Cloud fractions and related parameters

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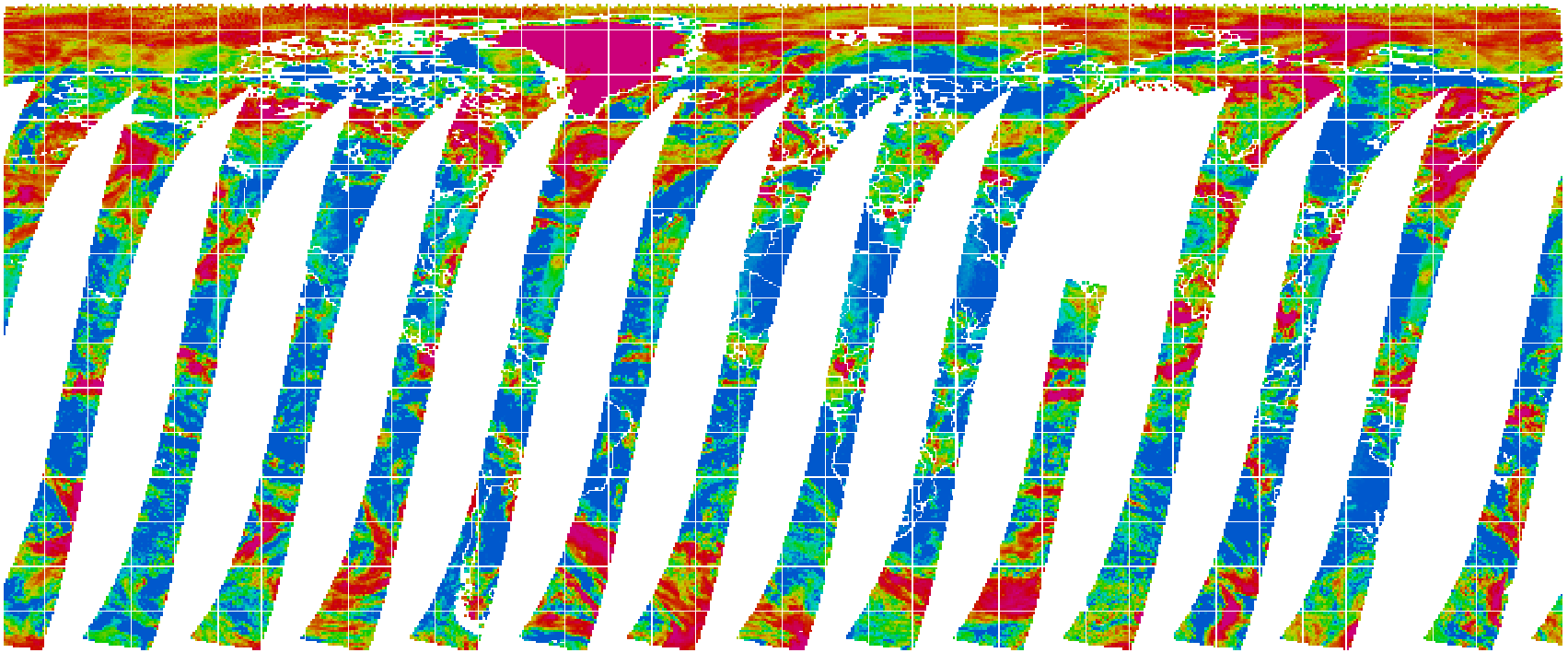
CRUSA 16.07.1997



Validation and further development of CRUSA

- Improvement of CRUSA and comparison with other algorithms.
- Results:
  - The outcome of CRUSA‘s iterative fix point method are quite good background (cloud free) images
  - The values of CRUSA over ocean are inaccurate
    - (negative values, if the pixel is cloudless; too high values, if the pixel is cloudy)
  - The problems due to using the HSV-colour space.

Cloud sensitivity of the PMD-channels

- Investigation was conducted of
  - The three PMD channels (UV, green and red)
  - Sum of red channel and green channel
  - Sum of red, green and uv channel.
  - Maximum of the three channels (HSV-brightness)
  - Red-green interpolation in RGB-colour space
  - Minimum of the three PMD channels
  - Minimum of the red and the green channel.

Iterative fix point method I

- A iterative fix point method is used to calculate background images:
  - The test was limited to data of 1997.
  - Pre-classification: cloudy pixel are removed through threshold-method. Mean of all images.
  - Cutting of clouds through comparison with the last background picture. Mean of all images.
  - The iteration ends, if there are no more changes of the background picture

Iterative fix point method II

- We get cloud free pictures for every day: The mean of them is the result of the iteration.
- For cloud detection the mean of the cloud free pictures of 30 days is used.
- A reference picture of maximum cloud is calculated in a similar way. Only one picture for the whole year is used.

