSM,kiolosys: Import: 00:47

Process Chain

Time	Host	Component	Action	Process ID	Message
09.09.2018 23:55:11.703	vm-w7...	KIDSM.Transfe...	detect	040fae0ca594...	'REXCHANGE_S_0233008_R15-2018-09-09_23-54-10.zrxp' found.
09.09.2018 23:55:15.233	vm-w7...	KIDSM.Transfe...	move	040fae0ca594...	'REXCHANGE_S_0233008_R15-2018-09-09_23-54-10.zrxp' was transmitted successfully to 'OptimizerIn'.
09.09.2018 23:55:15.233	vm-w7...	KIDSM.Transfe...	delete	040fae0ca594...	Deleting 'REXCHANGE_S_0233008_R15-2018-09-09_23-54-10.zrxp'.
10.09.2018 00:00:01.119	vm-w7...	kirolling	optimize	FileExporter...	#REXCHANGES_0233008_R15* RINVAL-777* ZRXPCREATORWskiPlotMap *
10.09.2018 00:00:11.352	vm-w7...	KIDSM.Transfe...	detect	e8a3a6051dd...	'REXCHANGE_S_0233008_R15-2018-09-10_00-00-01.zrxp' found.
10.09.2018 00:00:57.206	vm-w7...	KIDSM.Transfe...	kiolosys	e8a3a6051dd...	Starting Import of File REXCHANGE_S_0233008_R15-2018-09-10_00-00-01.zrxp into KIOSys.
10.09.2018 00:00:57.350	vm-w7...	KIOSys.IMPORT	IMPORT	e8a3a6051dd...	Import of file 'REXCHANGE_S_0233008_R15-2018-09-10_00-00-01.zrxp' with format 'ZRXp time series exchange format' (type: 'ZRXpV2R2') started.
10.09.2018 00:00:57.352	vm-w7...	KIOSys.IMPORT	IMPORT	e8a3a6051dd...	Processing of data record 1 started.
10.09.2018 00:00:57.638	vm-w7...	KIOSys.IMPORT	IMPORT	e8a3a6051dd...	To write the data, the configuration from the time series import agent will be used.
10.09.2018 00:00:57.638	vm-w7...	KIOSys.IMPORT	IMPORT	e8a3a6051dd...	Writing data of time series "/MO156/2_008/Q/15m.Cmd.SKOriginal" into KITSM.
10.09.2018 00:00:57.638	vm-w7...	KIOSys.IMPORT	IMPORT	e8a3a6051dd...	Time series "/MO156/2_008/Q/15m.Cmd.SKOriginal" found using import number "S_0233008_R15" of import agent.
10.09.2018 00:00:57.638	vm-w7...	KIOSys.IMPORT	IMPORT	e8a3a6051dd...	The ZRXp header does not contain the time zone information. The assumed time zone will be taken from the target time series.
10.09.2018 00:00:58.277	vm-w7...	KIOSys.IMPORT	IMPORT	e8a3a6051dd...	2 values from "2018-09-09 21:15:00 GMT" to "2018-09-09 21:30:00 GMT" successfully written into the KITSM time series "/MO156/2_008/Q/15m.Cmd.SKOriginal".

