

# Central Asia Regional Flash Flood Guidance System: FFGS Products and Data Needs



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CARFFG Planning Meeting  
05-07 May 2015  
Ankara, TURKEY



# Motivation

## CAsia-FFG - Central Asia Flash Flood Guidance System

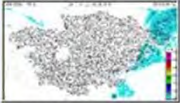
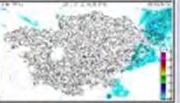
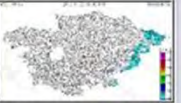
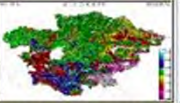

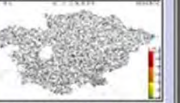
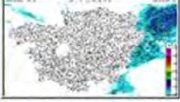
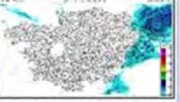
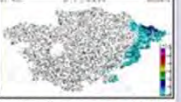



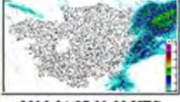
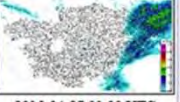

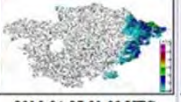
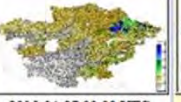


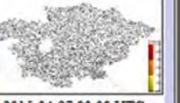
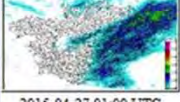
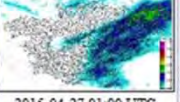

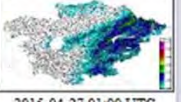
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Nav Date: 2015-04-27 01:00 UTC

Year: 2015 Month: 04 Day: 27 Hour: 01 REGION: REGIONAL Submit

-1 Month -1 Day -6 Hours -1 Hour +1 Hour +6 Hours +1 Day +1 Month

Prev 6-hr Interval (00 UTC) Reset to Current Next 6-hr Interval (06 UTC)

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**OBJECTIVE FOR THIS PRESENTATION:**  
Review FFGS products, and discuss data requirements.

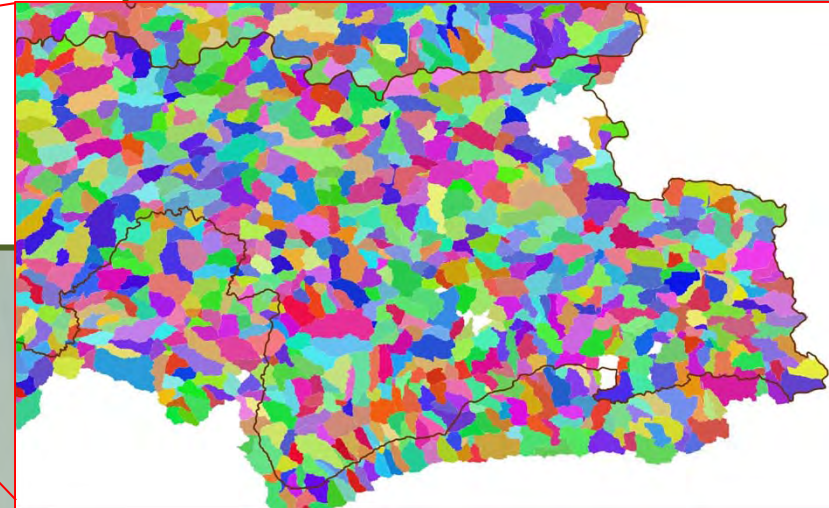
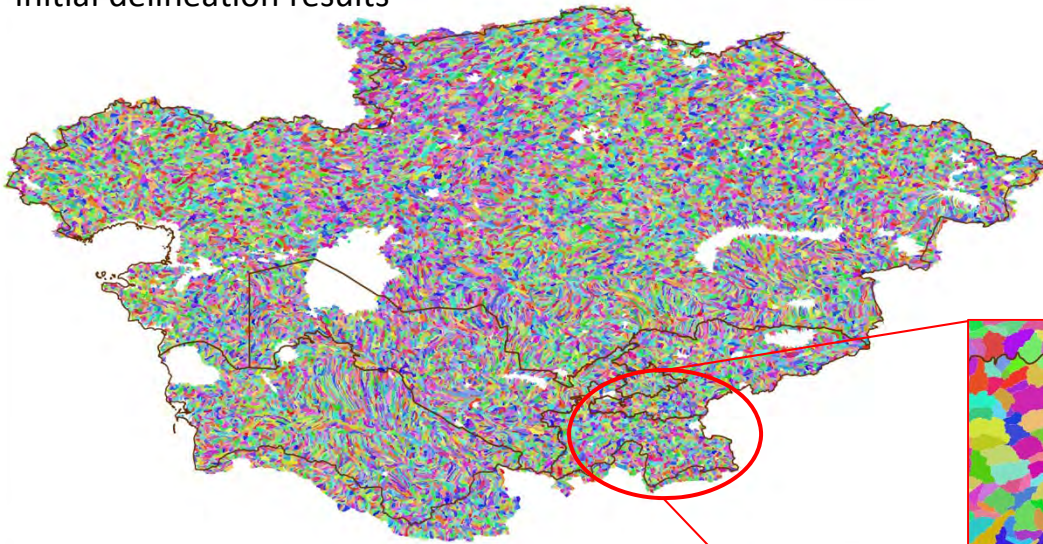


