Regional Research Network
Central Asian Water

Federal Foreign Office

Scientific component of Berlin Process
(CAWa Project)

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CAWa Project coordination

Tashkent, 24.11.2017

www.cawa-project.net

Regional Research Network «Central Asian Waters»

EU *strategy* „Central Asia“ / German Water Initiative for Central Asia („Berlin Process“)

- ≈ Political institutional component: GIZ (‚Transboundary Water Management in Central Asia‘ programme)
- ≈ Educational component: German-Kazakh University (DKU)
- ≈ Scientific component: CAWa Project
  - ❑Phase I–II (2008-2014): scientific data base, analysis and modeling
  - ❑Phase III (2015-2017): **Consolidation, Capacity Building, Transfer**
  - ❑Phase IV (2018-2019): Dissemination and Capacity building

Federal Foreign Office

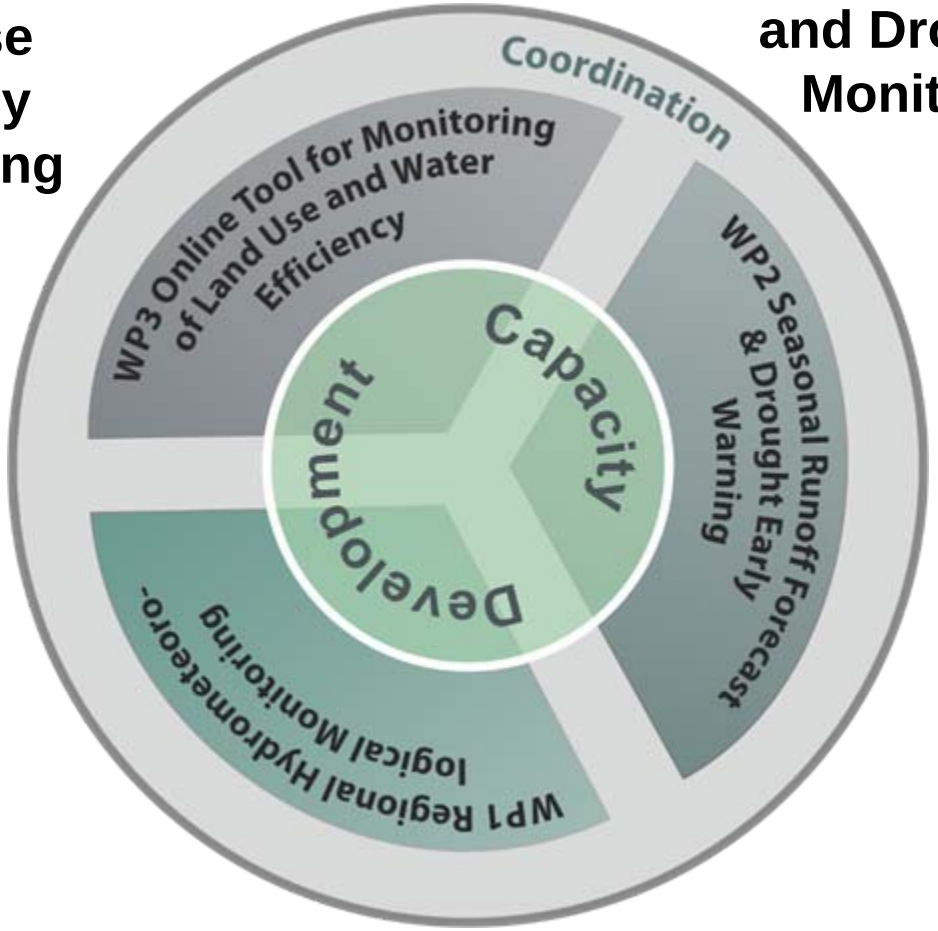
The former German Foreign Minister Steinmeier opening the „Water Unites“ Conference in Berlin in April 2008.

CAWa Regional Research Network «Central Asian Water»

