Long Term Land Data Records

NASA/GSFC: Ed Masuoka, Robert Wolfe, Jeff Pedelty, Nazmi Saleous, Sadashiva Devadiga, Compton Tucker and Jorge Pinzon

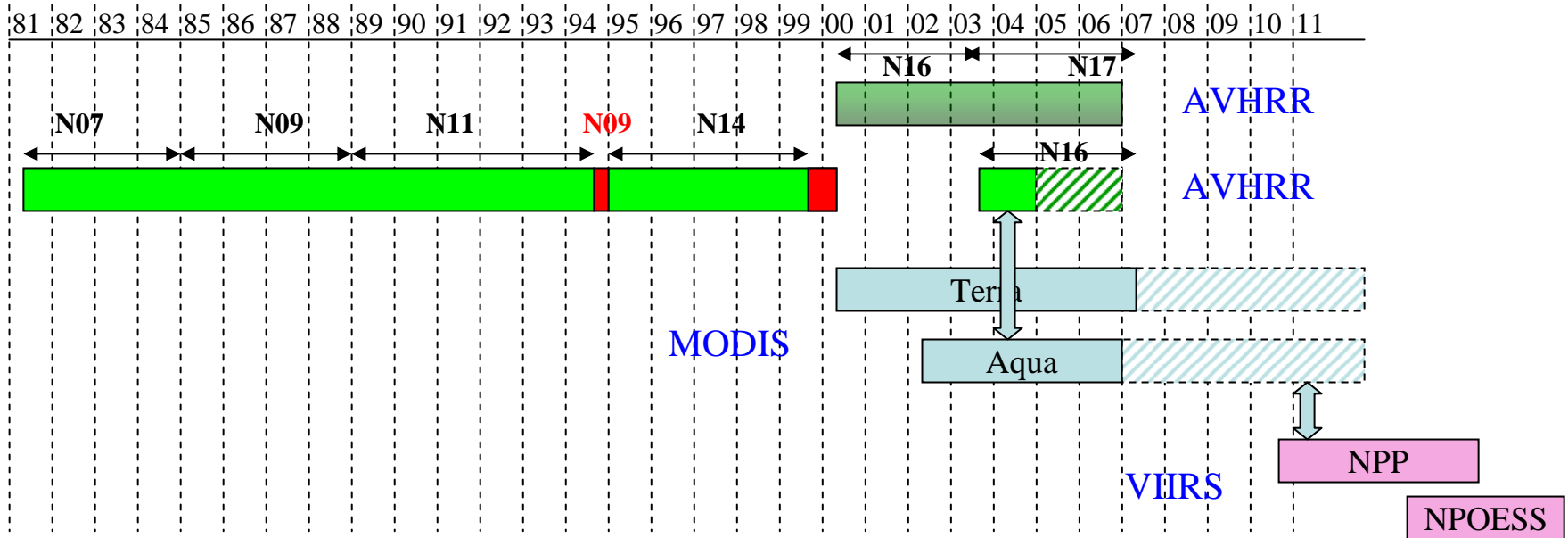UMD: Eric Vermote, Chris Justice and Steve Prince

