



# Overview of Satellite Products Use in the FFG System

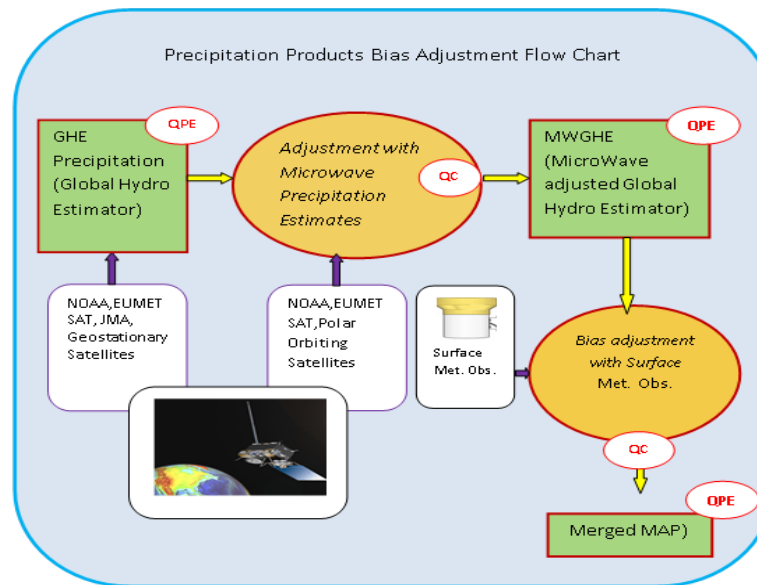
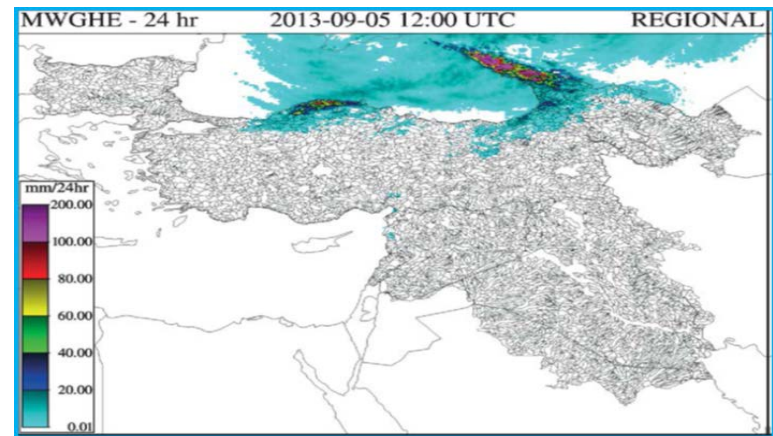
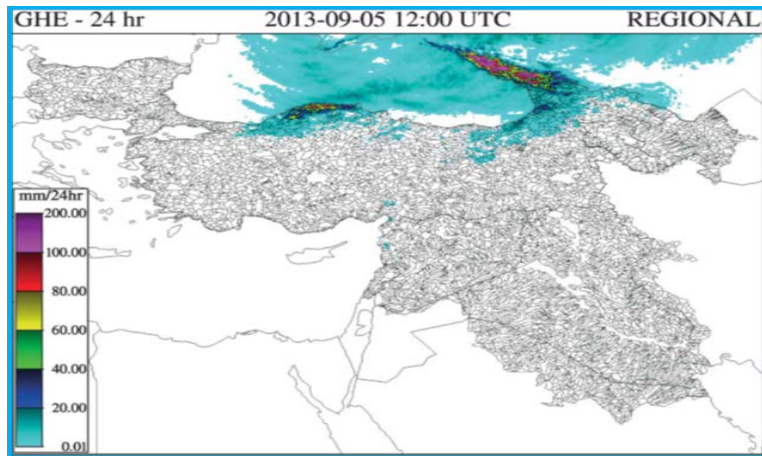