# Spatial Analysis for Basin Delineation

## OBJECTIVE:

- ❑ Define flash flood-scale watershed boundaries
- ❑ Provide spatial representation for model parameterization
- ❑ Determine geometric properties of flash flood basins used in model calculations.

\*initial delineation results



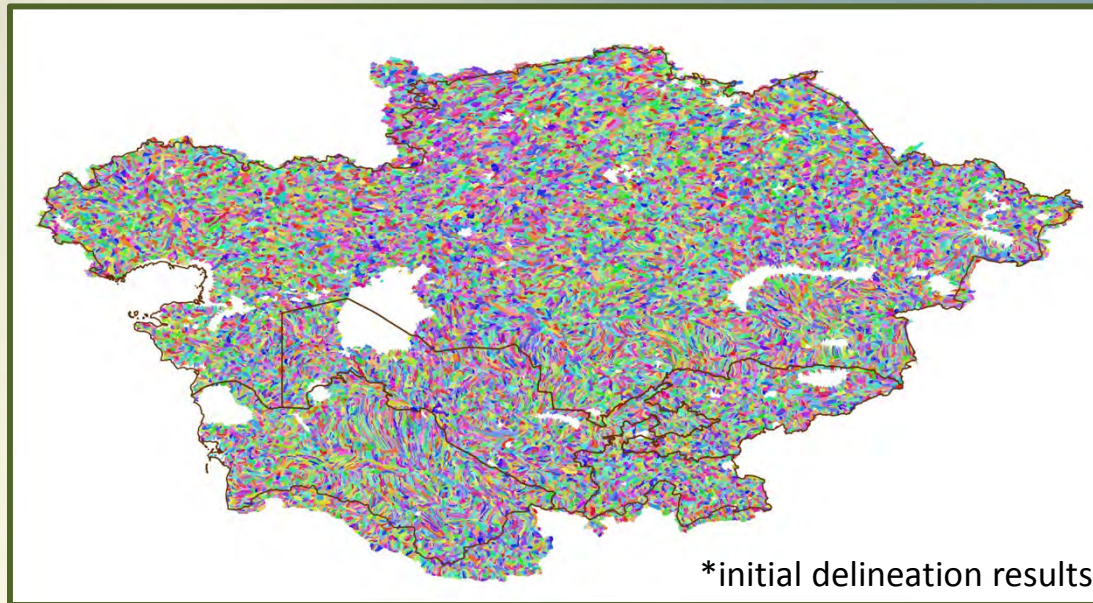
# Spatial Analysis for Basin Delineation