NOAA: Anna Pinheiro

South Dakota State: David Roy

Boston University: Crystal Schaff

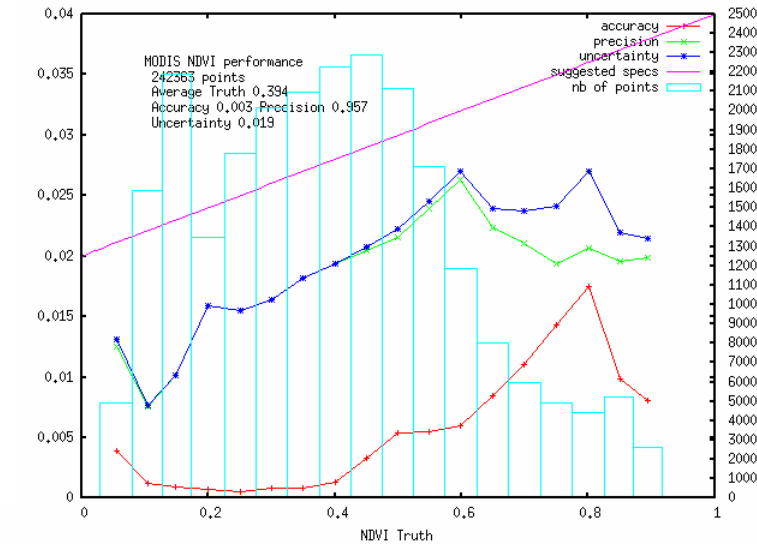LCLUC Meeting May, 2, 2008

Data Sources - LTDR

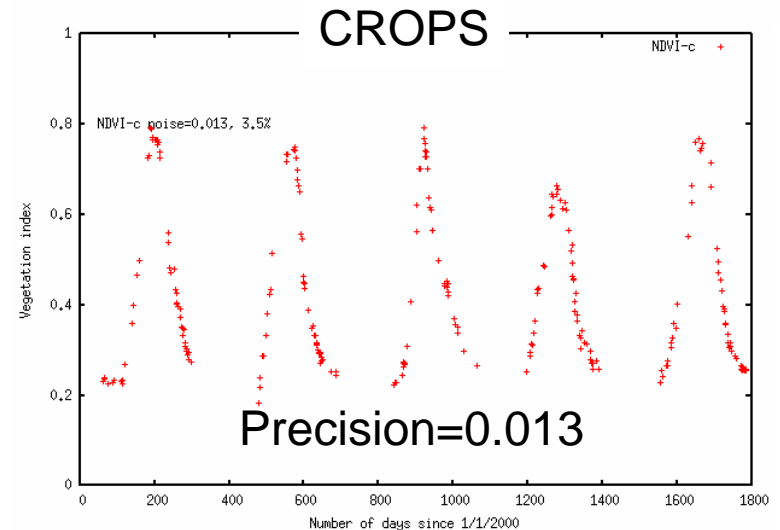AVHRR (GAC) 1982-1999 + 2003-2006
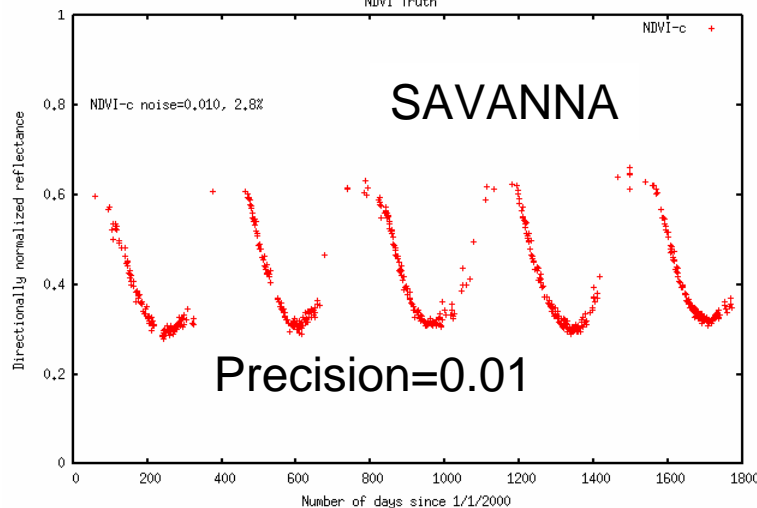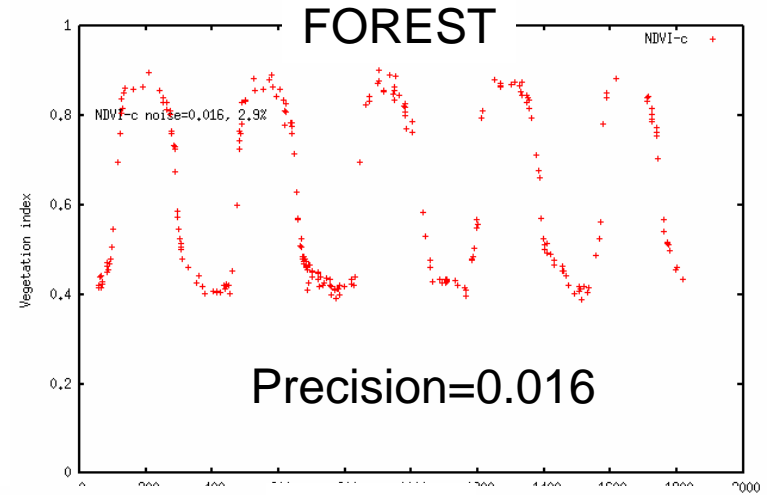MODIS (MO(Y)D09 CMG) 2000-present
VIIRS 2010 – 2020 (global gridded comparison products)

