SAPPHIRE Central Asia

Building Smart Bridges between Devices and Institutions for more Effective Water Monitoring

Tobias Siegfried, hydrosolutions GmbH, 02. Feb. 2023

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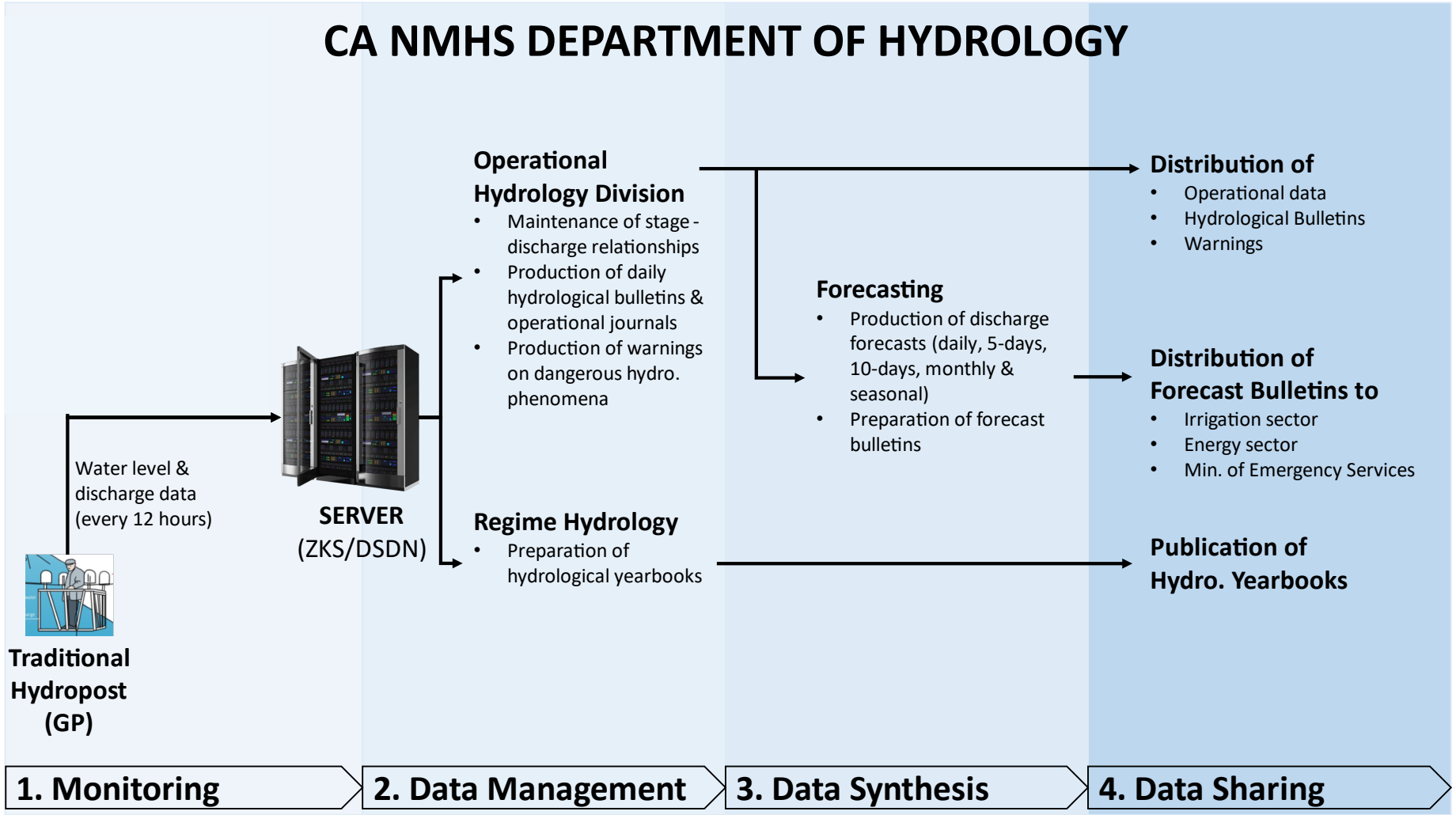
Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development and Cooperation SDC