Topics and Partners

WP 3: Space-based land and water use efficiency monitoring

WP 2: Seasonal Runoff Forecast and Drought Monitoring



WP 1: Ground-based and space-based monitoring of water resources

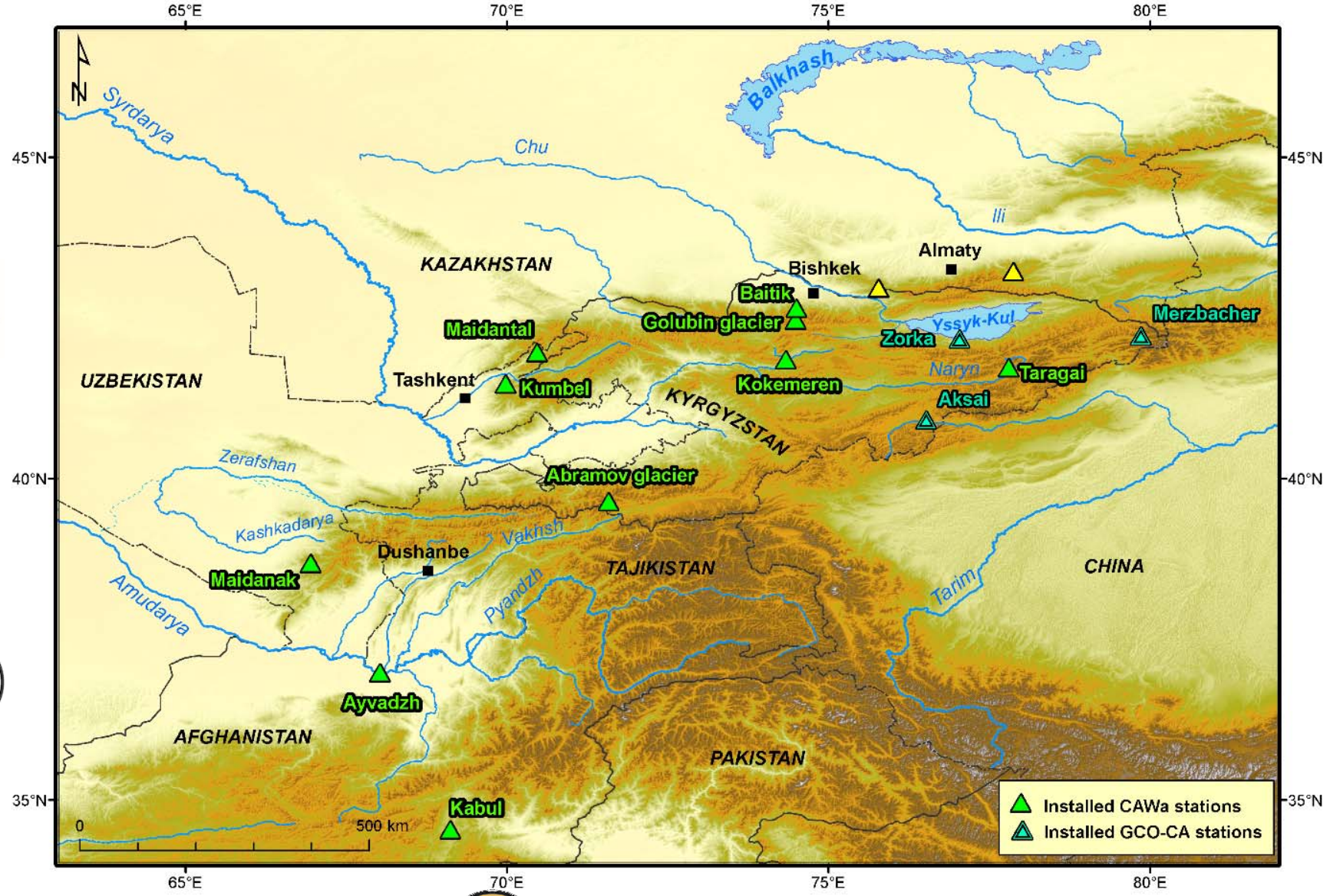
Work Package 1

REGIONAL HYDROMETEORO-LOGICAL MONITORING

GFZ Helmholtz Centre Potsdam

CAIAG

Monitoring network



As of November 2016

Station Design

- ❑ **Designed for operation in remote areas (ROMPS – Remotely Operated Multi-Parameter Stations)**
- ❑ **Good performance even in high altitudes and under extreme climatic conditions**

- ✓ Automated
- ✓ High-tech low-maintenance components
- ✓ Independent power supply
- ✓ Power management
- ✓ Real-time data transmission
- ✓ Remote control
- ✓ Multi-sensor stations
- ✓ Complying with WMO recommendations

Taragay / Kyrgyzstan

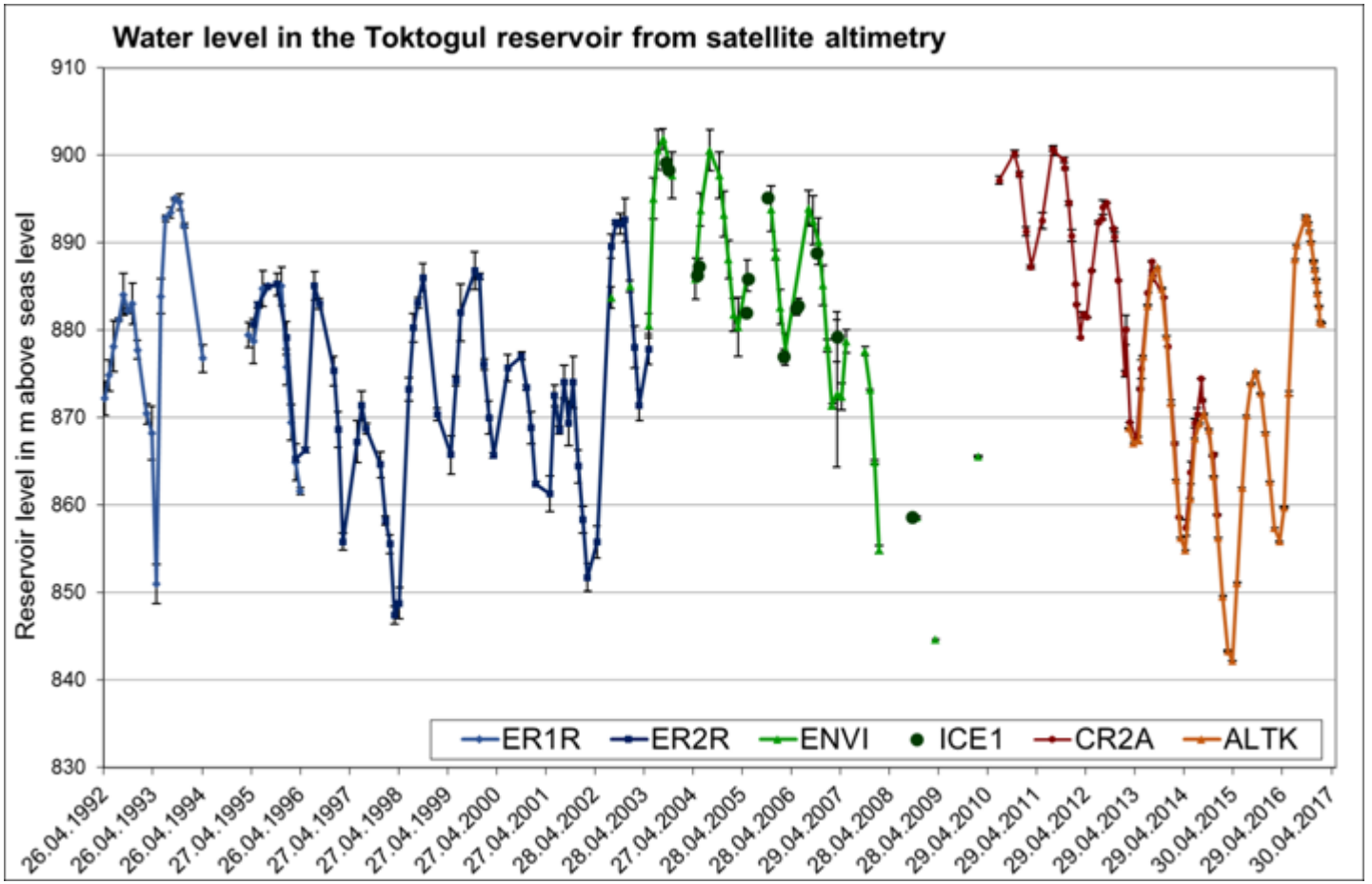
Space-based monitoring of reservoirs & lakes

Satellite altimetry

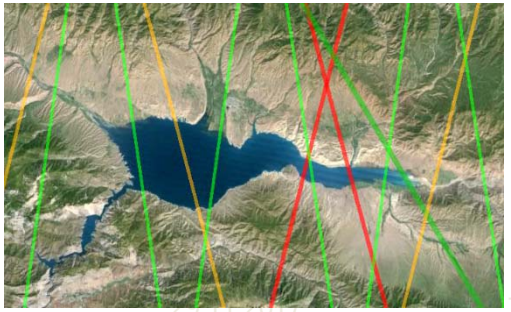
Laser and radar altimeters provide information on water levels in reservoirs and lakes