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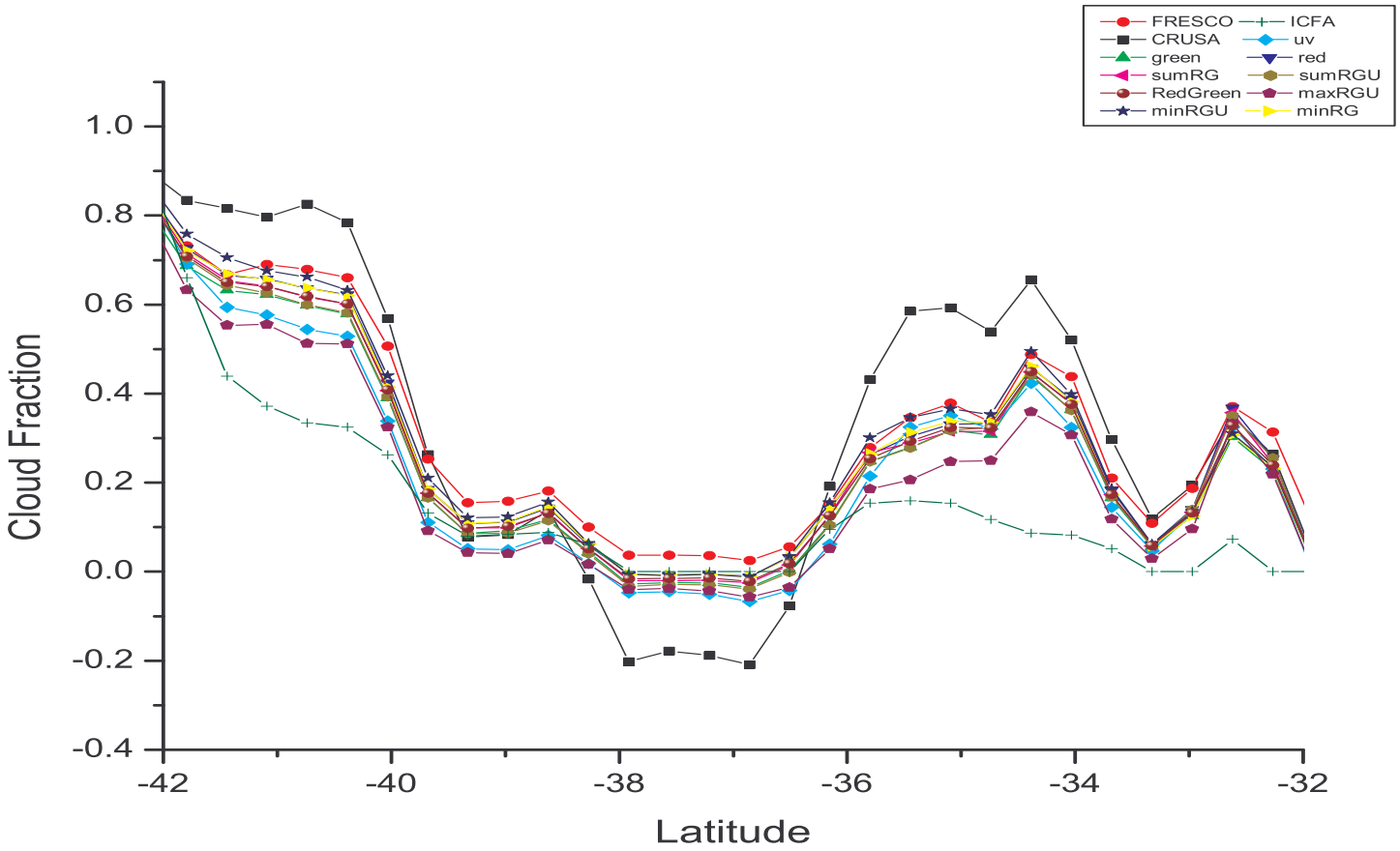