## DEVELOPMENT INPUT DATA:

- Digital Elevation Model (DEM) data
  - The preliminary delineation shown was based on SRTM-90m data

## VALIDATION DATA:

- Digital stream network data (Digital Chart of the World database)
- Comparison with satellite visible imagery (e.g., GoogleEarth)
- Country-provided *digital* stream and/or basin GIS files
- Country-representative review and comments*





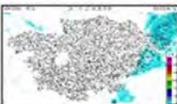
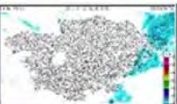
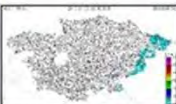
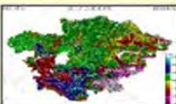
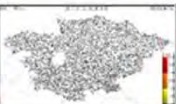
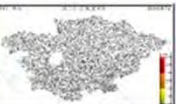
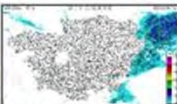
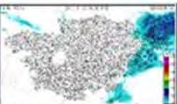

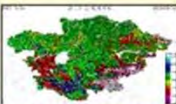
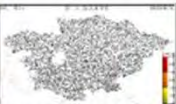
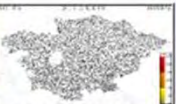
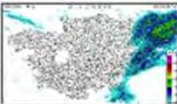
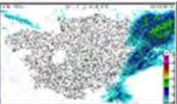
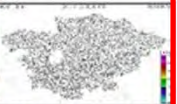
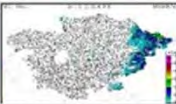




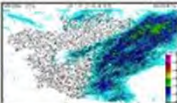
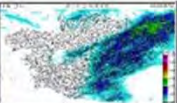
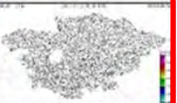
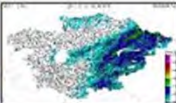
# Real-Time Rainfall Processing and Merged MAP

## CAsia-FFG - Central Asia Flash Flood Guidance System

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# Real-Time Rainfall Processing and Merged MAP

## OBJECTIVE:

- ❑ Provide “best estimate” of mean areal precipitation over each watersheds input to soil water and FFG models.

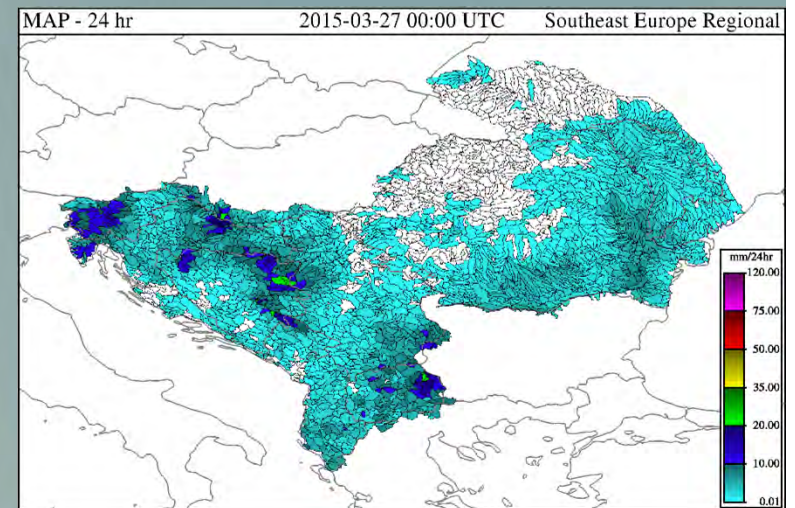
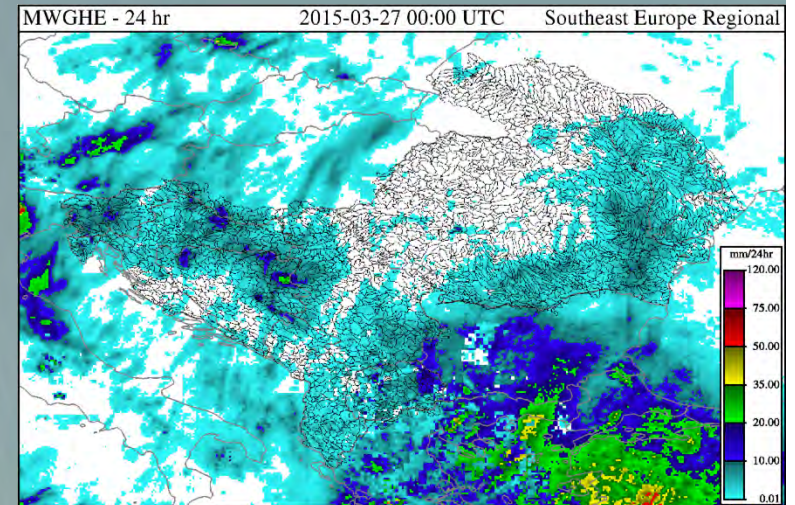
## DEVELOPMENT INPUT DATA:

- ❑ Historical satellite precipitation data (HRC)
- ❑ Historical rain gauge precipitation data (6-hourly or daily)
- ❑ Analysis of climatological bias of satellite precipitation

## REAL-TIME INPUT DATA:

- ❑ Satellite precipitation (GHE, MWGHE)
- ❑ Climatological adjustment factors
- ❑ Real-time rain gauge precipitation for dynamic (real-time) precipitation bias adjustment

## Examples from SEFFGS



# Flash Flood Guidance



**FFG** product is computed through several hydrologic modeling components:

- Threshold Runoff Modeling
- Snow Modeling
- Soil Water Modeling



# Threshold Runoff Model Component

**Threshold Runoff** is a foundational parameter of FFG, defined as the amount of *effective* rainfall of a given duration over a watershed that produces bankfull flow at the watershed outlet.

## OBJECTIVE:

- ❑ Estimate *Threshold Runoff* for all flash flood-scale watersheds in region.



## DEVELOPMENT INPUT DATA:

- ❑ Geometric properties of watersheds as determined via spatial analysis;
- ❑ Stream surveys or estimates of cross-sectional properties at channel bankfull for developing regional relationships;
- ❑ Return period discharge information for flash flood prone streams to develop regional relationships.



# Snow Model Component (1)

## OBJECTIVE:

- ❑ Estimate area covered by snow

## REAL-TIME INPUT DATA:

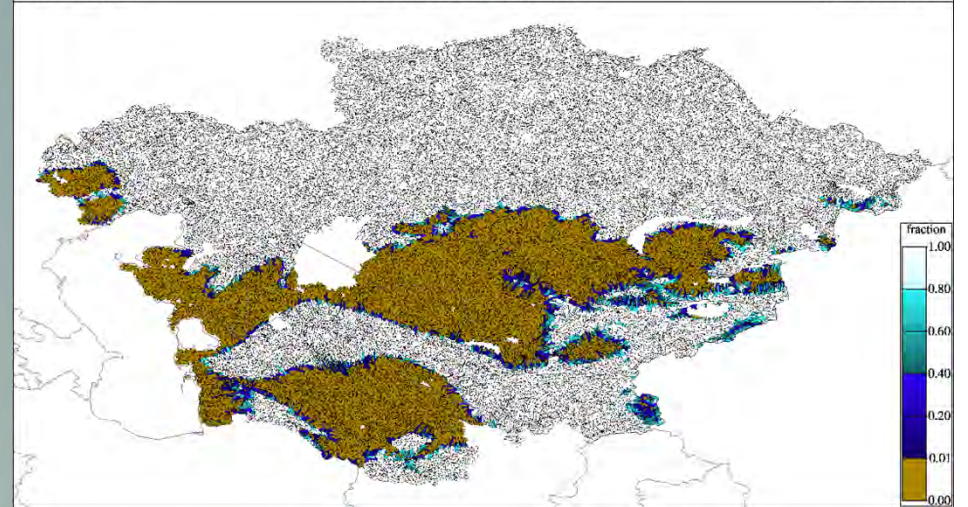
- ❑ NOAA Integrated Multi-Sensor (IMS) Snow and Ice satellite product