Data available since early 1990ies with a temporal resolution of 10 to 35 days

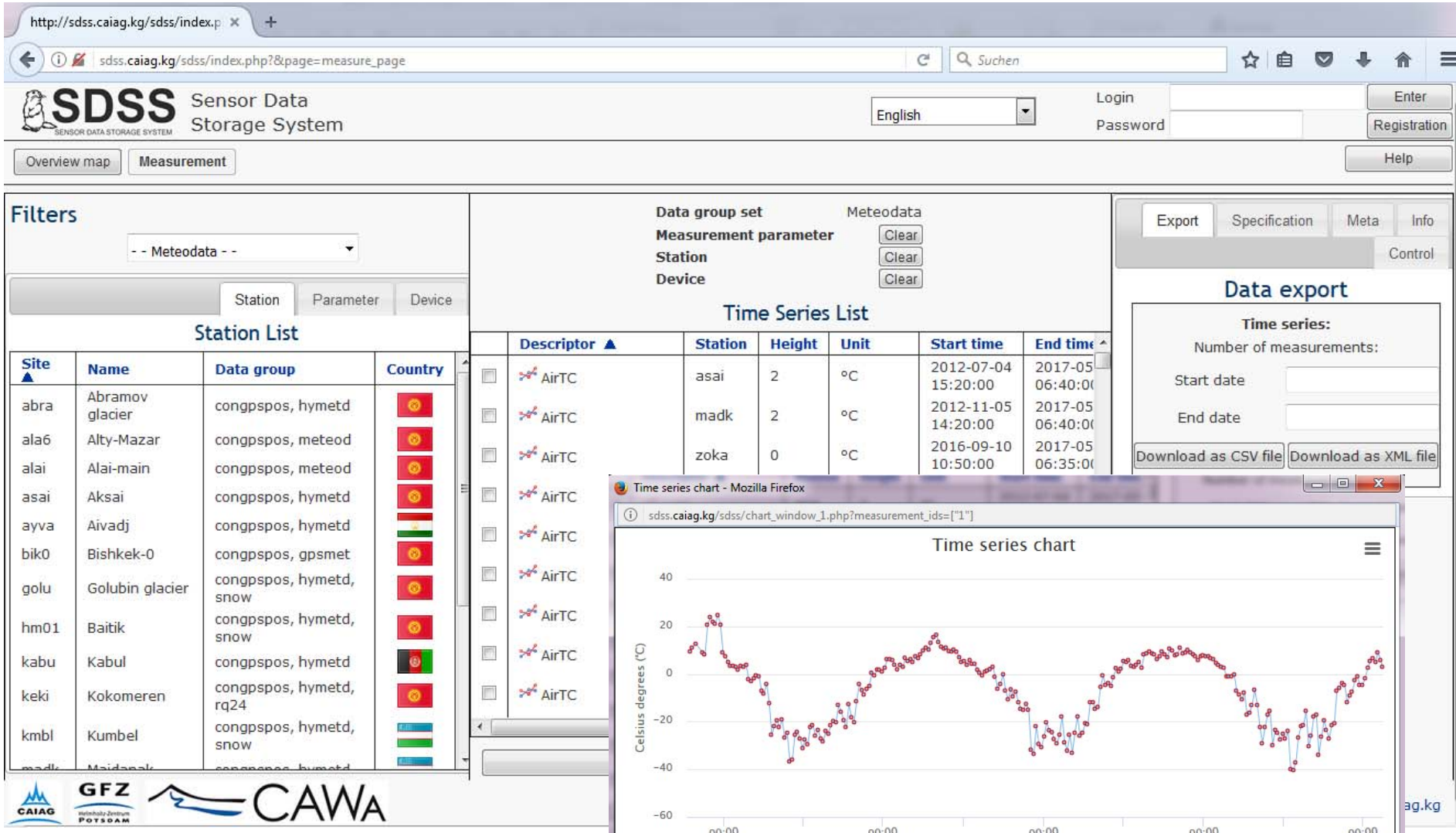
Potential applications: operational tool for Hydromet services, BWOs, Ministries of Water, Agriculture, Energy,