Traditional Data Acquisition and Workflows in Hydrology

Central Asia Hydromet Hydrology Divisions



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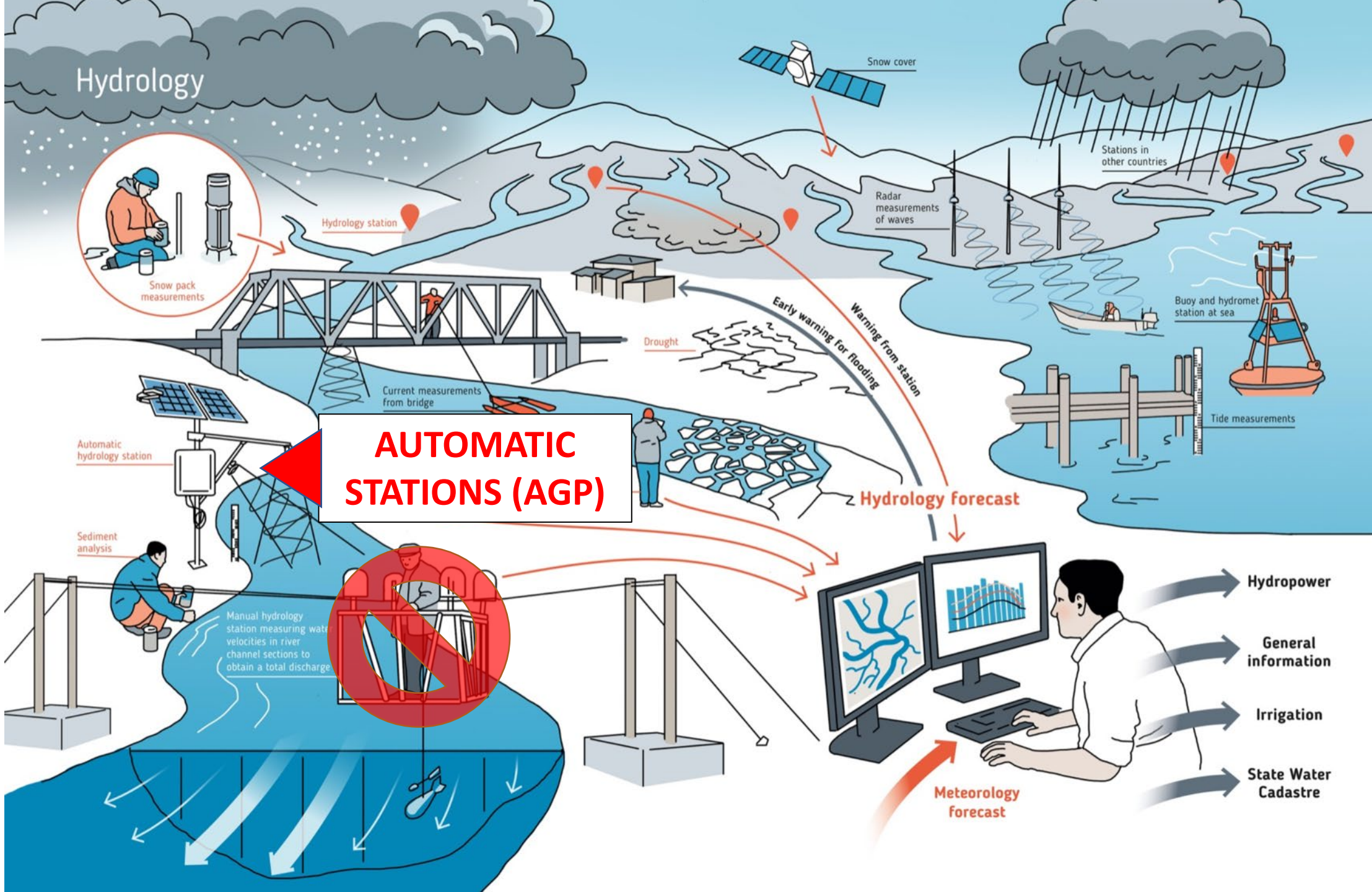
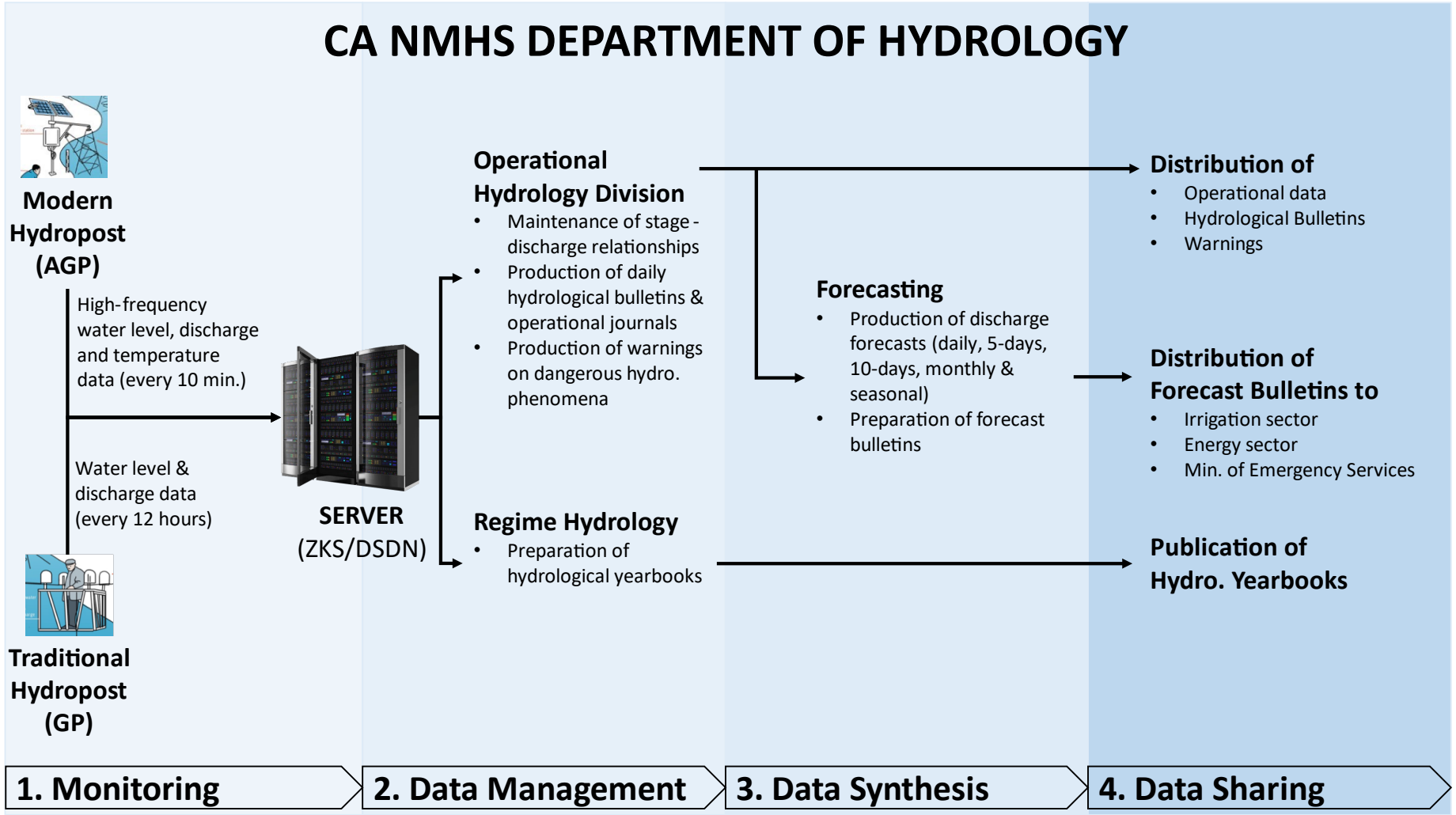
Gradual Modernization of Observations