## DEVELOPMENT INPUT DATA:

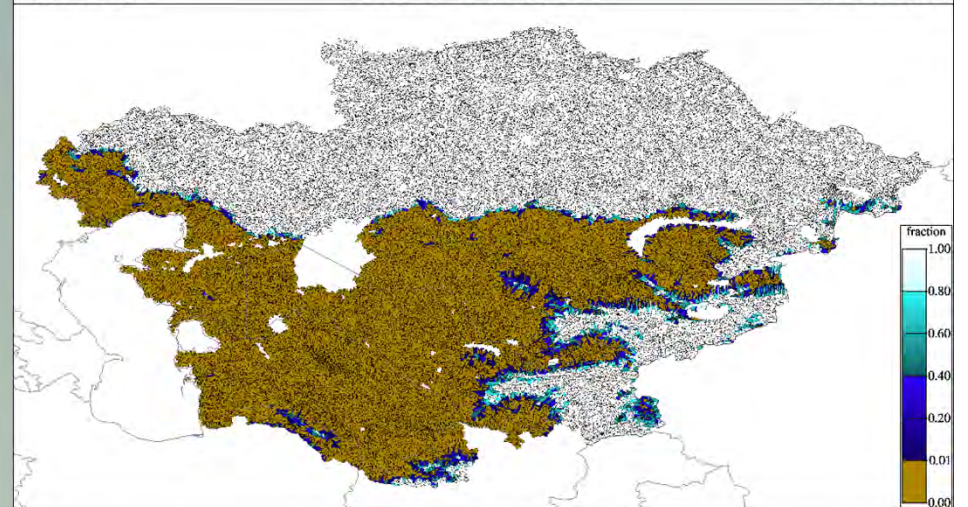
- ❑ Spatial Land Cover Data
- ❑ Historical archive of IMS products (for climatology analysis)
- ❑ Historical snow cover data (observations)