Operational satellite altimeter tracks over the Toktogul



Station data



Database access via
http://sdss.caiag.kg/

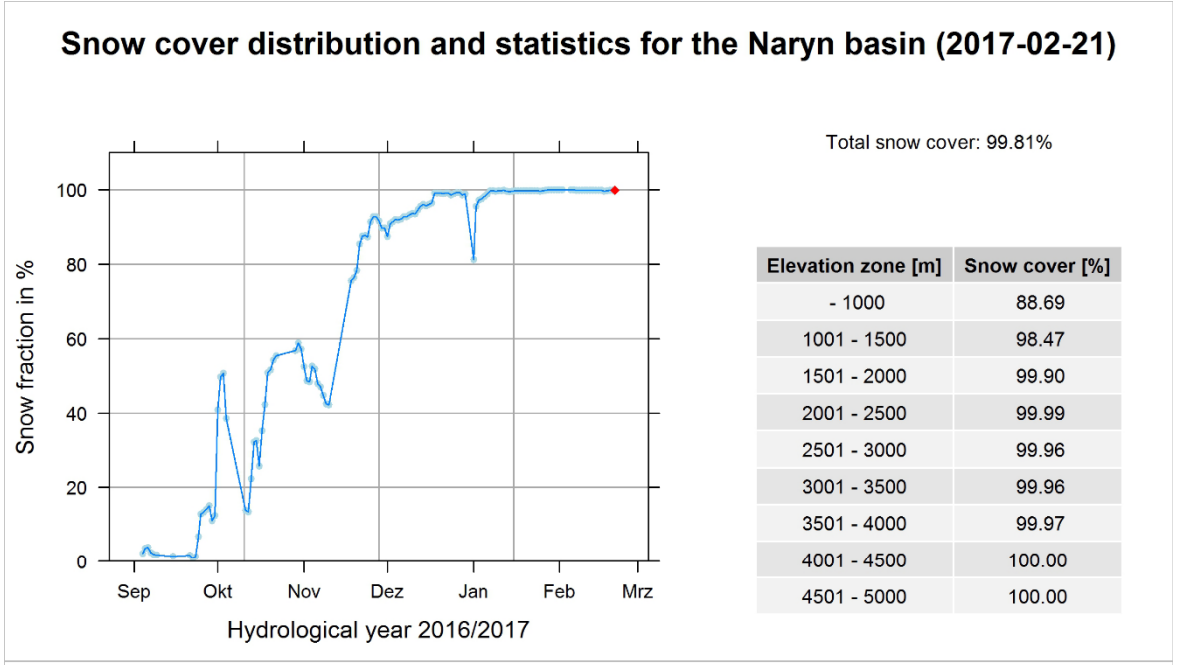
Work Package 2

SEASONAL RUNOFF FORECAST AND DROUGHT MONITORING

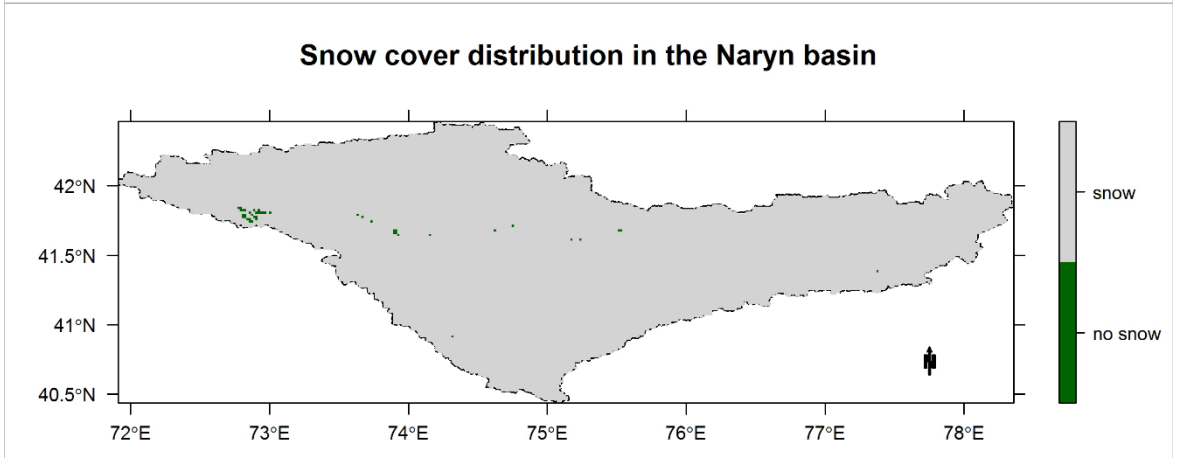
Snow Cover Monitoring

Near real time snow cover monitoring

- MODSNOW tool developed by A. Gafurov at GFZ
- using freely available MODIS snow data
- automatic processing of satellite data
- elimination of cloud cover
- snow cover statistics for defined river basins
- daily updates of snow cover maps
- installed at Hydromet services in KAZ, KGZ, UZB, TKM and CAIAG



Elevation zone [m]	Snow cover [%]
- 1000	88.69
1001 - 1500	98.47
1501 - 2000	99.90
2001 - 2500	99.99
2501 - 3000	99.96
3001 - 3500	99.96
3501 - 4000	99.97
4001 - 4500	100.00
4501 - 5000	100.00



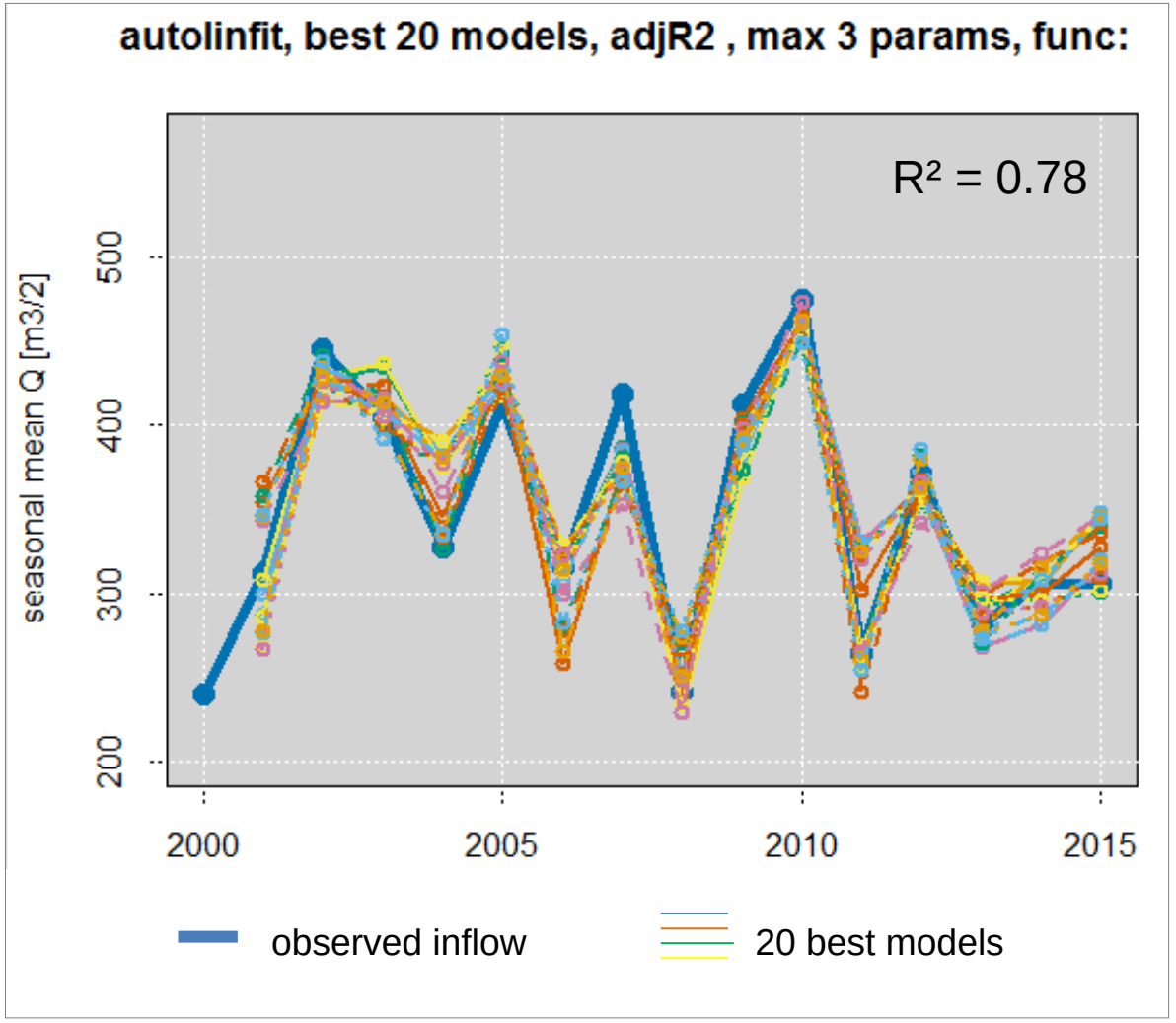
Gafurov et al., 2013; Gafurov et al., 2016

Implemented Forecast Models

Status of model implementation at Hydromets

	River basins
KAZ	Sharyn Shelek Oba Ulba
KGZ	Naryn Upper Chu Talas Ala-Archa
TAJ	
TKM	Murgap Upper Amudarya
UZB	Inflows to Charvak r. Andizhan r.