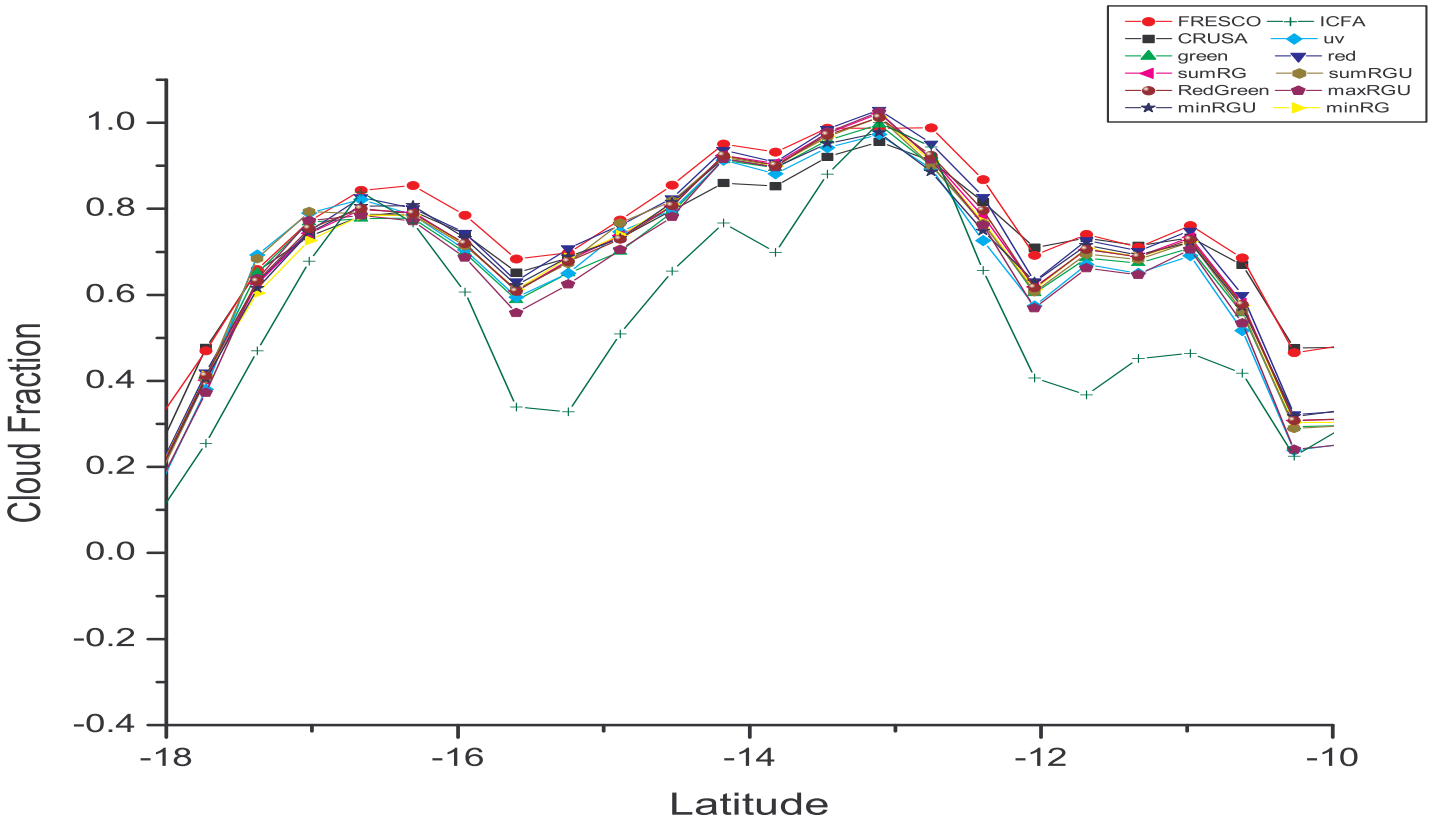
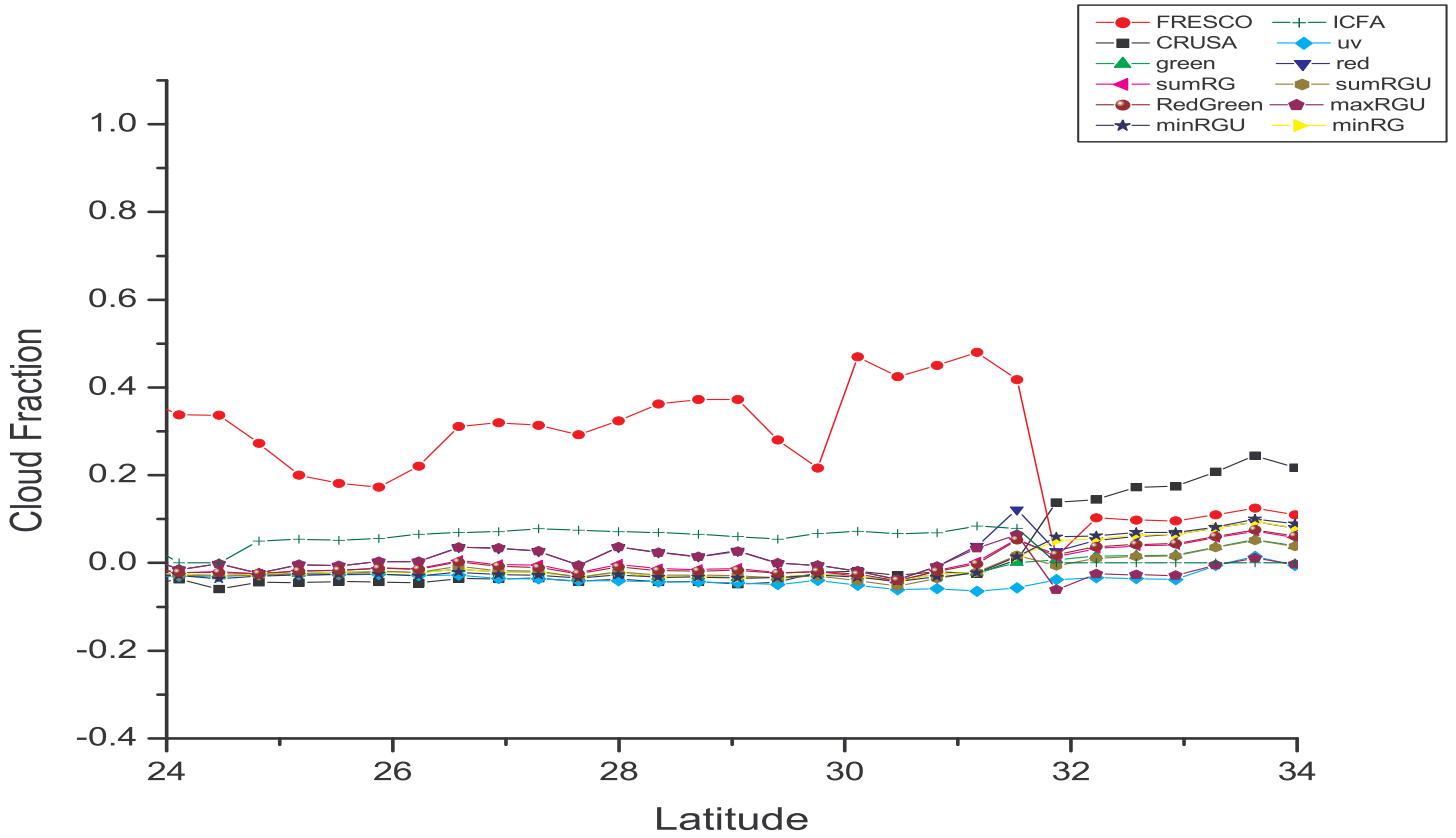
Comparison: Ocean (18.02.97)