**WMO OMM**

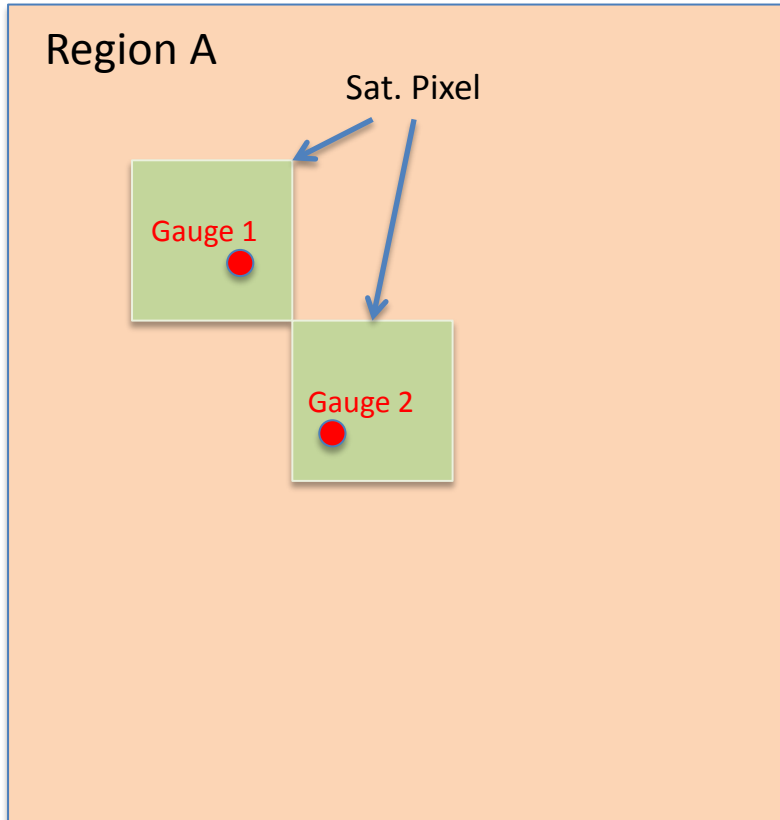
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# Global Hydro Estimator (GHE)



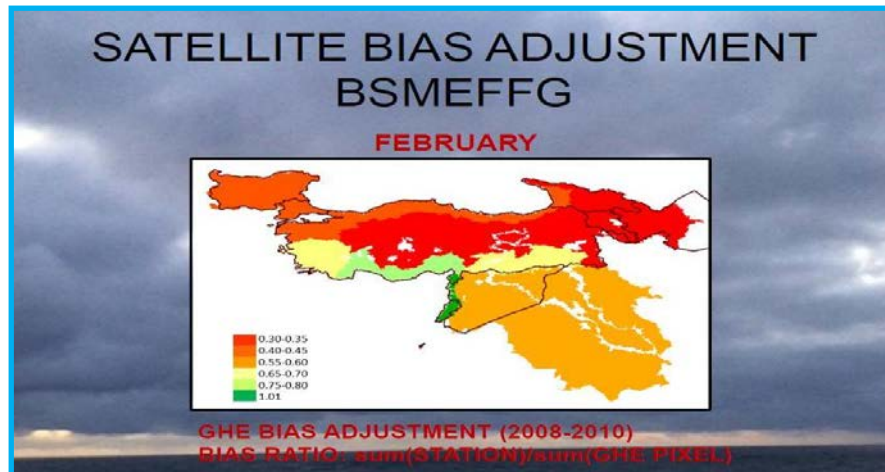
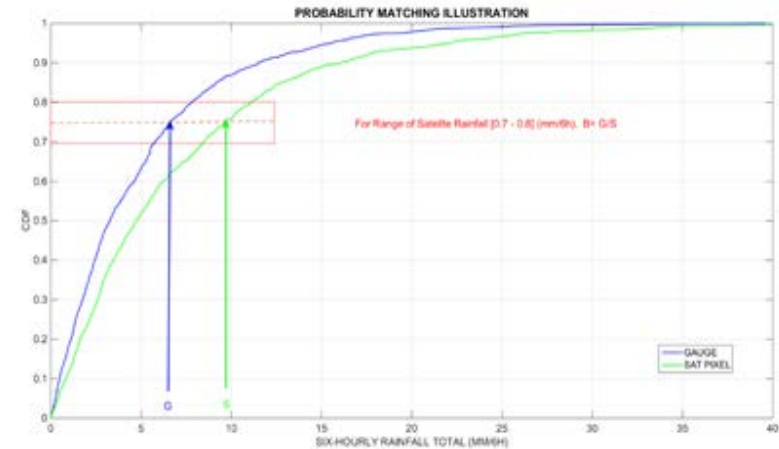
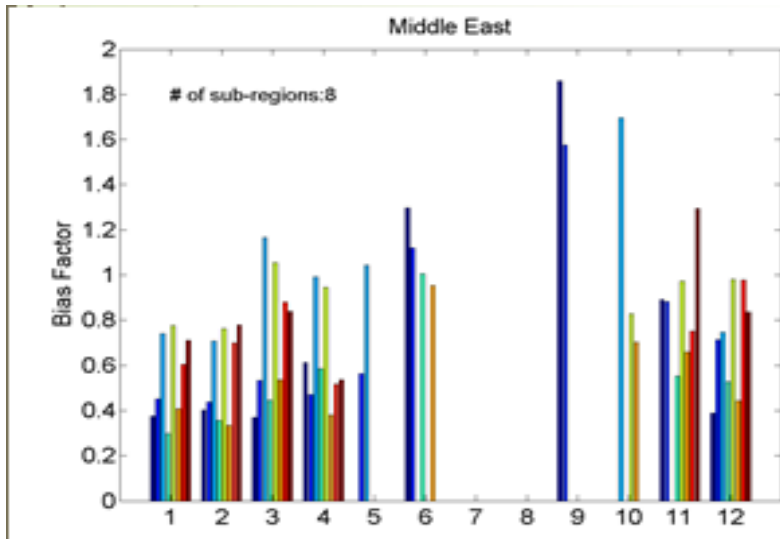
# Bias-Adjustment