Task Summary

Status: ok

Timeseries: /MO156/2_008/Q/15m.Cmd.SKOriginal

Import number: S_0233008_R15

Timeseries written: 1

Values written: 2

No Timeseries found: 0

Ts checkout errors: 0

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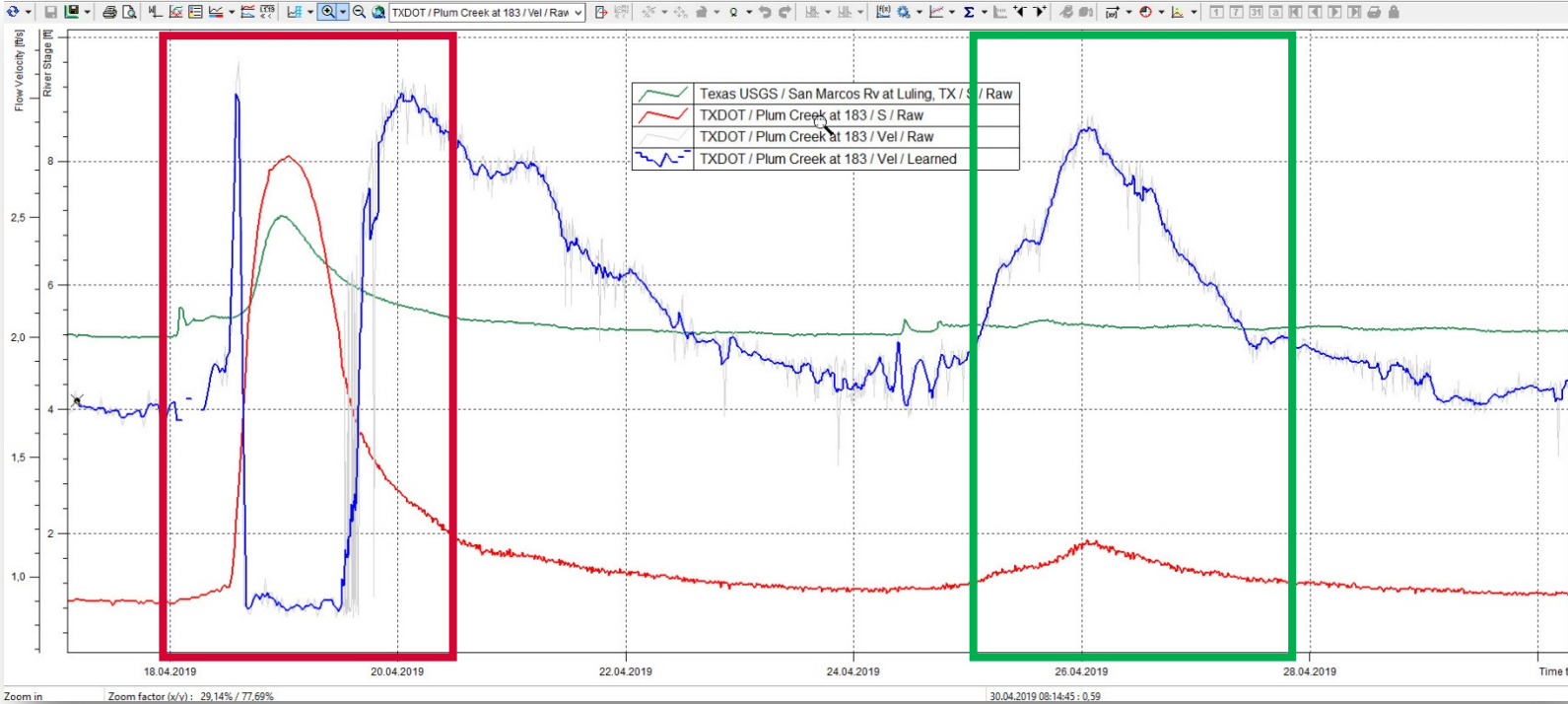
Automated Plausibility Checks and Data Validation

Score	Station Name	Station ID	Incident	Options
Fail	Wachenheim	5062	Spatial com...	
Fail	Ellerstadt	5098	Spatial com...	
Doubtful	Freinsheim	5077	Spatial com...	
Good	Hüttgeswasen	25414210		
Good	Entenpfuhl	25454215		
Good	Sprendlingen	25494706		
Good	Liebenscheid	2584400000	Spatial com...	
Good	Körperich-G...	26274315	Spatial com...	
Good	Kirchweiler	26634108		
Good	Hersdorf-We...	26654100		
Good	Maroth	2716413500		
Good	Neustadt	5001		
Good	Mainz-Marie...	5002		
Good	Rommershei...	5003		