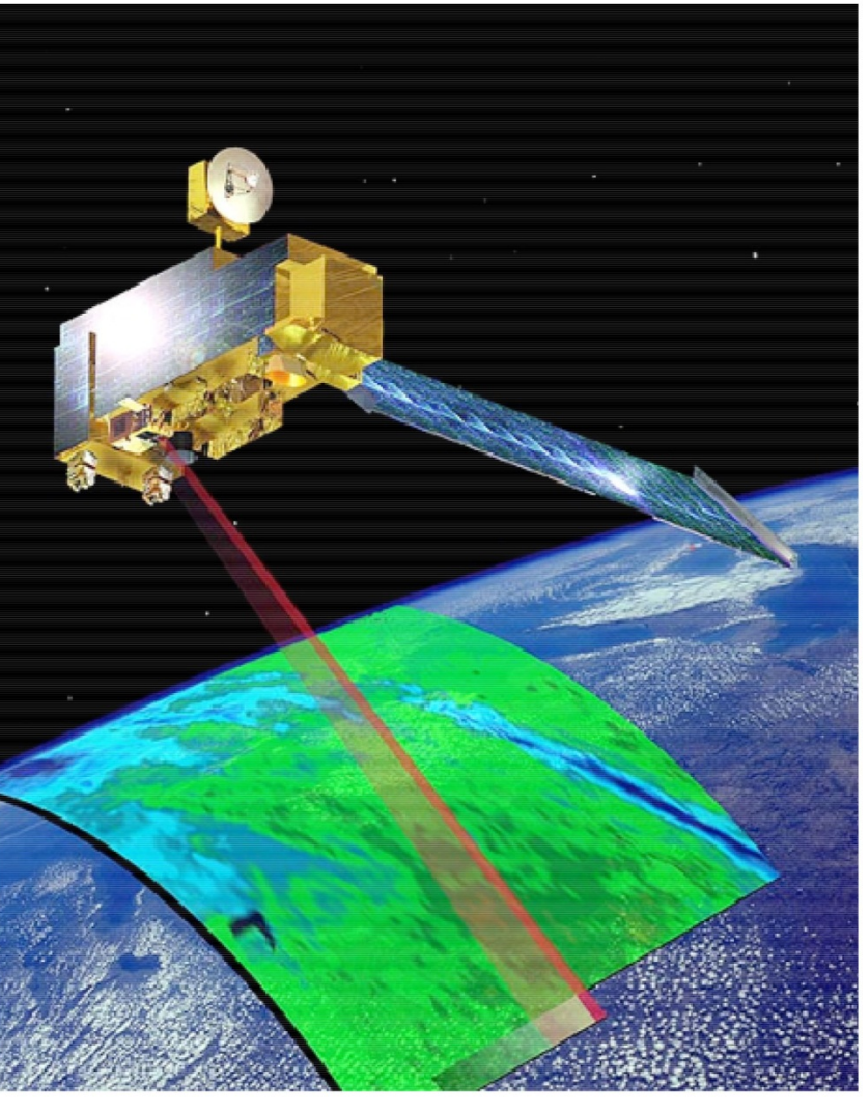
Example: Modeled mean seasonal inflow to Charvak reservoir (Gavrilenko, 2016, based on Apel et al., 2016)



Work package 3

LAND USE MONITORING

MODIS



AQUA (EOS PM-1) satellite
https://podaac.jpl.nasa.gov

Moderate Resolution **I**maging **S**pectroradiometer

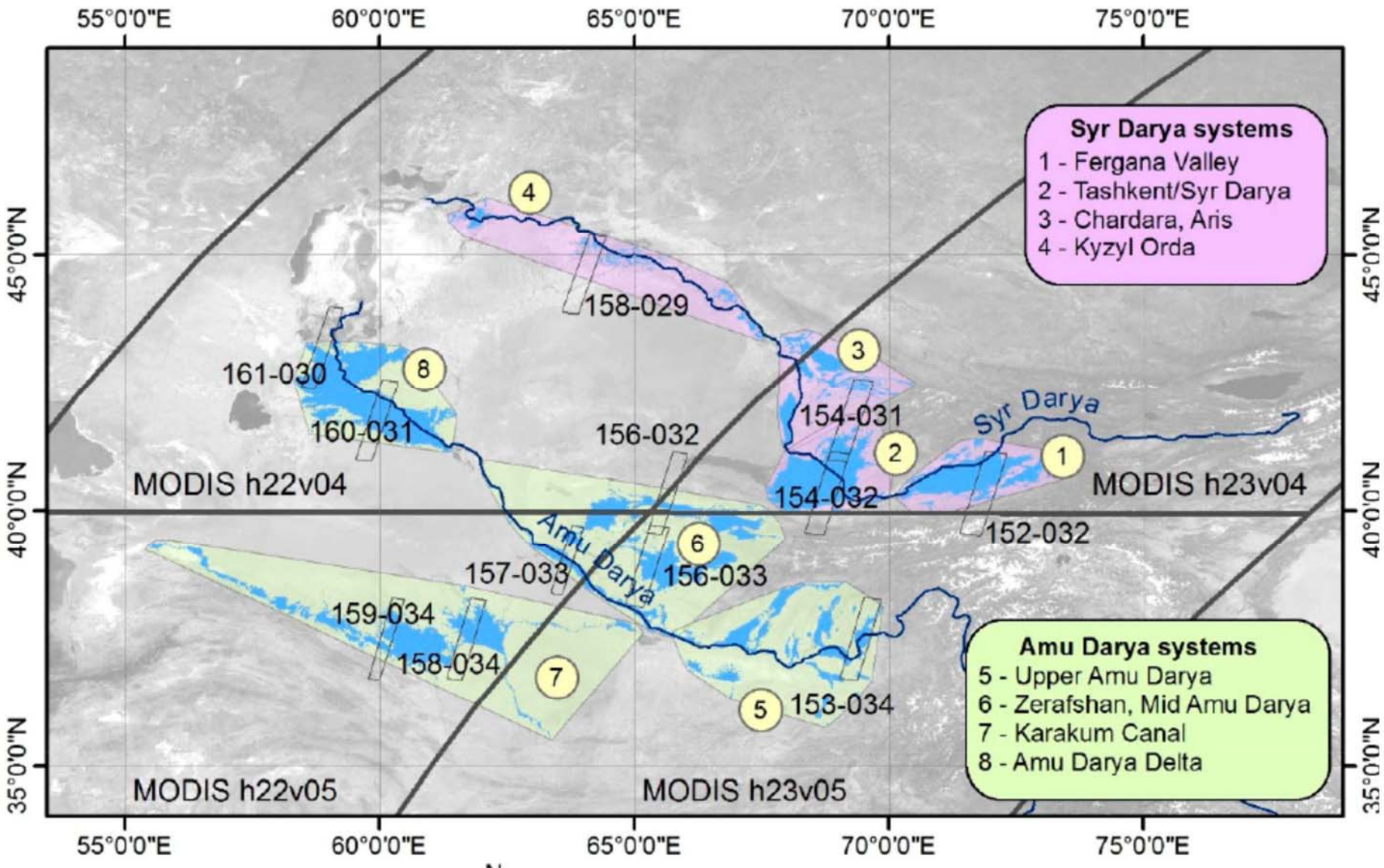
- Launch in December 1999 - TERRA (EOS AM) and in May 2002 – AQUA (EOS PM-2)
- Continuous monitoring of the Earth's water cycle and the environment
- Swath 2330 km by 10 km
- Spatial resolution: 250 m (bands 1–2; e.g., land cover) 500 m (bands 3–7) 1000 m (bands 8–36, e.g., atmospheric water vapour and surface temperature)