Bias may exist in the remotely sensed precipitation data relative to the gauges; bias should be removed before ingesting satellite precipitation data into hydrologic models.

$$\beta = \ln \left[ \frac{\sum_{j=1}^{Ng} Rg(j, t) / Ng}{\sum_{j=1}^{Ng} Rsat(j, t) / Ng} \right]$$

# Climatological Bias-Adjustment



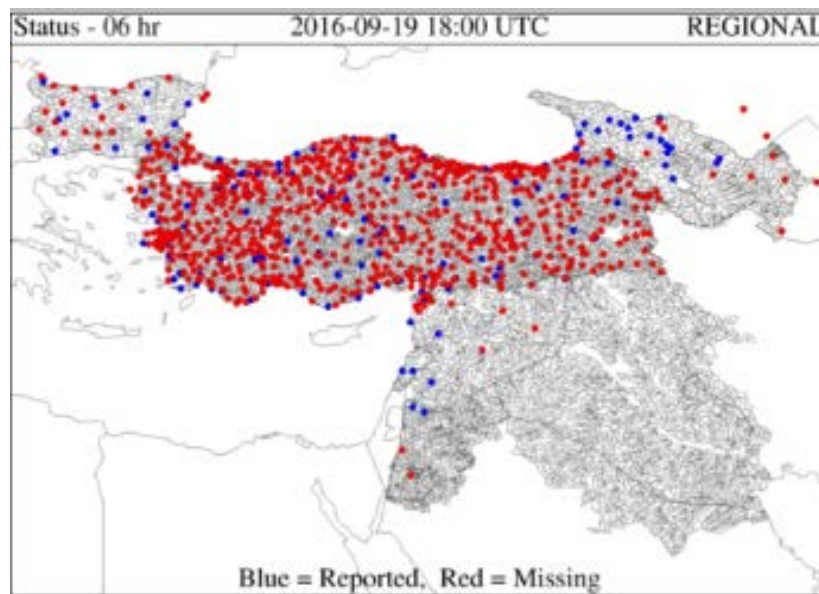
# Dynamic Bias-Adjustment

- Considers short-term adjustment based on real-time gauge reports
- Employs Kalman Filter Approach
- Minimum number of gauge/satellite pixel pairs reporting over consecutive time steps