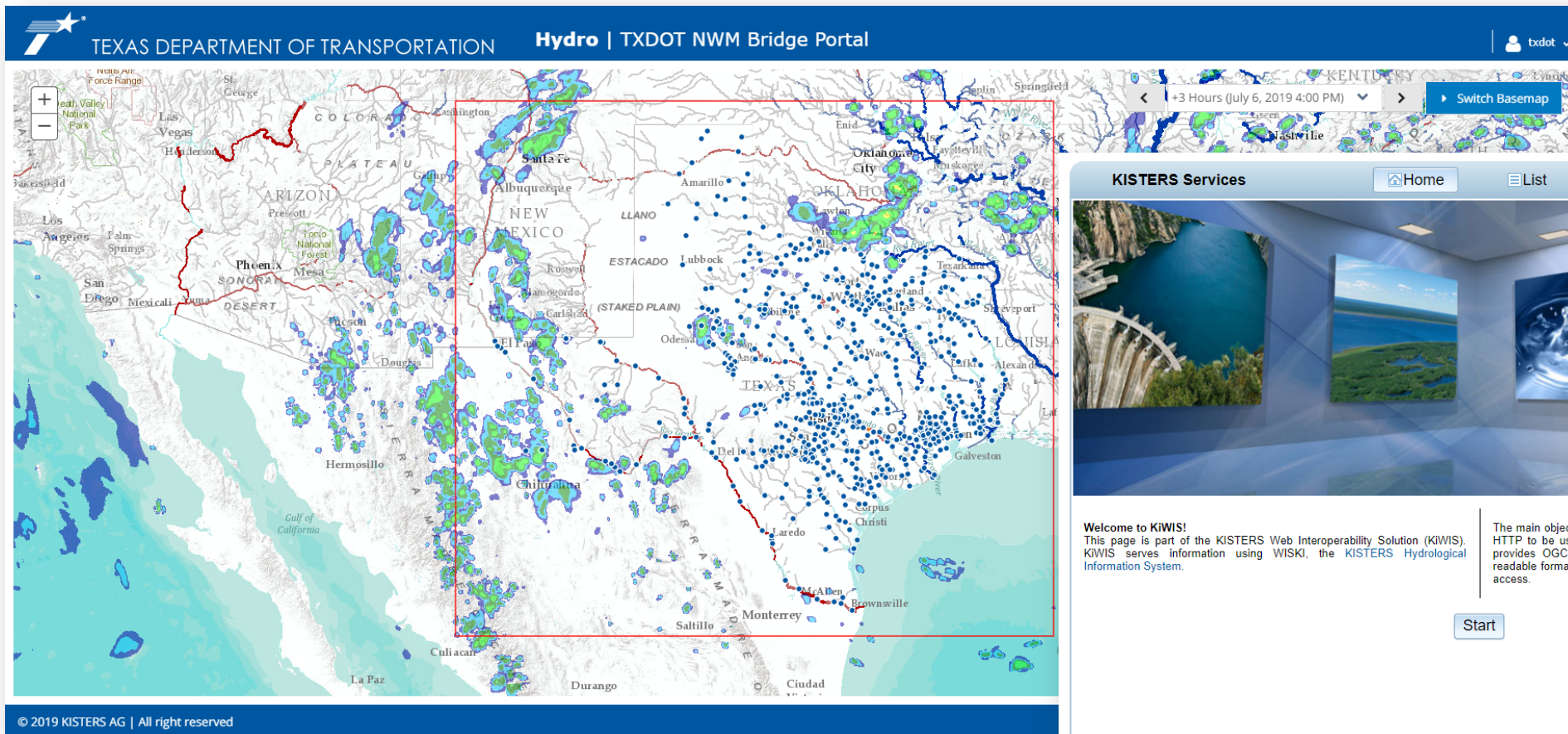
Time Series Support for Flood Forecasting



Automated Plausibility Checks and Data Validation



Time Series Support for Flood Forecasting



KISTERS Services Home List Gallery Search

Welcome to KIWIS!
This page is part of the KISTERS Web Interoperability Solution (KIWIS). KIWIS serves information using WISKI, the KISTERS Hydrological Information System.