## Examples of Snow Cover Area over Central Asia

SCA - 24 hr 2015-02-25 00:00 UTC REGIONAL



SCA - 24 hr 2015-03-15 00:00 UTC REGIONAL





# Snow Model Component (2)

## OBJECTIVE:

- ❑ Account for snow melt contribution to soil water modeling

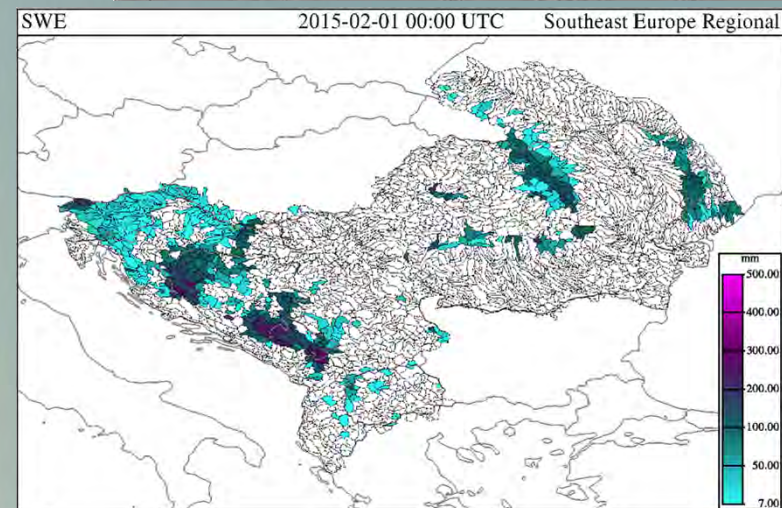
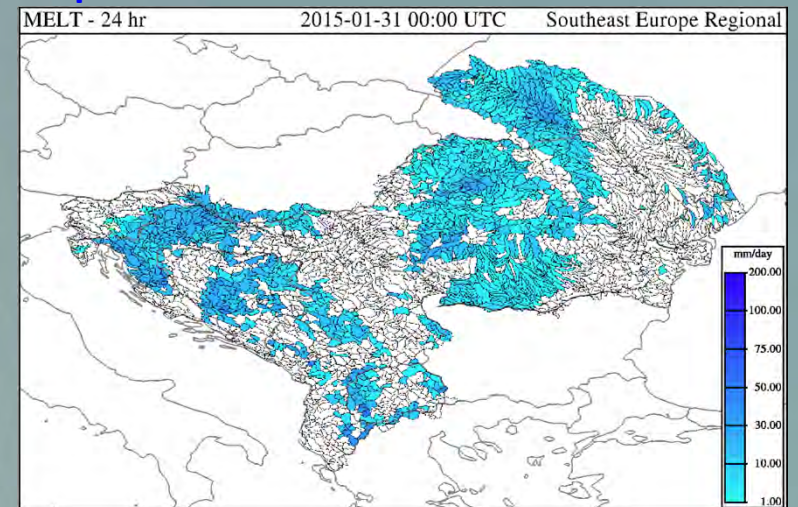
## Examples of Snow Melt & SWE from SEFFGS

## REAL-TIME INPUT DATA:

- ❑ Mean Areal Precipitation (from Rainfall Processing)
- ❑ Mean Areal Temperature
- ❑ Snow Covered Area (IMS Product)

## DEVELOPMENT INPUT DATA:

- ❑ Spatial Land Cover Data
- ❑ Historical temperature data (for climatology)
- ❑ Historical snow cover/snow depth data
- ❑ Historical snow water equivalent





# Soil Water Model Component

## OBJECTIVE:

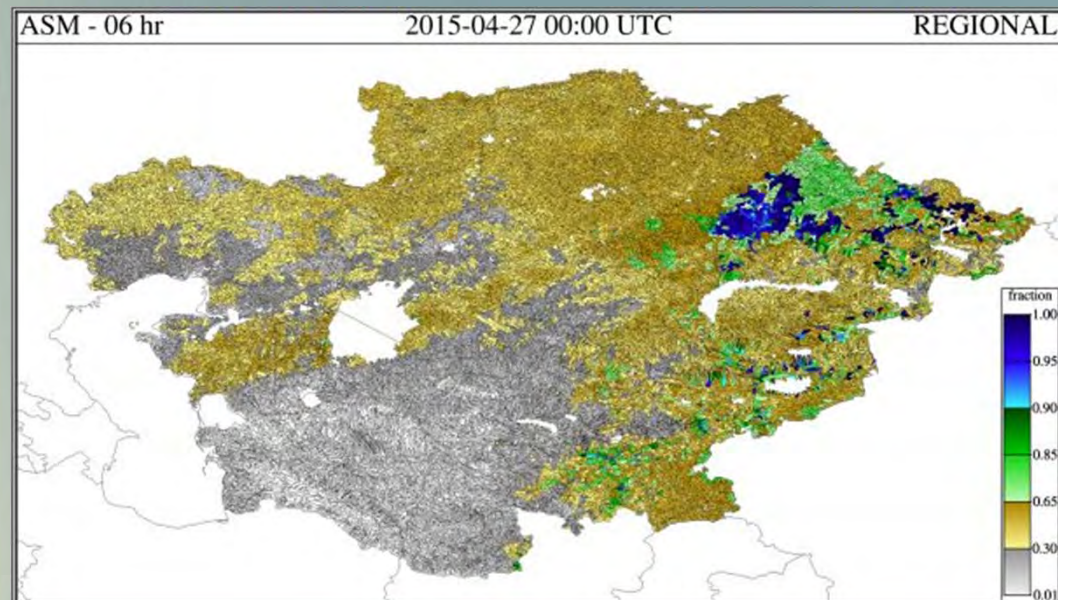
- Estimate soil water conditions within basins in real-time
- Account for land surface processing in transformation of rainfall to runoff