Savannah (18.02.97)



Sahara (16.07.97)



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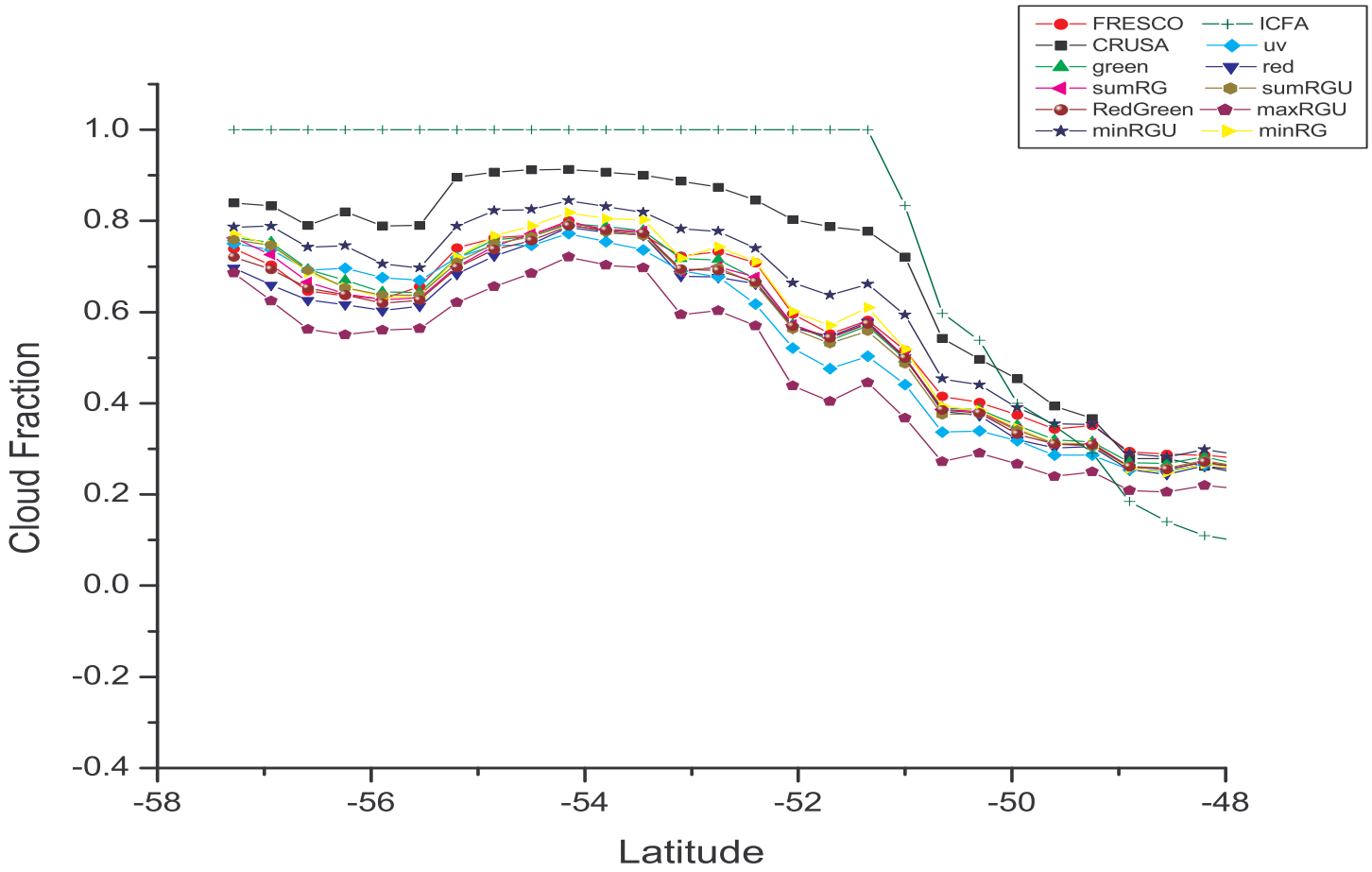
Ocean (16.07.97)