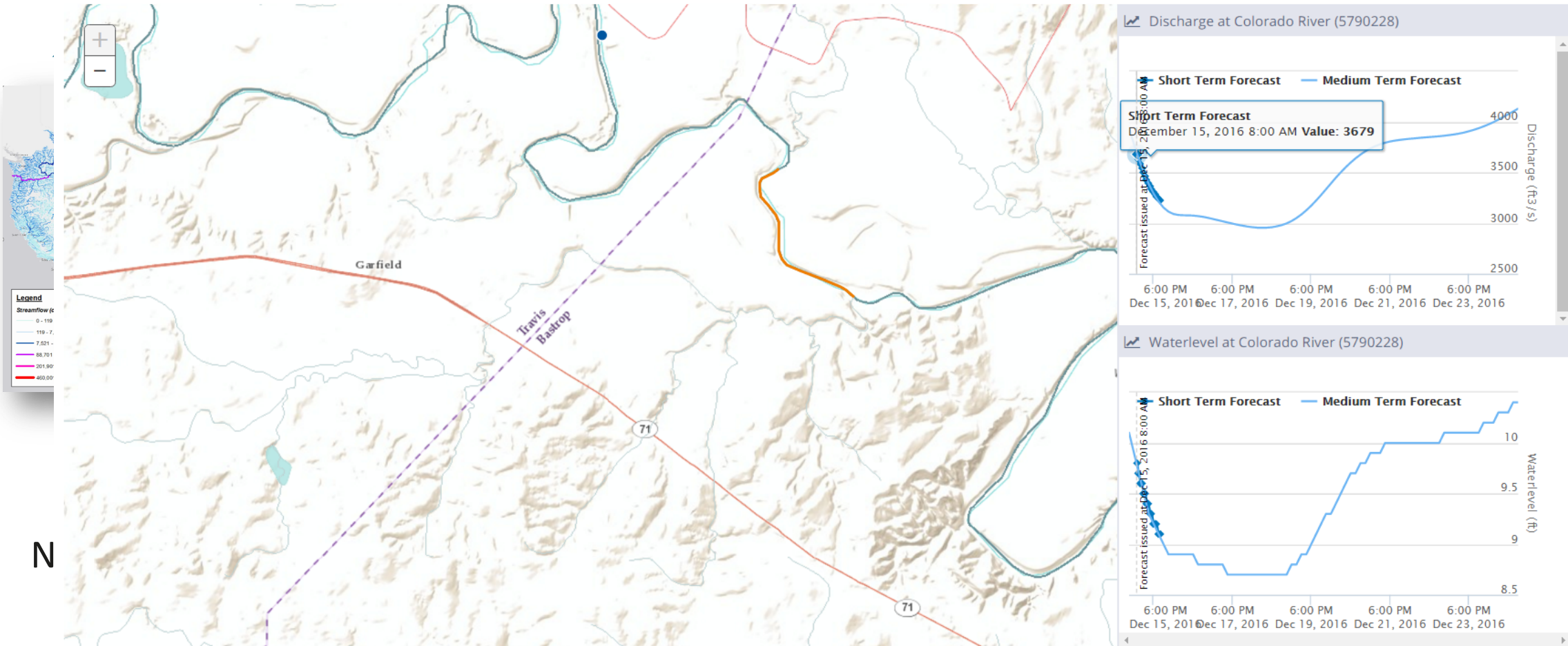
The main objective of this web service solution is to provide API options via HTTP to be used by client programs. Next to KISTERS query services it provides OGC services as well as CUAHSI WaterOneFlow or ArcGIS-readable formats - all based on one publishing mechanism and user based access.