http://aqua.nasa.gov/

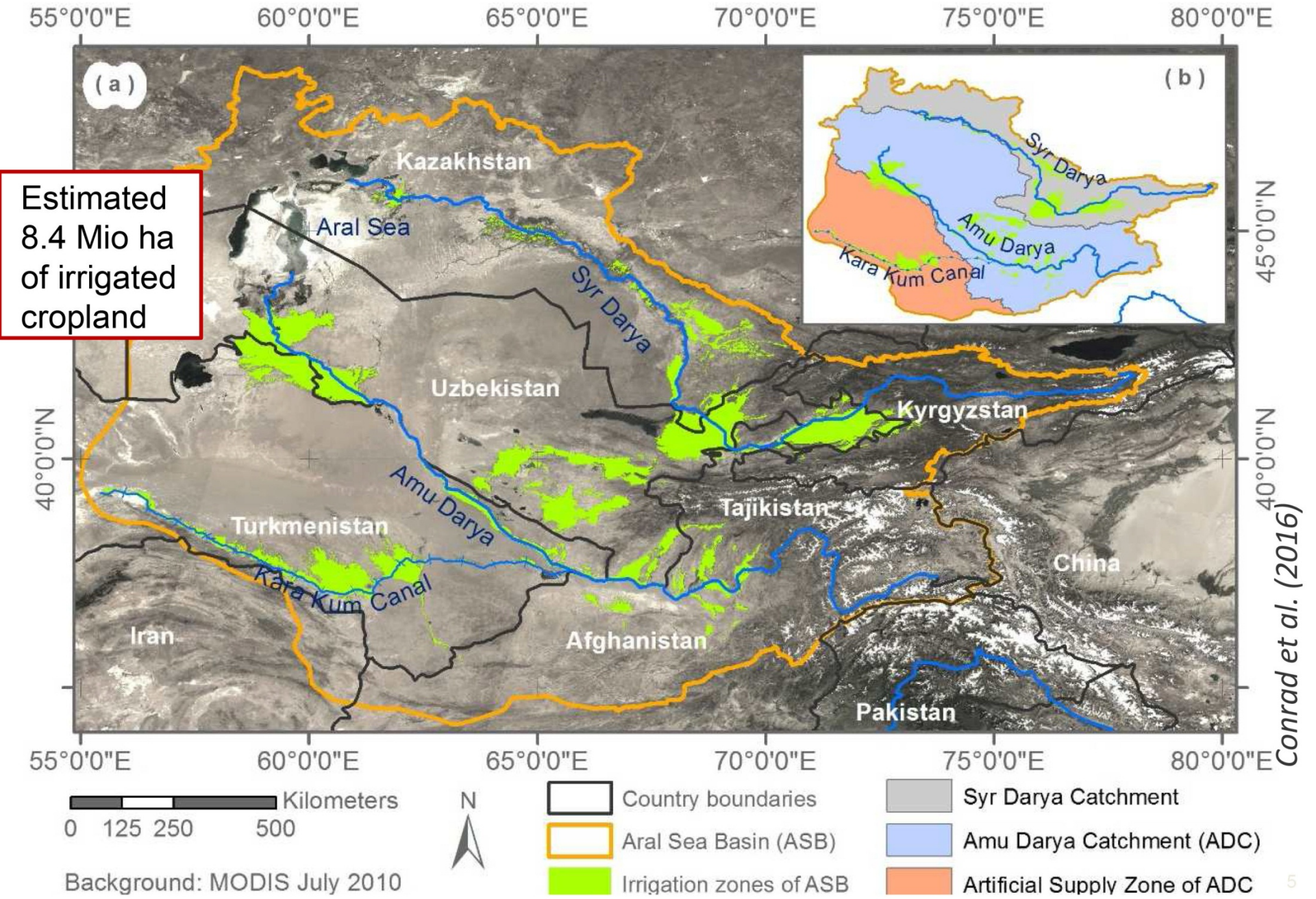
http://modis.gsfc.nasa.gov/

http://terra.nasa.gov/

Conrad et al. (2016)

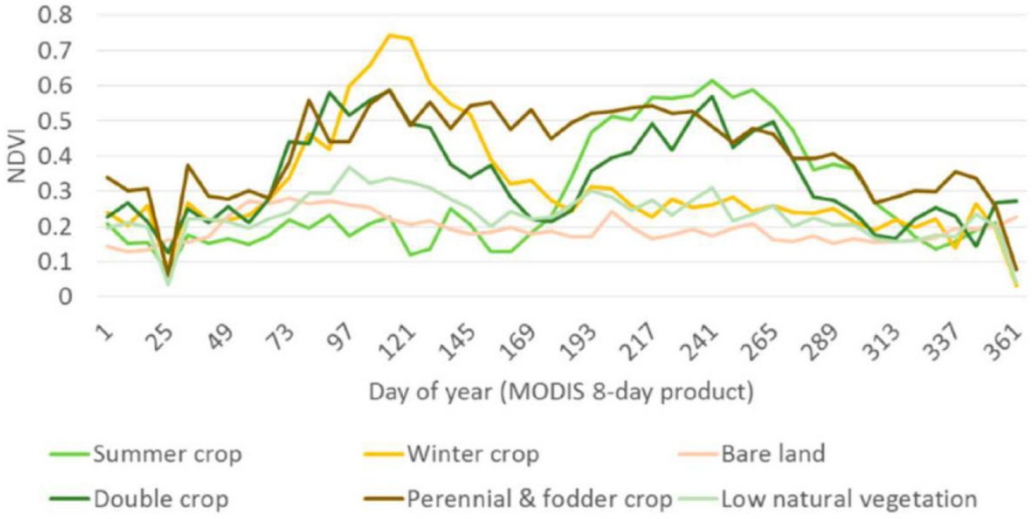


Land Use Monitoring

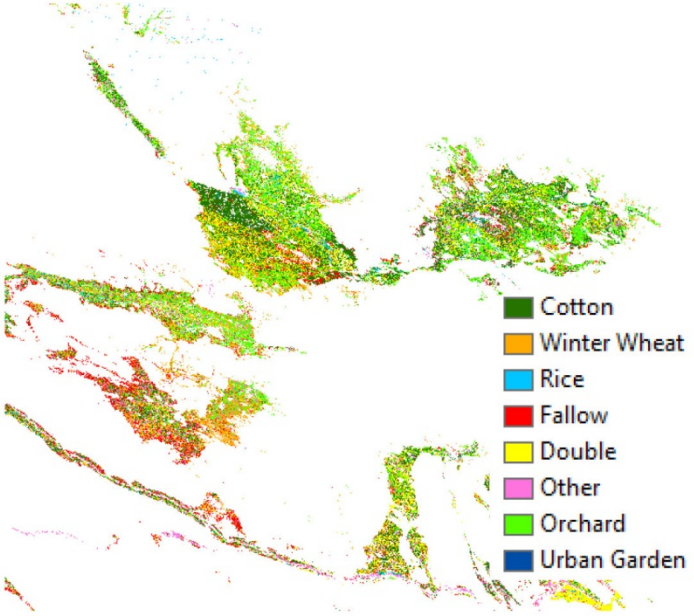


Geodatabase

- 250m MODIS (MOD9Q1 v6) data, 8-day aggregates of spatial information
  MODIS tiles: h22v04, h23v04, h22v05, h23v05
- Normalized Differenced Vegetation Index (NDVI)
- Ground truth data on crop distribution and phenological properties
- Vector data on the administrative and water distribution levels