## REAL-TIME INPUT DATA:

- Small watershed mean areal precipitation
- Snow melt

## DEVELOPMENT INPUT DATA:

- Soils Properties
- Spatial Land Cover Data
- Historical temperature and evaporation data
- Stream discharge data



# Central Asia Regional FFG System Products and Data Needs

## CAsia-FFG - Central Asia Flash Flood Guidance System

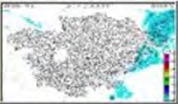
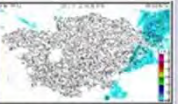
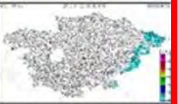


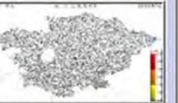
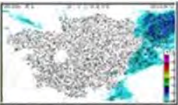
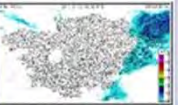



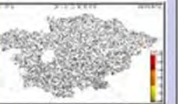
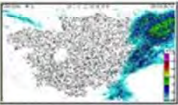
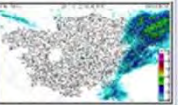
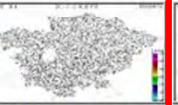
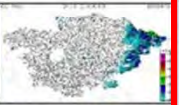




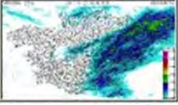
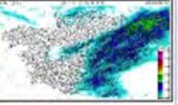
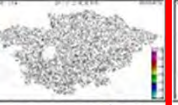
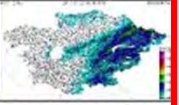
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01-hr	 2015-04-27 01:00 UTC Text: <a href="#">view</a>	 2015-04-27 01:00 UTC Text: <a href="#">view</a>		 2015-04-27 01:00 UTC Text: <a href="#">view</a>		 2015-04-27 00:00 UTC Text: <a href="#">view</a>	 2015-04-27 01:00 UTC Text: <a href="#">view</a>	 2015-04-27 00:00 UTC Text: <a href="#">view</a>
03-hr	 2015-04-27 01:00 UTC Text: <a href="#">view</a>	 2015-04-27 01:00 UTC Text: <a href="#">view</a>		 2015-04-27 01:00 UTC Text: <a href="#">view</a>		 2015-04-27 00:00 UTC Text: <a href="#">view</a>	 2015-04-26 21:00 UTC Text: <a href="#">view</a>	 2015-04-27 00:00 UTC Text: <a href="#">view</a>
06-hr	 2015-04-27 01:00 UTC Text: <a href="#">view</a>	 2015-04-27 01:00 UTC Text: <a href="#">view</a>	 2015-04-27 00:00 UTC Text: <a href="#">view</a>	 2015-04-27 01:00 UTC Text: <a href="#">view</a>	 2015-04-27 00:00 UTC Text: <a href="#">view</a>	 2015-04-27 00:00 UTC Text: <a href="#">view</a>	 2015-04-27 00:00 UTC Text: <a href="#">view</a>	 2015-04-27 00:00 UTC Text: <a href="#">view</a>
24-hr	 2015-04-27 01:00 UTC Text: <a href="#">view</a>	 2015-04-27 01:00 UTC Text: <a href="#">view</a>	 2015-04-27 00:00 UTC Text: <a href="#">view</a>	 2015-04-27 01:00 UTC Text: <a href="#">view</a>				

Composite Product: [text](#), [CSV](#), [CSVt](#)

SFTP data transfer (requires SFTP Client): [EXPORTS/REGIONAL/2015/04/27](#)



# Central Asia Regional FFG System Products and Data Needs