Sample AGP
Ala Archa, KYG

- Fully automatic station, sending observations every 10 minutes to a dedicated web portal
- Water level, discharge, accumulated discharge, water quality parameters (T, pH, conductivity, …)

Central Asia Hydromet Hydrology Divisions



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Coming Data Flood

> 200 times more data coming from new stations as compared to manual stations

High-Frequency Data not Used

	# GP*	# AGP**	# AGP / # GP**	# AGP in *actual* use**
KAZ	310	42	14 %	**0**
KGZ	78	3	4 %	**0**
TJK	96	12	13 %	**0**
UZB	132	2	2 %	**0**
TOT	**616**	**59**	**10 %**	**0**

* Data Source GidroPosts (GP): GFDRR & The World Bank

** Data Source Automated GidroPosts (AGP): Workshop discussion with all HM representatives, 25/05/2022

 # GP: Total number of operational gauging stations, # AGP: Number of modernized stations

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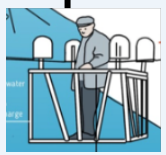
CA NMHS DEPARTMENT OF HYDROLOGY

Modern Hydropost (AGP)

High-frequency water level, discharge and temperature data (every 10 min.)

Water level & discharge data (every 12 hours)



Traditional Hydropost (GP)

SERVER (ZKS/DSDN)

Break point

Operational Hydrology

- Maintenance of stage-discharge relationships
- Production of daily hydrological bulletins & operational journals
- Production of warnings on dangerous hydro. phenomena

Regime Hydrology

- Preparation of hydrological yearbooks

Forecasting

- Production of discharge forecasts (daily, 5-days, 10-days, monthly & seasonal)
- Preparation of forecast bulletins

Distribution of

- Operational data
- Hydrological Bulletins
- Warnings

Distribution of Forecast Bulletins to

- Irrigation sector
- Energy sector
- Min. of Emergency Services

Publication of Hydro. Yearbooks

1. Monitoring | **2. Data Management** | **3. Data Synthesis** | **4. Data Sharing**

Problem #1

- High-frequency data from the growing number of modern hydrological stations are *not* used in the NMHS for the production of hydrological bulletins and operational journals
  - Lacking in-house methodological guidelines specifying temporal aggregation methods for high-frequency data
  - No quality controlling of high-frequency data from modern hydrological observation stations
  - Lacking technical capacity to manage and process high-frequency data in the operational hydrology workflows