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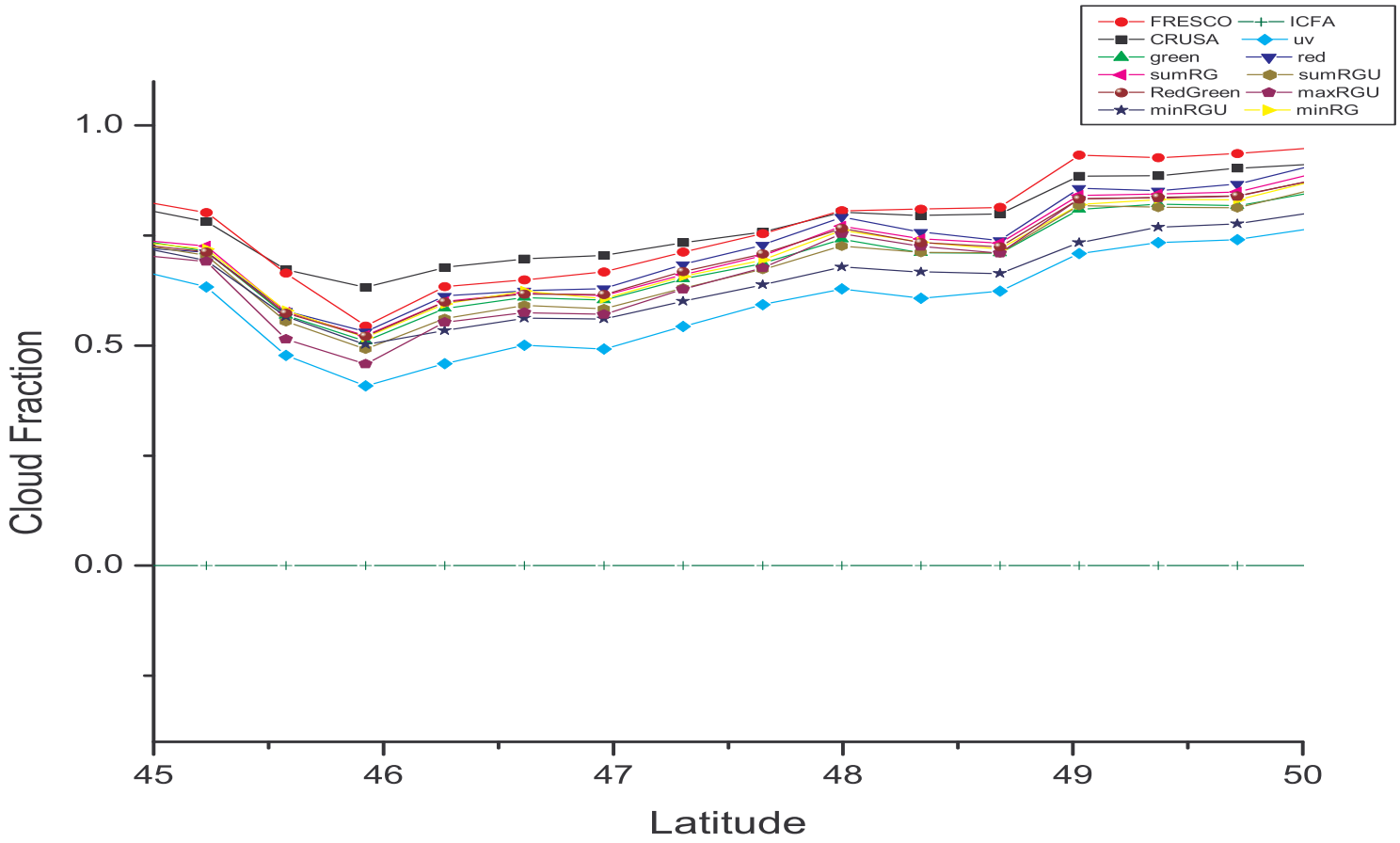
Ukraine, Black Sea (16.07.97)