Conrad et al. (2016)



Monitoring Tool

WUEMoCA - Water Use Efficiency Monitor in Central Asia

- Automated monitoring and visualization instrument addressing sustainable land management, and decision making and program planning processes

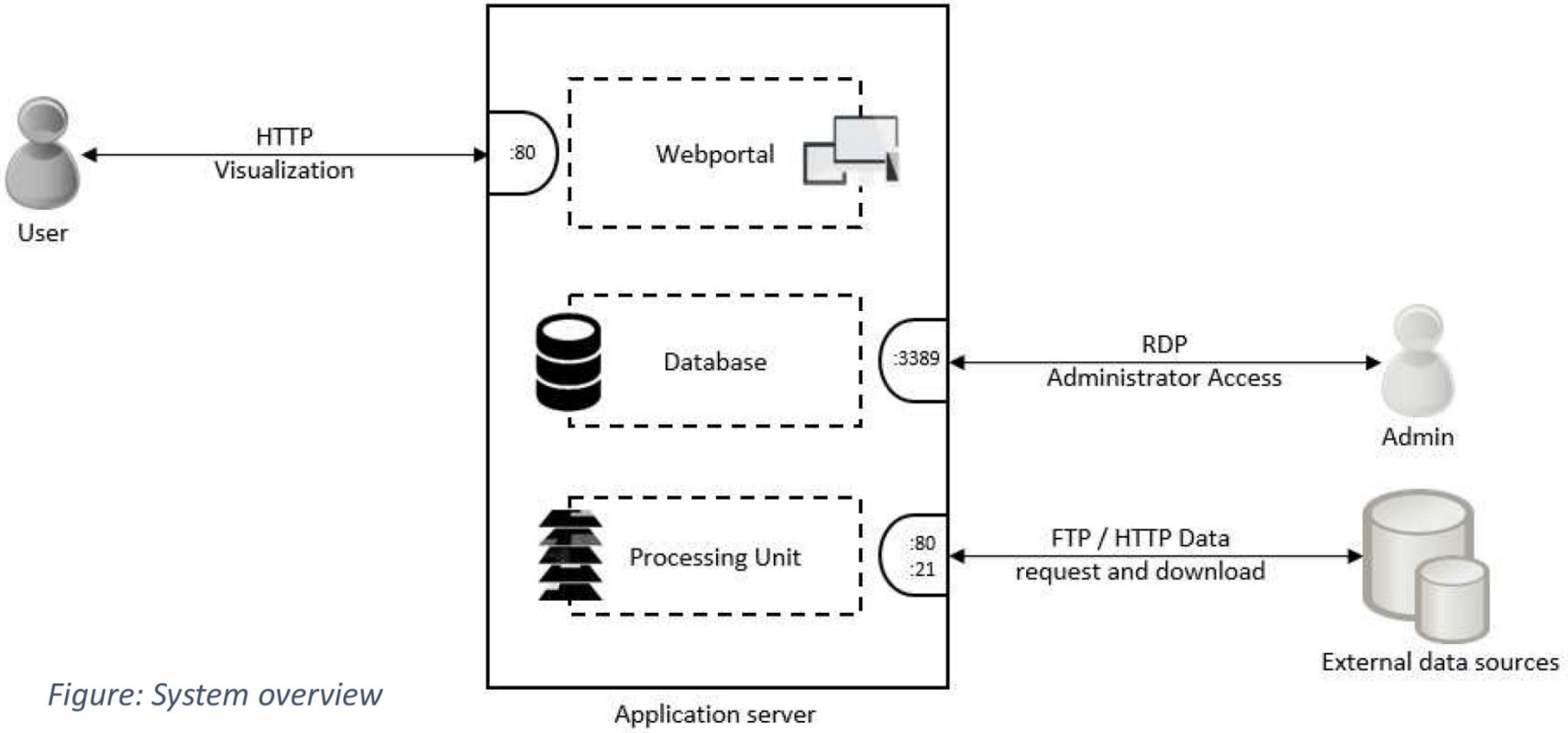
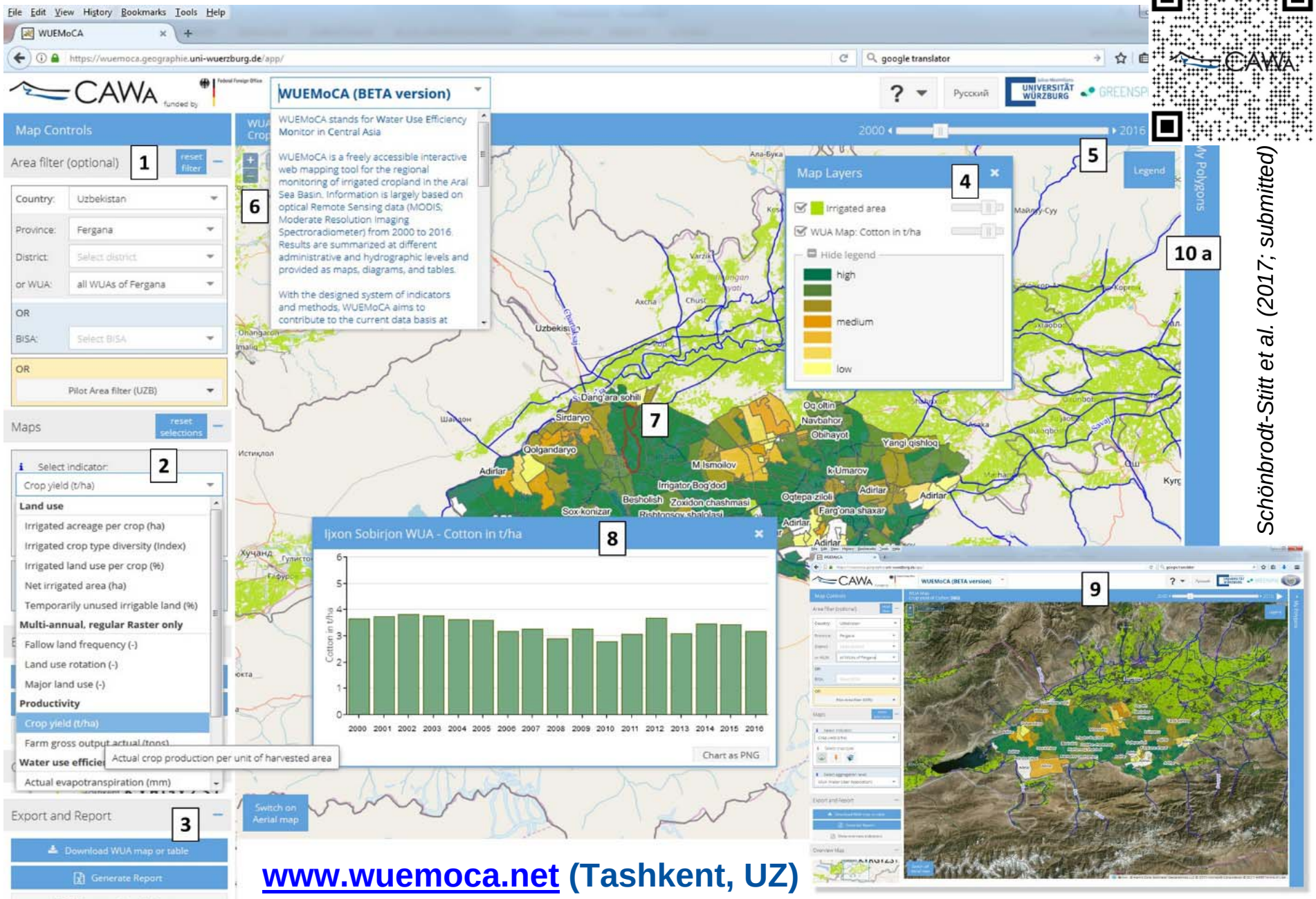


