Soil moisture data from the active microwave instruments:

Figure 1. An example of the surface relative soil moisture from the ERS scatterometer with 50 km resolution (April 11, 2007).

Soil moisture data from the active microwave instruments:

Figure 2. An example of the surface relative soil moisture from the ENVISAT ASAR GM with 1 km resolution (April 2, 2007).

Soil moisture algorithm:

\[ \sigma^2 = \sigma_{\text{dry}}^2 + 2 \sigma \theta + \sigma^2 \theta \]  

where \( \sigma^2 \) represents the final downscaled soil moisture, \( \sigma_{\text{dry}}^2 \) stands for the coarse resolution ERS data and \( c \) and \( d \) are the downscaling coefficients.

AsAR GM coverage over Europe

The low coverage of ASAR GM over the European continent does not allow for derivation of high resolution soil moisture datasets.

需要对粗分辨率数据进行降尺度技术处理。

Need for downscaling techniques of coarse resolution datasets

The soil moisture algorithm is based on the change detection approach. The actual radar measurements (backscatter) are scaled between the historically lowest (“dry reference”) and highest (“wet reference”) measurements. The final result is a relative measure of soil moisture (0 – 100%).

Figure 3. Soil moisture measurements over the REMEDHUS Network.

Figure 5. Soil moisture measurements over the REMEDHUS Network.

While narrow range (13 – 37 %) soil moisture values were measured with the ERS data, highly heterogeneous soil moisture patterns were evident in the ASAR GM (13 – 87%). Clearly, large amount of information can not be detected by the ERS coarse measurements.

Figure 7f then demonstrates the added spatial information at the 1 km scale via the downscaling coefficients c and d. The patterns in the downscaled product corresponded to the ASAR GM soil moisture patterns (Figure 1e).

CONCLUSION

- An innovative approach of retrieving 1 km soil moisture information from the coarse resolution products is presented.
- The results are of relevance for interpreting and downsampling coarse resolution soil moisture data retrieved from active (METOP ASCAT) and passive (SMOS, AMSR-E) instruments.

Results:

Soil moisture at 50 km (ERS) (a), 1 km (ENVISAT ASAR GM) (b) and the 1 km downscaled product (c) covering the area of northeastern Austria at 1 km resolution on March 13th, 2006 are demonstrated in Figure 7 (upper part).

While the relative spatial patterns of the ERS and ASAR GM soil moisture data correlated, the soil moisture levels differed

Figure 8.