CM-SAF and EUMETSAT Showcase on
„The Use of CM-SAF data for operational Climate Applications"

Background
EUMETSAT is the European Organisation for the Exploitation of Meteorological Satellites (www.eumetsat.int). In order to utilise specialist expertise from the Member States in this area, EUMETSAT established the Network of Satellite Application Facilities (SAF). SAF's are dedicated centres of excellence for processing satellite data and form an integral part of the distributed Application Ground Segment The Satellite Application Facility on Climate Monitoring (CM-SAF) (www.cmsaf.eu) develops, generates, archives and distributes widely recognised high-quality satellite-derived products and services, including user support and training, relevant for climate monitoring in operational mode.

WMO, through its programmes and bodies such as the World Climate Data and Monitoring Programme (WCDMP) and the Commission for Climatology (CCl), urges Members to exploit the potentials of satellite data as an important information source for climate purposes.
Therefore the goal of this showcase "The use of CM-SAF data for operational Climate Applications" is to demonstrate the use of CM-SAF data for operational climate applications. Within its Visiting Scientist scheme CM-SAF supports the Showcase(s) with 10,000 Euro for the development of a climate application related to practical needs with the use of CM-SAF data. The showcase will then be presented during the "1st advanced Workshop on the Use of Satellite Data for Climate Applications", which will take place in spring 2009 in Germany.

After the announcement of this activity and the review of the six received proposals, Armstatehydromet from Armenia has been selected to conduct this showcase.

Background about conducting National Meteorological Service of Armenia:
Armenia is a climatically diverse region. There are various climate zones in the region starting with everlasting snowcaps and glaciers to warm humid subtropical forests and humid semi-desert steppes. Variety of hazardous weather and climate events such as droughts, floods, cold and heat waves, mudflows, avalanches, landslides, storm winds, etc. affect the socio-economic sectors and sustainable development in the region. Data representing the state of the atmosphere for a certain area during a period of time are the basis of climate monitoring and research. Even though meteorological observations are carried out regularly in Armenia, but the scarcity of the stations network and the time gap of receiving the observation data do not allow to fulfil valuable monitoring.
Climate data derived from satellite measurements are an important component in the climate observing system that consists of conventional observations, remote sensing data and data sets which are created by means of numerical weather prediction models. Satellite-derived data provide a high spatial coverage compared to conventional surface networks and especially fill gaps in areas with few data such as oceans or land regions with sparse conventional observations. They also provide information which cannot be measured from the ground, like the outgoing radiation at the top of the atmosphere. Satellite Application Facility on Climate Monitoring (CM-SAF) provides high quality, reliable data sets with high spatial and temporal resolution. These data in conjunction with the observation data will significantly improve the monitoring of climate system in Armenia and in the entire region.

In a first step to conduct the showcase a common work-plan was developed and it contains the following steps:
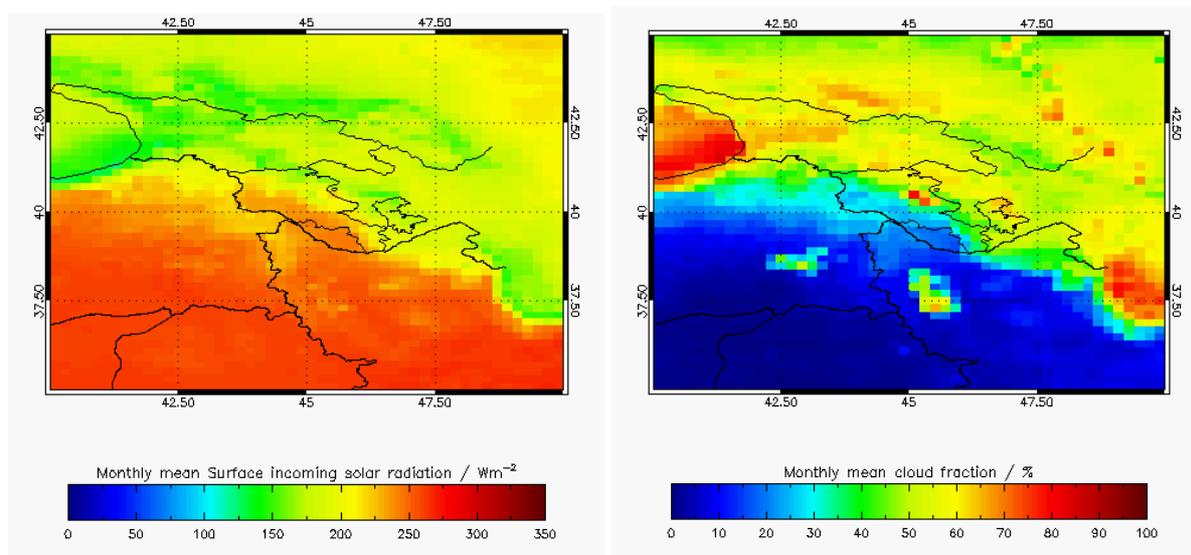
Figure 1: An example of CM-SAF Monthly means of surface solar radiation (W/m²) and cloud fractional coverage (%) for Armenia for September 2006 on a regular 0.5 deg lat/lon grid.

Working plan

Content
Forming a working group led by executive scientist in order to implement CM-SAF showcase project at Armstatehydromet.
Provision of all necessary technical facilities and software packages • ftp-server & internet connection • PC, graphics software
Installation of the softwares required for data processing and visualization and training guided by CM-SAF specialist
Collection of daily and monthly satellite data for last 2,5 years as well as daily data update for surface radiation components (SOL, SDL, SIS, SAL, SNL/SNS, SRB), Fractional cloud cover, cloud top parameters to be collected after completing surface radiation part
Collection of observed data for solar radiation (cloud characteristics at a later stage)
Develop a software to read satellite data, extract pixels close to the stations and make an inter-comparison of satellite data with observed values, validation of CM-SAF products, develop and apply merging technique with surface data.
Short visit of the executive scientist to DWD / CM-SAF if needed
Create an example application for operational usage in Armstatehydromet. Validate the application. Definition of operational requirements.
Processing and Analysis of data. Production of final outputs: -assessment of solar radiation as a renewable source of energy (monthly maps) -surface radiation budget, surface albedo monitoring (weekly, monthly maps) - cloudy and clear sky days (weekly, monthly maps)
Publish products in Web-site of Armstatehydromet
Documentation and presentation the showcase work during the joint EUMETSAT/CM-SAF trainings event in Langen /Germany
Submit a paper for publication
Present and discuss the results of work during the meeting of Scientific-Technical Committee of Armstatehydromet
Organize a training seminar with potential users for presenting products and discussing their further use in specific sectors.