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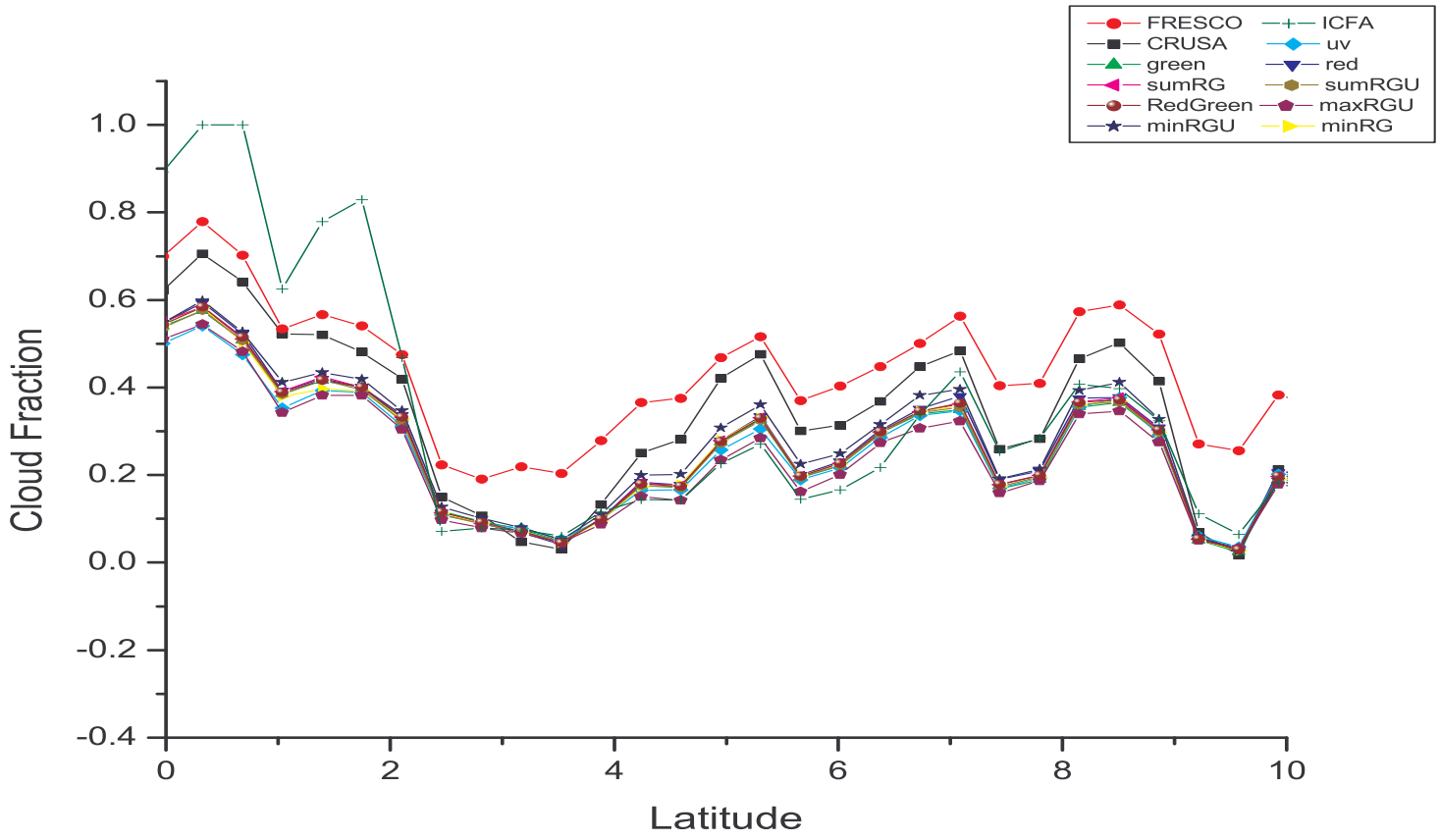
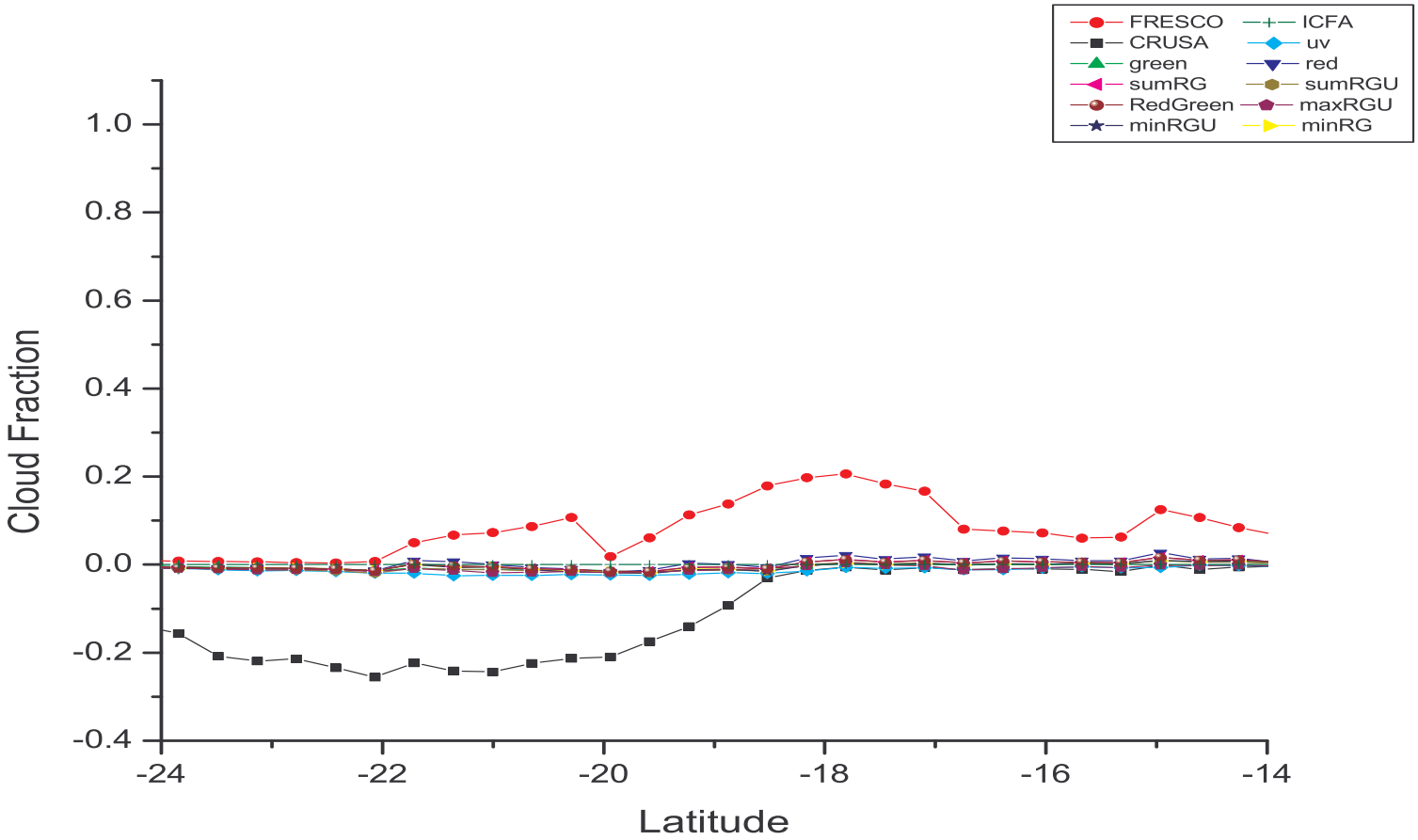
Rainforest, savannah (16.07.97)



