Comparison of Three Simplified Algorithms for Atmospheric Corrections of MERIS Data over Land

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Modified Ångström Algorithm (A)
Assumptions:
- Clear atmosphere
Procedure:
- Modeling of the physical phenomena, i.e. Rayleigh scattering, absorption due to water vapor and ozone, as well as aerosol scattering and absorption, using climatological data
- The atmospheric correction is performed for all MERIS channels except 11 (O2) and 15 (H2O)

Modified Clear Water (B) / Dark Vegetation Method (C)
Assumptions:
- Reflectance of clear water or dark vegetation is known
- Atmospheric properties do not vary significantly in the scene
Procedure:
- Estimate the key atmospheric parameters to calculate the radiative transfer as a function of the difference between measured (TOA) reflectance and ground reflectance of clear water or dark vegetation and of the sun and observer geometry
- Apply the same correction for the entire scene
- The atmospheric correction is performed for all MERIS channels except 11 (O2) and 15 (H2O)

RGB: MERIS-channels 7, 5 and 3: λ = 665, 560 and 490 nm

Results for southern Germany

<table>
<thead>
<tr>
<th>Method</th>
<th>Advantages</th>
<th>Disadvantages</th>
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| Modified Ångström | • Modeling of physical phenomena  
• Takes into account ground level elevations  
• No information concerning surface reflectance required | • Valid only for low haze conditions |
| Modified Clear Water | • Very fast  
• Accurate for the NIR | • Requires knowledge of water signature (larger uncertainties at visible wave length)  
• Valid only if atmospheric conditions above clear water and the rest of the scene are very similar |
| Modified Dark Vegetation | • Very fast  
• Accurate for the visible wave length range | • Requires knowledge of dark vegetation signature  
• Extrapolation necessary for NIR channels  
• Valid only if atmospheric conditions above dark vegetation and the rest of the scene are very similar |