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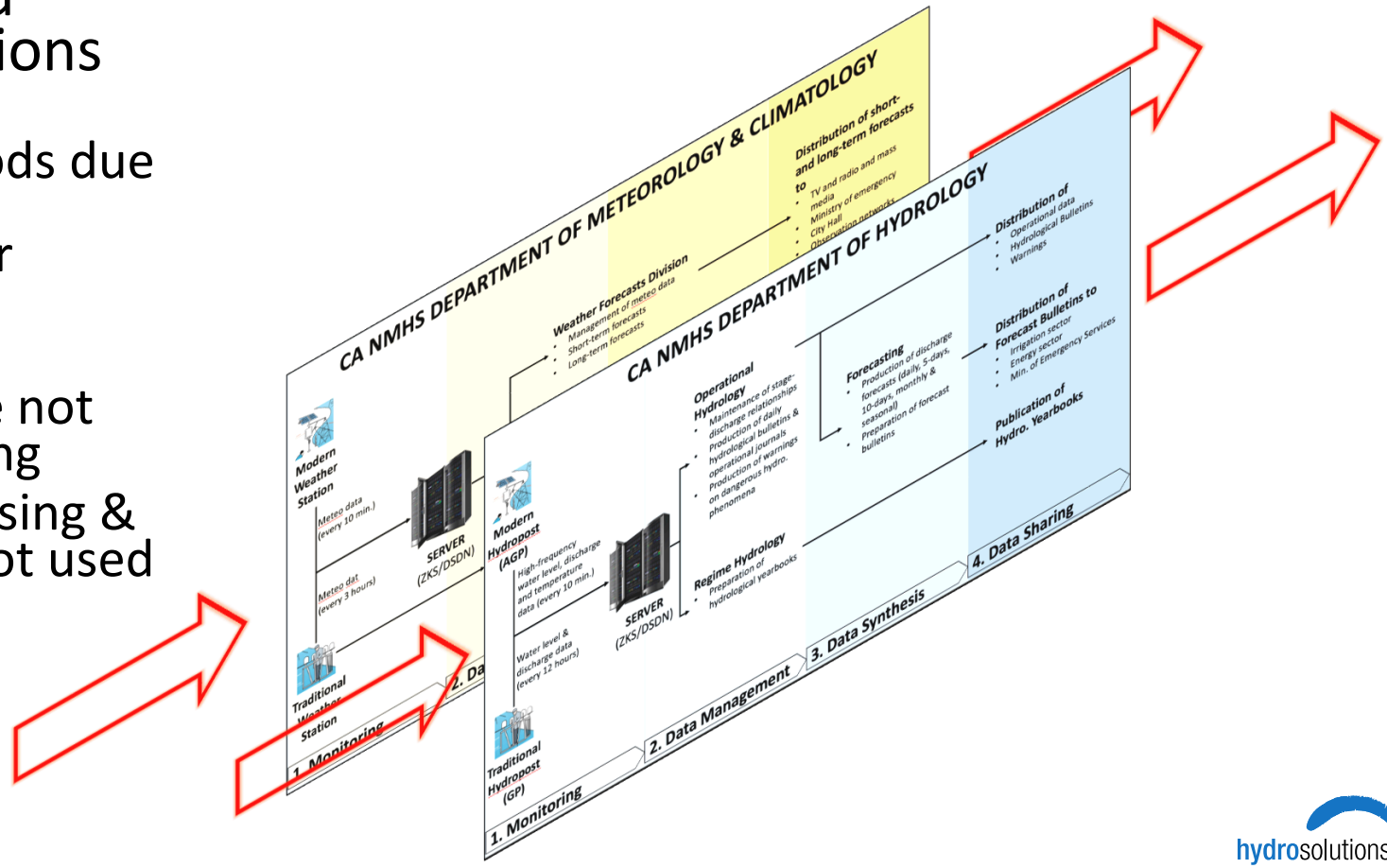
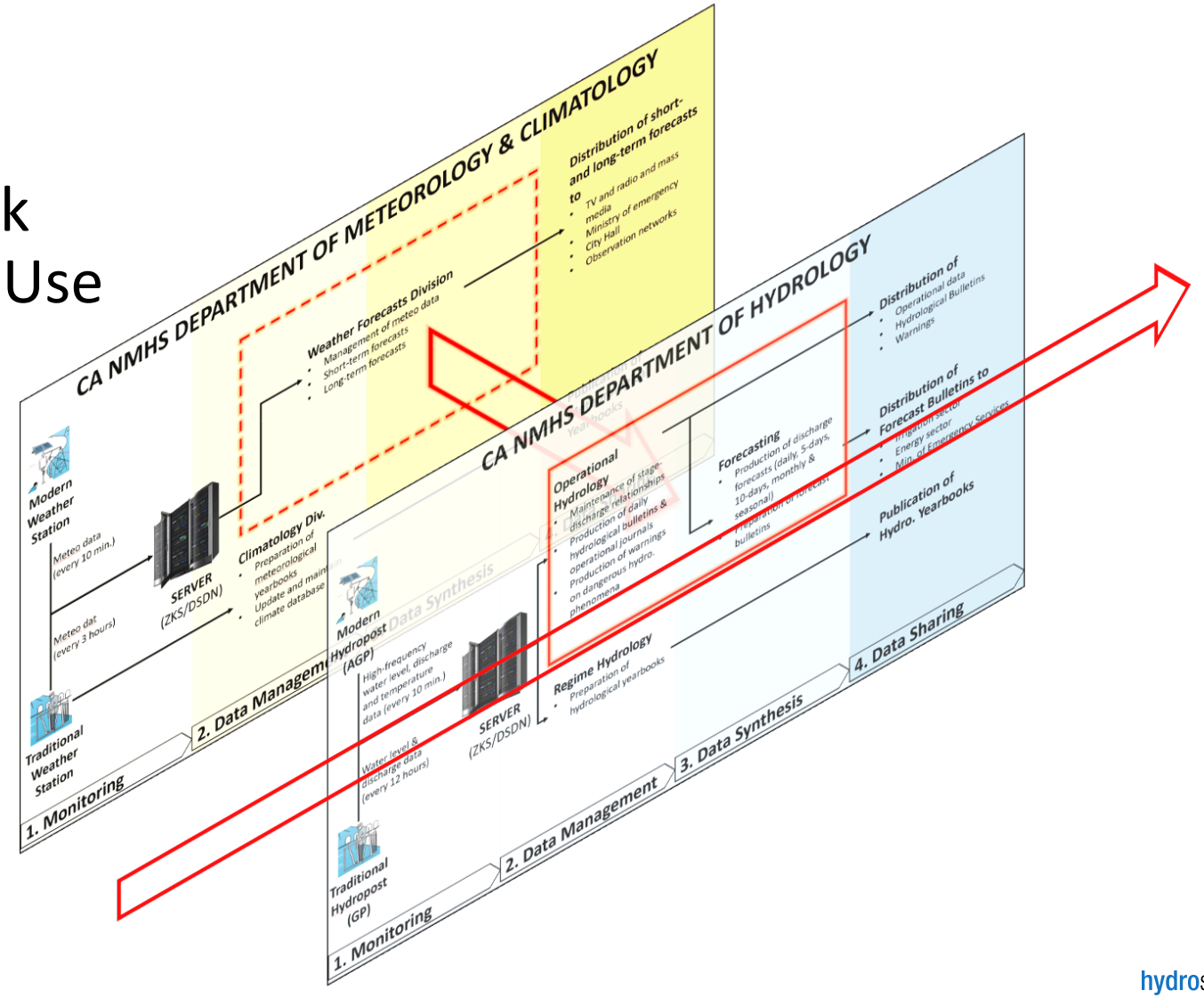
Problem #2