Desert and ocean (16.7.97)



Outlook I

- **Implementation of a new PMD-algorithm to detect fractional cloud cover:**
- We won‘t use the UV-channel.
- Improved background iteration:
  - Different iterations for different periods of the year using the whole GOME-Data.
  - Higher spatial resolution

Outlook II

- Improved calculation of maximum cloud
  - further investigation: determination of maximum depends only on solar zenith angle?
  - Quality of maximum cloud data depends strongly on the size of the used dataset.
- Calculation of cloud top height
  - evaluation of O_4 (630 nm) , new cloud fractions and radiation transfer modelling.

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ADD-ONs

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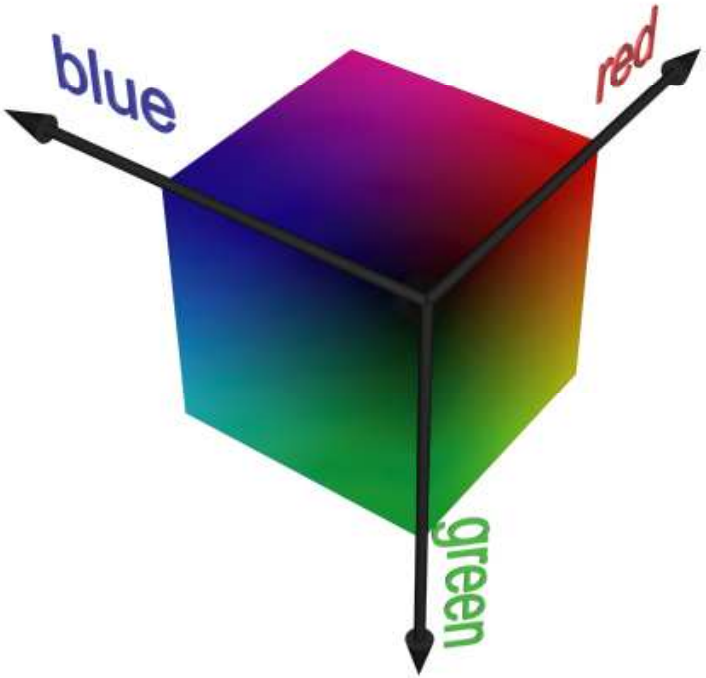
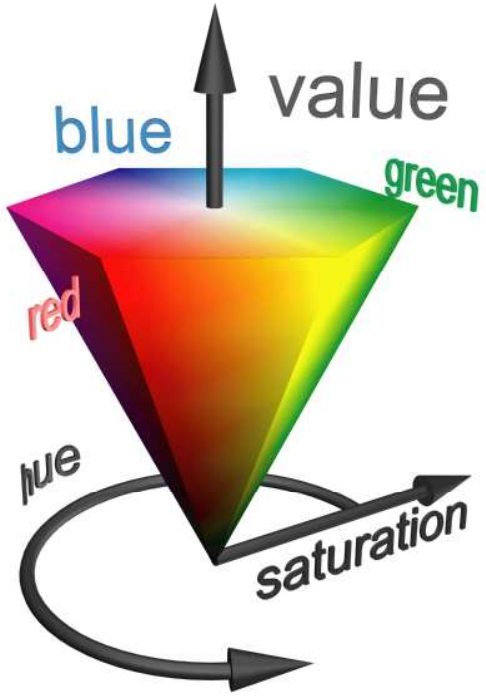
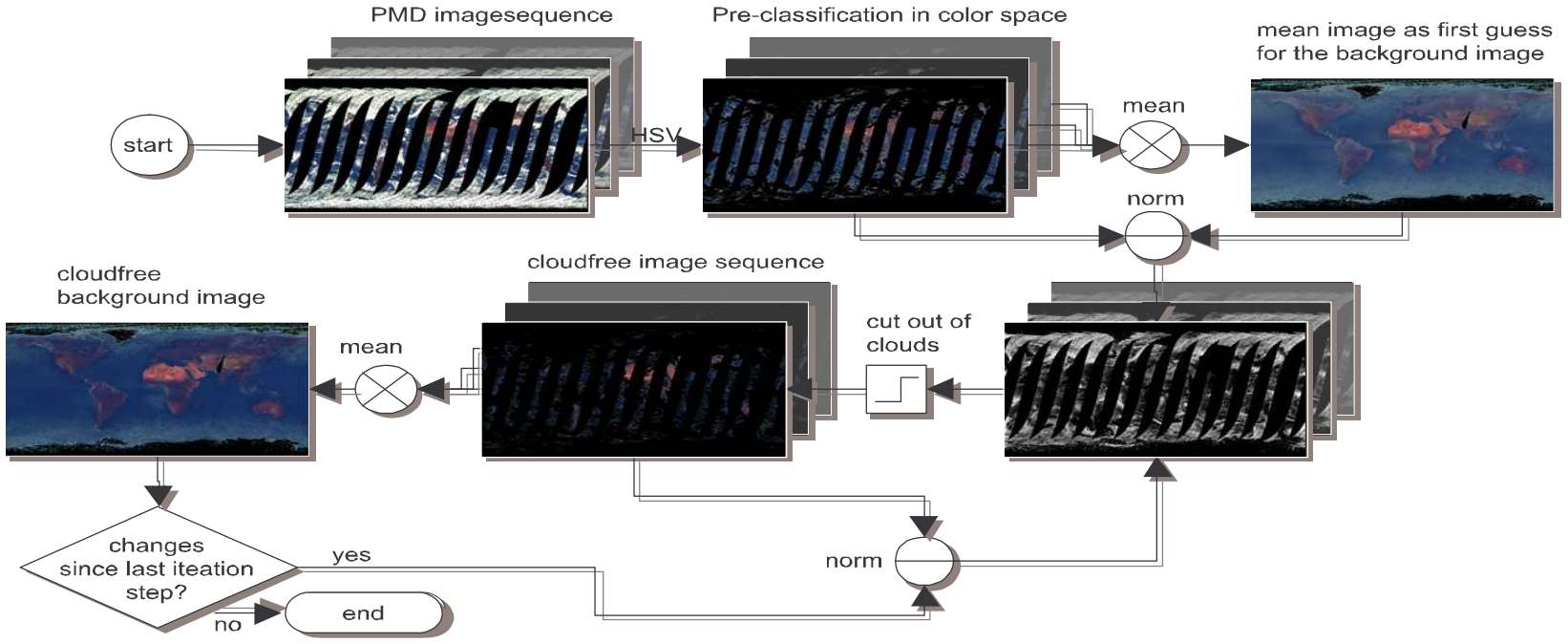
HSV and RGB colour space