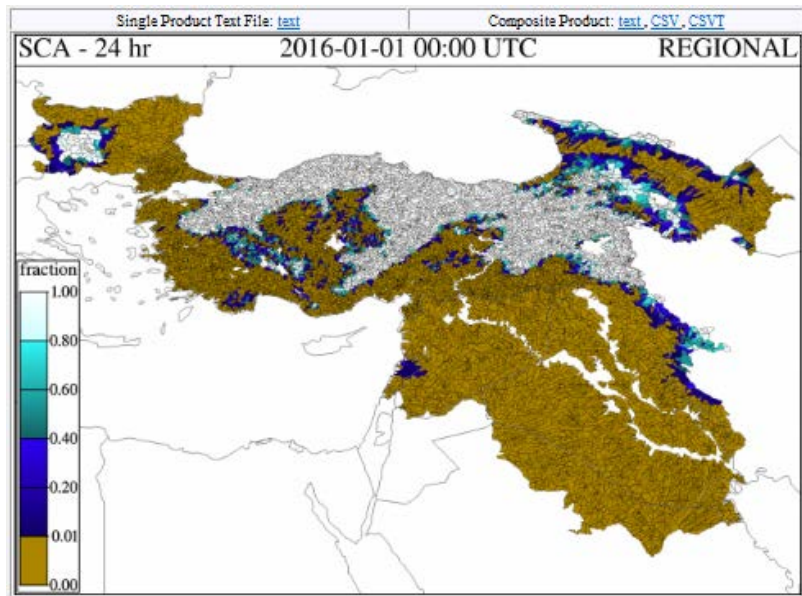
$$\beta_t = \ln \left[ \frac{\sum_{j=1}^{Ng} Rg(j,t)/Ng}{\sum_{j=1}^{Ng} Rsat(j,t)/Ng} \right]$$

$$\beta_{t+1} = \beta_t + w_{t+1}$$

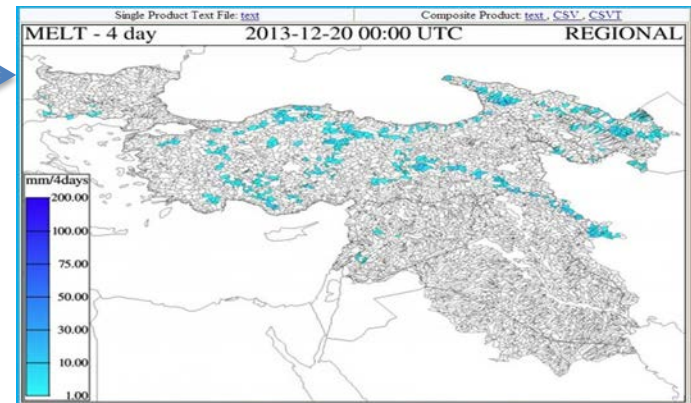
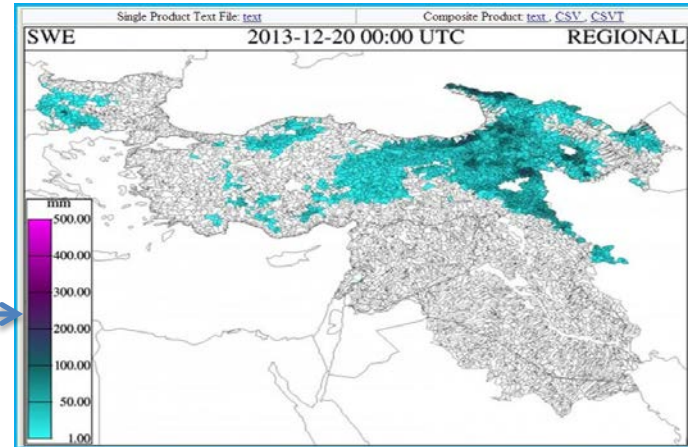
$$z_{t+1} = \beta_t + v_{t+1}$$