Start

KISTERS

KISTERS Homepage

Time Series Support for Flood Forecasting

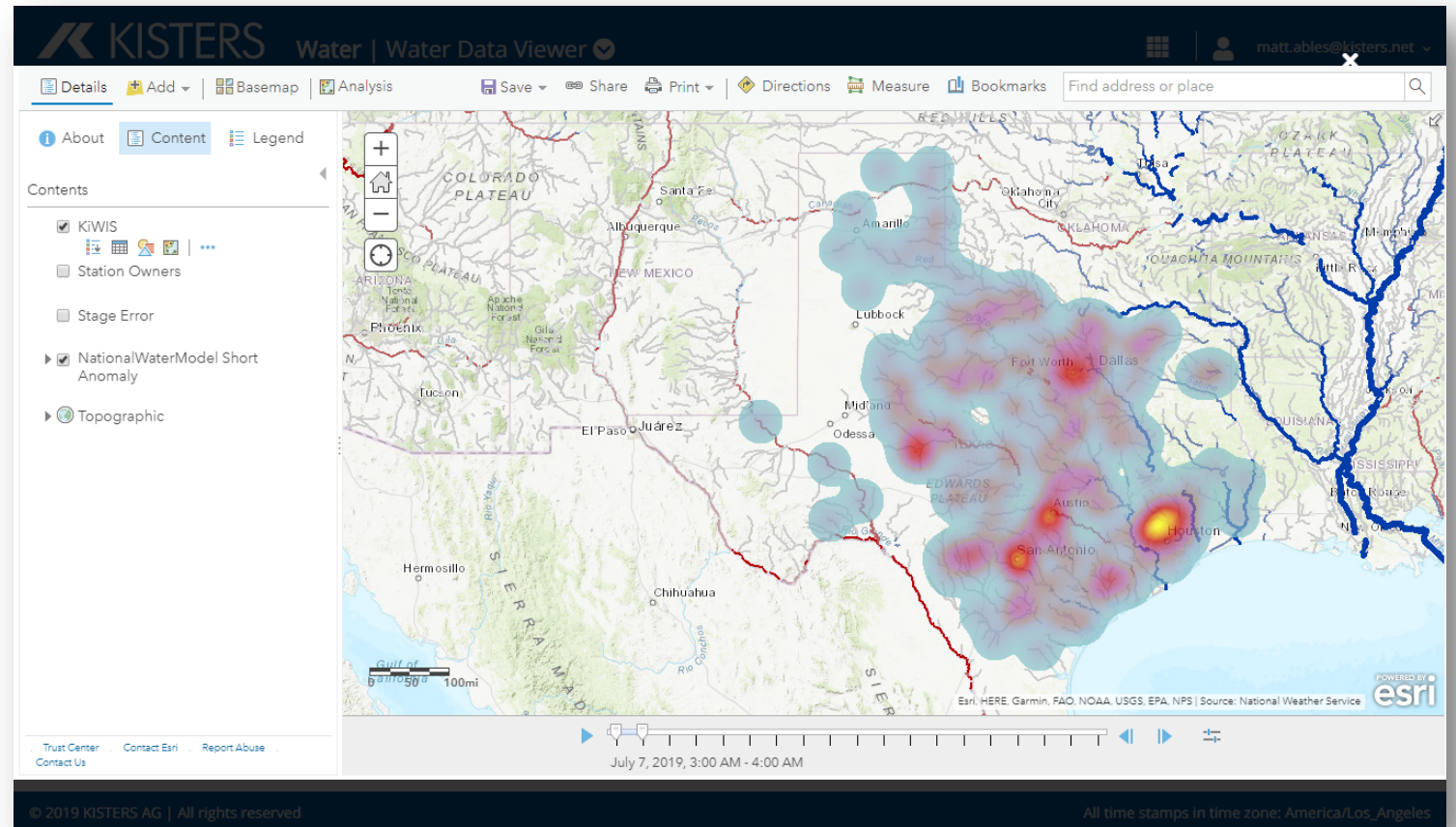