CRUSA iteration



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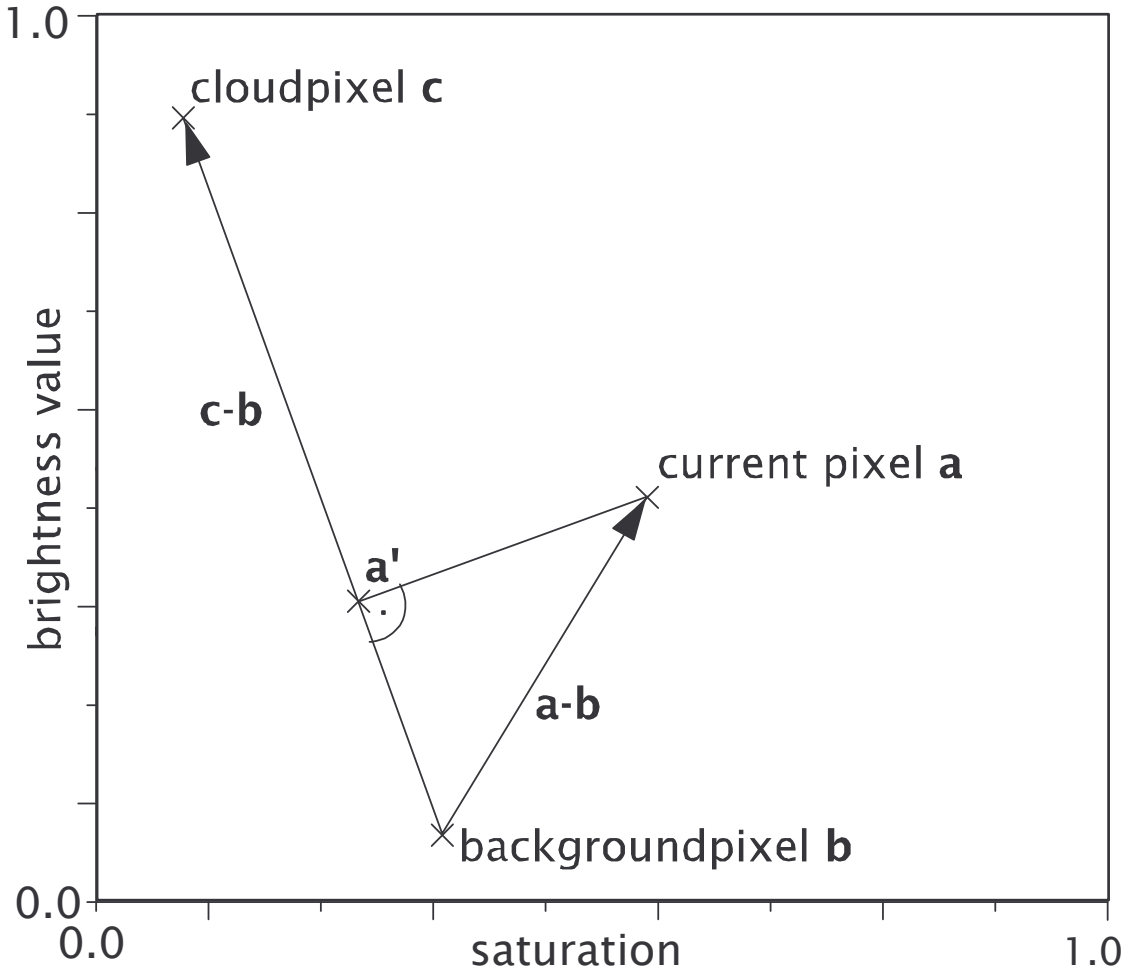
CRUSA interpolation



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CRUSA 18.02.1997