Figure: System overview

WUEMoCA (Beta Version) – Demonstration Tool



Schönbrodt-Stitt et al. (2017; submitted)

www.wuemoca.net (Tashkent, UZ)

Work package 4

CAPACITY BUILDING

Capacity Building

Trainings

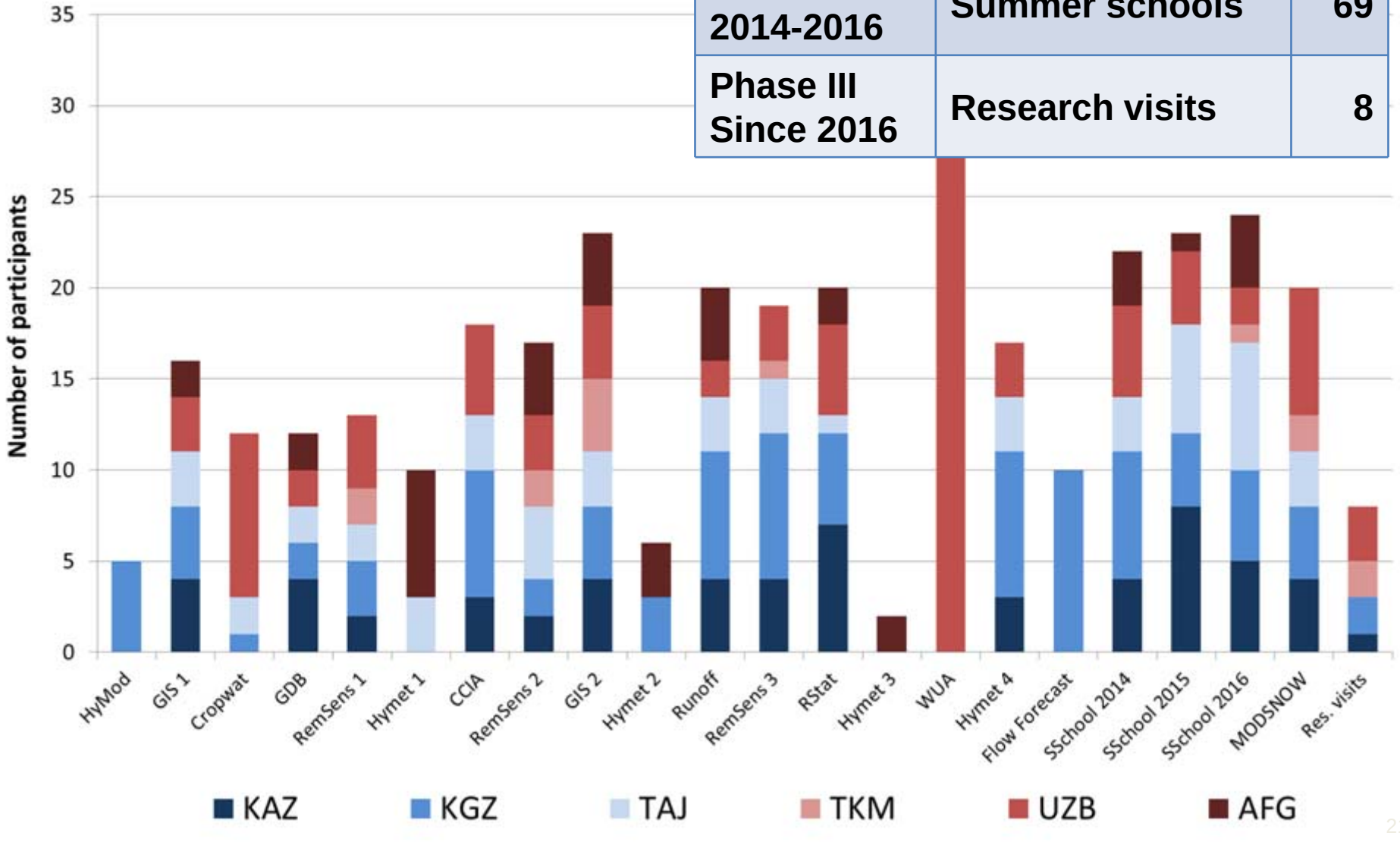
- Short-term vocational trainings for professionals in project specific technologies and methods
- Research stays at German partner institutions
- Annual Regional Summer School at the German-Kazakh University in Almaty
- Supervision of master and PhD theses

Operational tools

- MODSNOW
- WUEMoCA
- SDSS

Capacity Building

Phase I-II (III) 2009-2014	**Vocational trainings**	**269**
Phase II-III 2014-2016	**Summer schools**	**69**
Phase III Since 2016	**Research visits**	**8**



CAWa

Federal Foreign Office

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GFZ Helmholtz Centre Potsdam

Julius-Maximilians-Universität Würzburg

GREENSPIN

Кыргызгидромет

Казгидромет

О ПОГОДЕ ИЗ ПЕРВЫХ РУК

CAIAG

carec

KRASS
Khorezm Rural Advisory Support Service

UZHYMET

Kabul Polytechnic University

Universitas Friburgensis

Deutsch Kasachische Universität

Central Asian Journal for Water Research

- launched in 2015
- electronic bi-lingual open access journal
- peer-review by international and regional scientists

Mission:

- promote exchange between Central Asian scientists and practioners
- bridge the gap between the regional and international scientific community