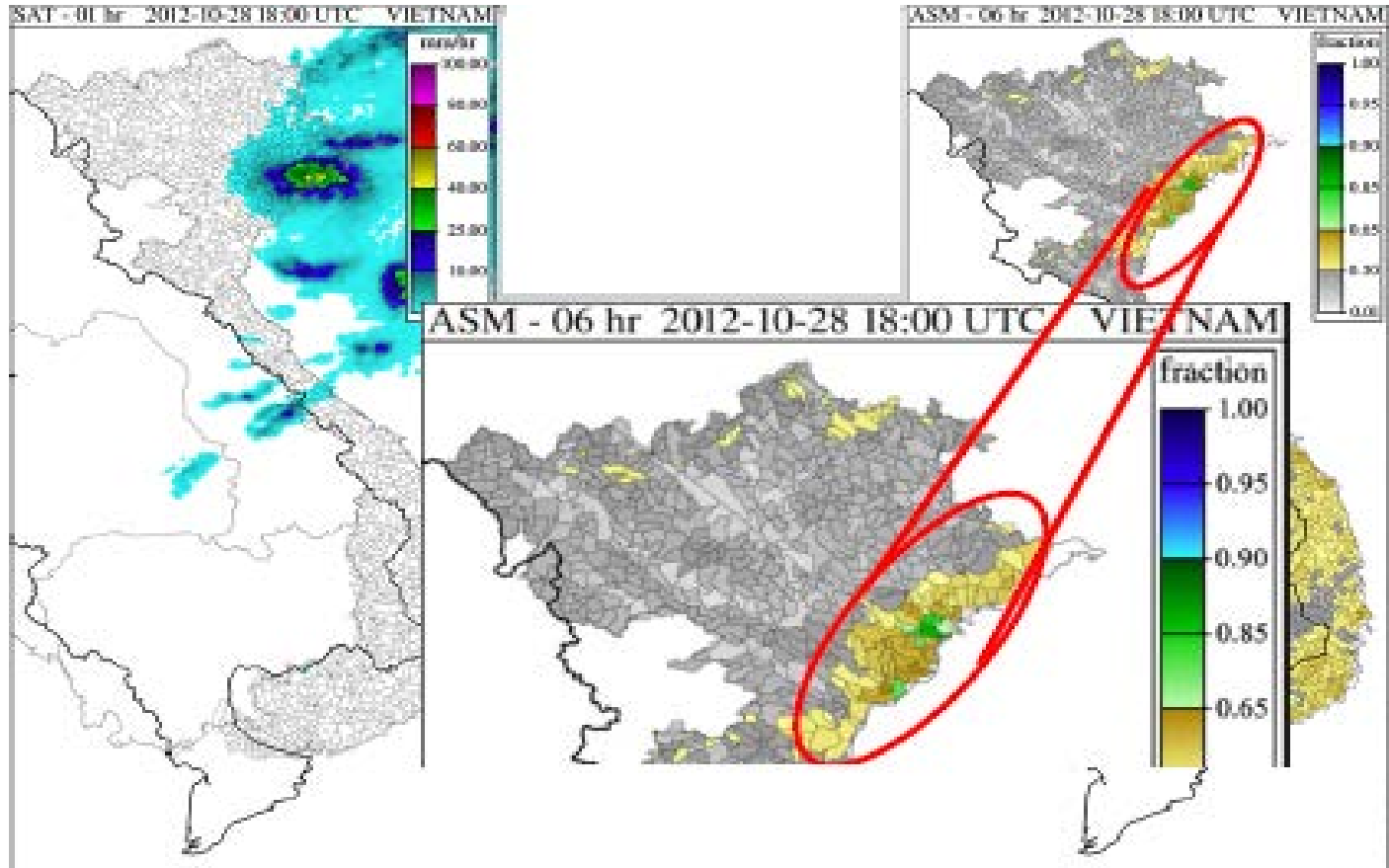
# Snow Coverage Area (SCA)