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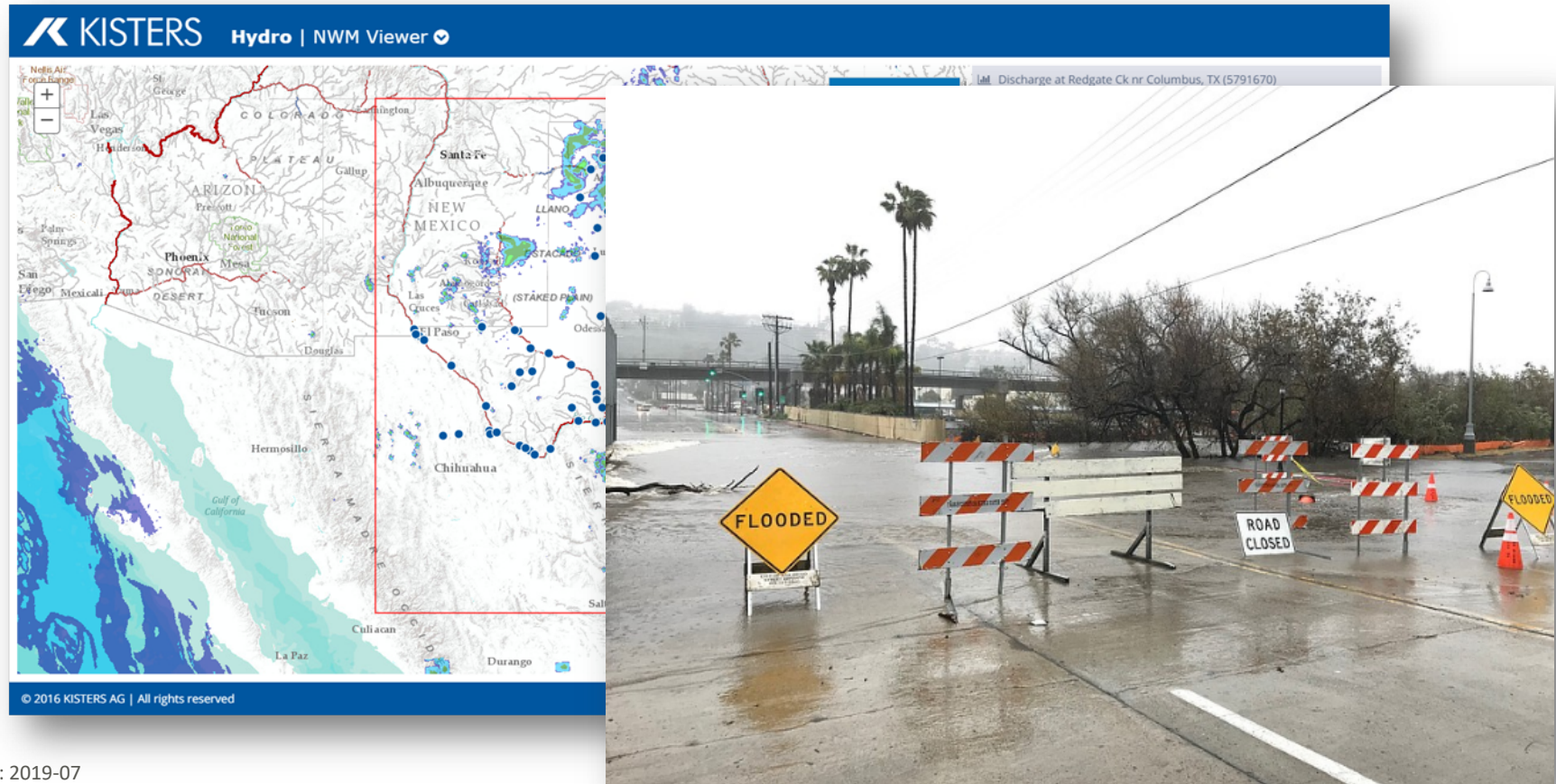


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