- Low forecasting skills of daily, pentad, decadal, monthly and seasonal hydrological predictions
  - Institutions are using outdated hydrological forecasting methods due to a lack of in-house technical capacity and the lack of regular exchange with academia
  - Data from in-house numerical weather prediction models are not used for hydrological forecasting
  - Data from satellite remote sensing & global reanalysis models are not used in a consistent manner for hydrological forecasting



SAPPHIRE Central Asia Project

- **S**mart & **P**recise **P**rognostic **H**ydrology for **I**nnovative Risk Management and **R**esource Use **E**fficiency in **Central Asia**
  - Linking Observations with digital solutions for improved forecasting



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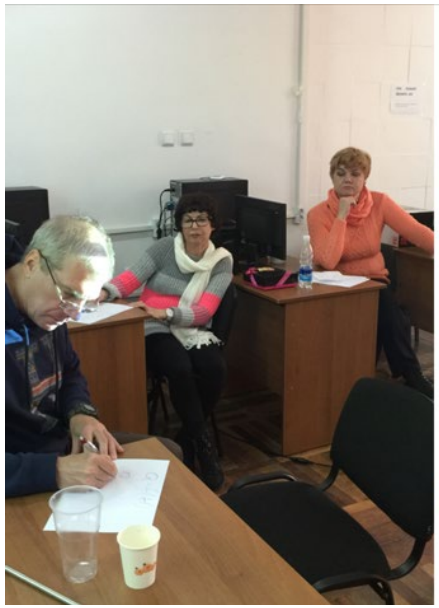
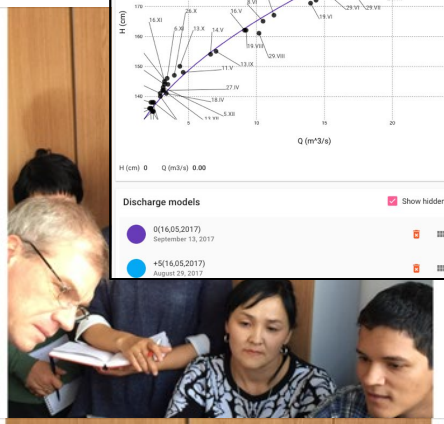
Built-in Regional Focus & Building on Previous Success

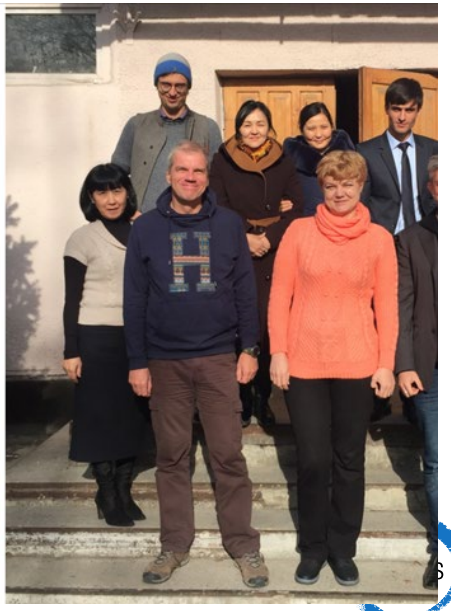
16. February 2019

22. November 2019

13. May 2022



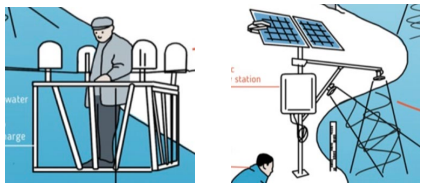




Tech Level Interventions

Observation Data Collection Center

DSDN



Water level H, discharge Q & meteo data

Telegram KN-1 (GP)

Telegram KN-15 (GP)

Data stream via API (AGP)

Operational Meteorology

CROMO-ADAPT

Cryospheric Observation and Modeling for Improved Adaptation in Central Asia

NOAA

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

U.S. DEPARTMENT OF COMMERCE

iEASYHYDRO HF

Operational Hydrology Block

- Data Quality Control
- Maintenace of stage-discharge relationship
- Operational Journal & Hydrological Bulletins