SNOW MODEL



# Inundation Mapping for Soil Moisture



# Inundation Mapping for Soil Moisture Correction

MODIS Image

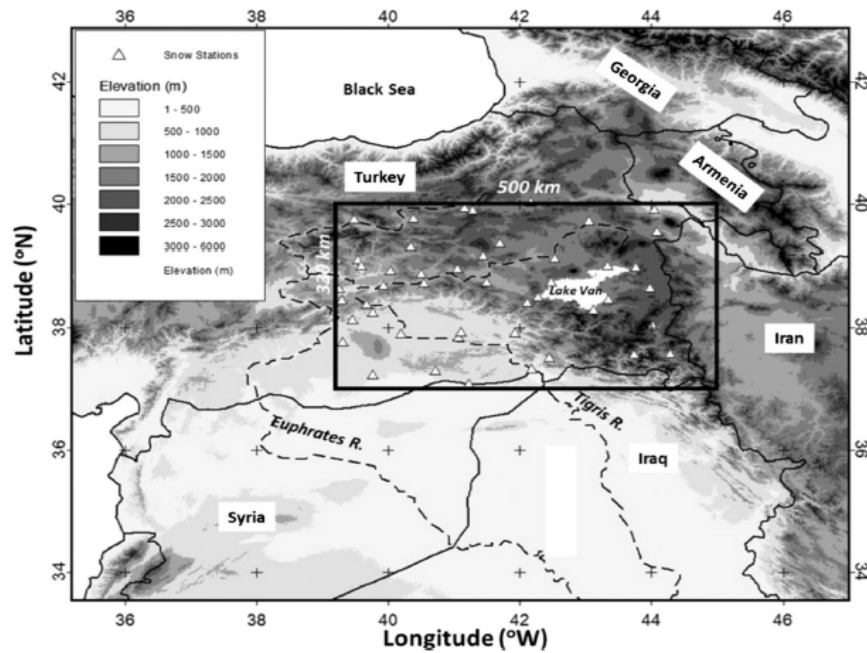


Soil Moisture Fraction (ASM)

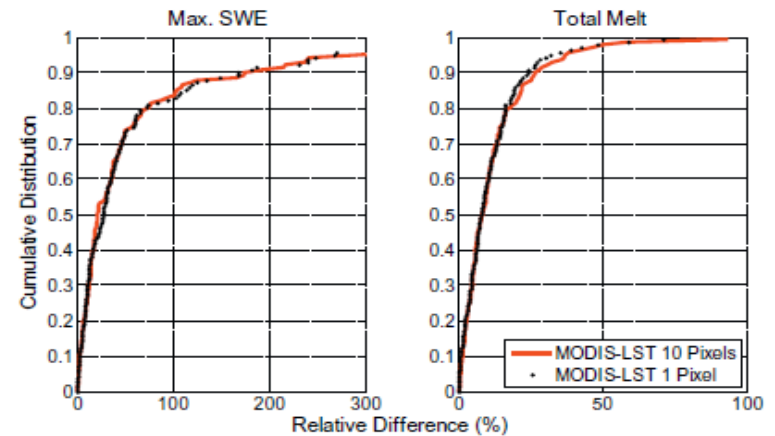
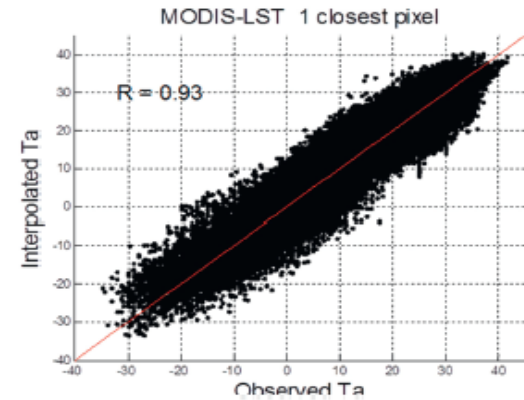




# MODIS Land Surface Temperature for SNOW Model



E. Shamir, K.P. Georgakakos / Remote Sensing of Environment 152 (2014) 83-98



# Thank you

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