P, T forecasts

Q

iEASYHYDRO HF

Data Warehouse

H, Q

AGP Data only (for KAZ, all data)

Reijka Regime

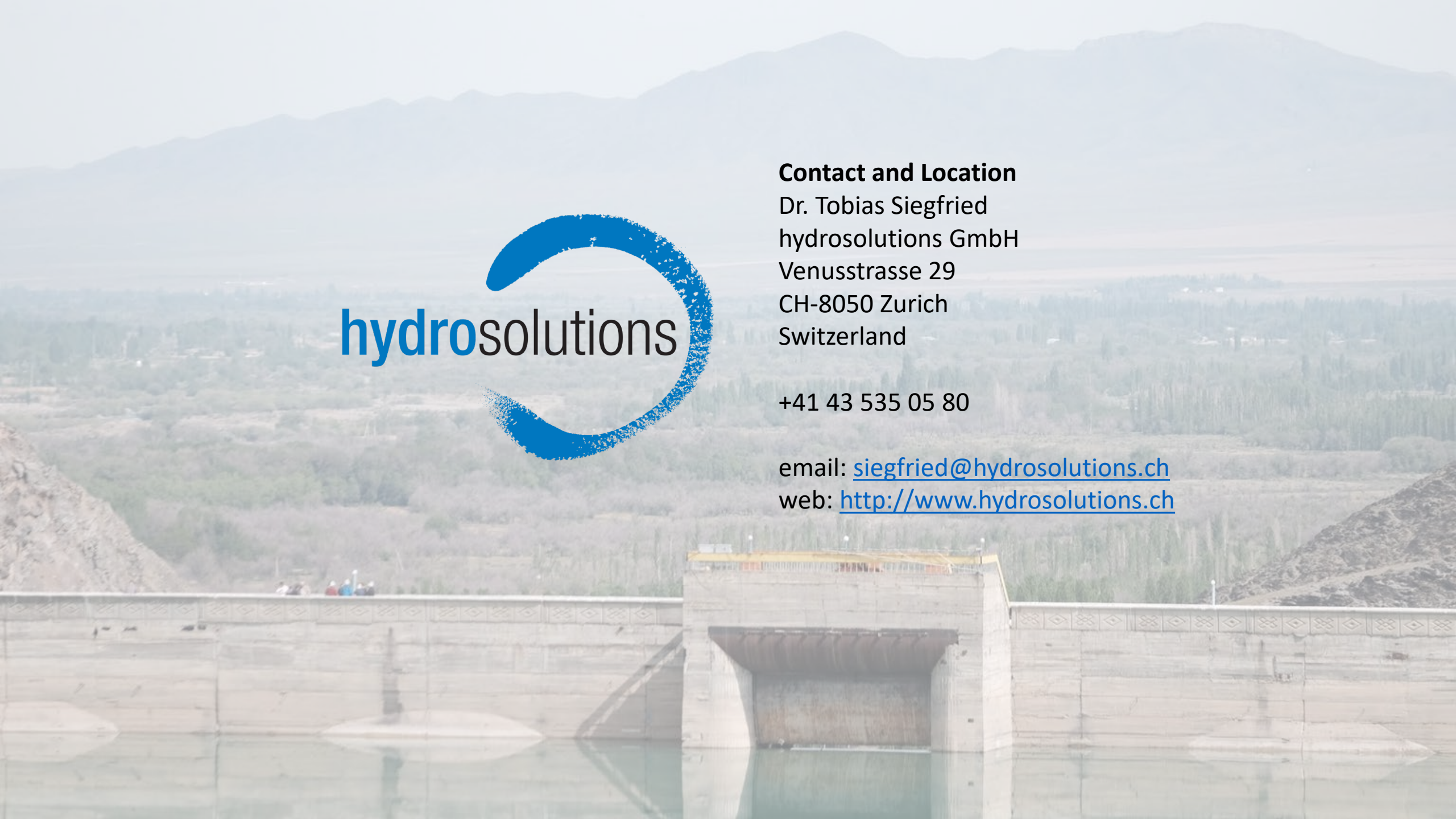
Ecosystem of forecasting models

CROMO-ADAPT

Cryospheric Observation and Modelling for Improved Adaptation in Central Asia

Forecasts

- Production & dissemination of forecasts



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