MODIS used as a reference for past and future land data record (example NDVI)
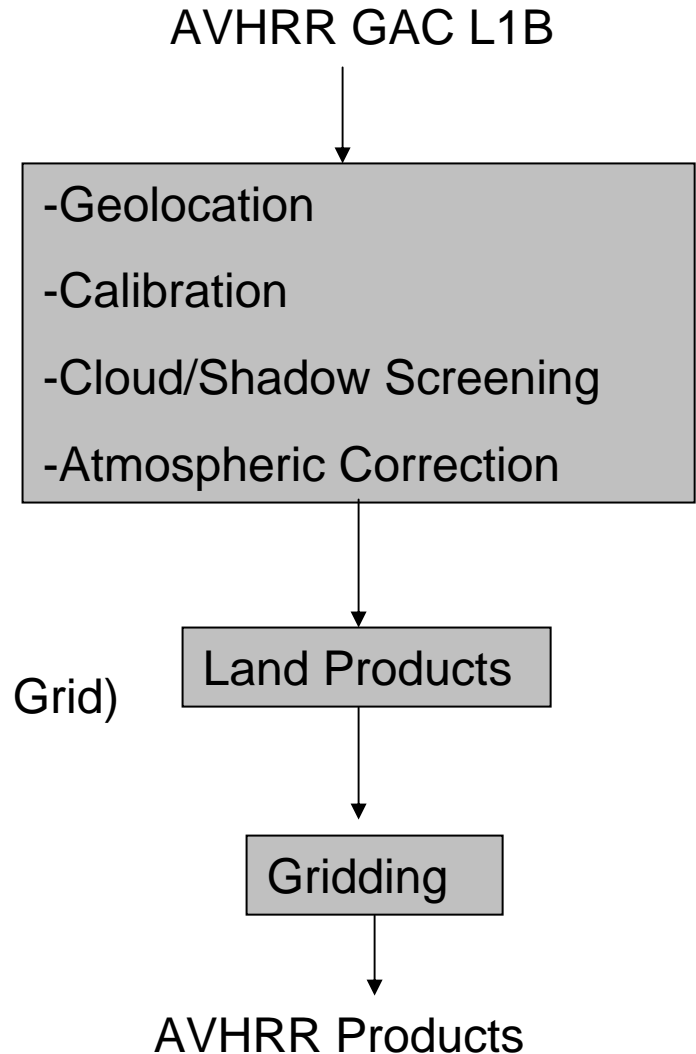
Evaluation over AERONET (2003)
0.007 < Precision < 0.017

Independent evaluation of the precision
Over 2000-2004 CMG daily time series

FOREST

Precision=0.016

SAVANNA

Precision=0.01

CROPS

Precision=0.013

AVHRR Data Production and Status

- Algorithms:
  - Vicarious calibration (Vermote/Kaufman)
  - Cloud screening: CLAVR-1
  - Partial Atmospheric Correction:
  - Rayleigh (NCEP)
  - Ozone (TOMS)
  - Water Vapor (NCEP)
- Products:
  - Daily surface reflectance (AVH09C1)
  - Daily NDVI (AVH13C1)
- HDF-EOS Format:
  - Linear Lat/Lon projection
  - Spatial resolution: 0.05º (Climate Modeling Grid)
- Time Period:
  - 1981 – 2000 completed
- Distribution:
  - ftp and web

AVHRR GAC L1B

-Geolocation

-Calibration

-Cloud/Shadow Screening

-Atmospheric Correction

Land Products

Gridding

AVHRR Products

LTDR Web Page

http://ltdr.nascom.nasa.gov/ltdr/ltdr.html

Data Sets

- **Beta Quality (Version 1)**
  - Released in Summer 2006
  - Evaluation of data revealed following issues
    - Geolocation shift due to bad ephemeris
    - Calibration error
    - Cloud mask error

- **Version 2**
  - Released in Summer 2007
  - Improved geolocation, water vapor and calibration

Geolocation Accuracy N09 and N11

Red points: Version 1.0 geolocation accuracy
Green points: Version 2.0 geolocation accuracy

Geolocation Accuracy N14

Red points: Version 2.0 geolocation accuracy (Miami Clock corrections)
Green points: Version 3.0 geolocation accuracy (adjusted clock corrections)

Calibration of NOAA 16 AVHRR

Calibration of NOAA16 AVHRR over a desert site using MODIS data

E.F. Vermote [a,*], N.Z. Saleous [b]

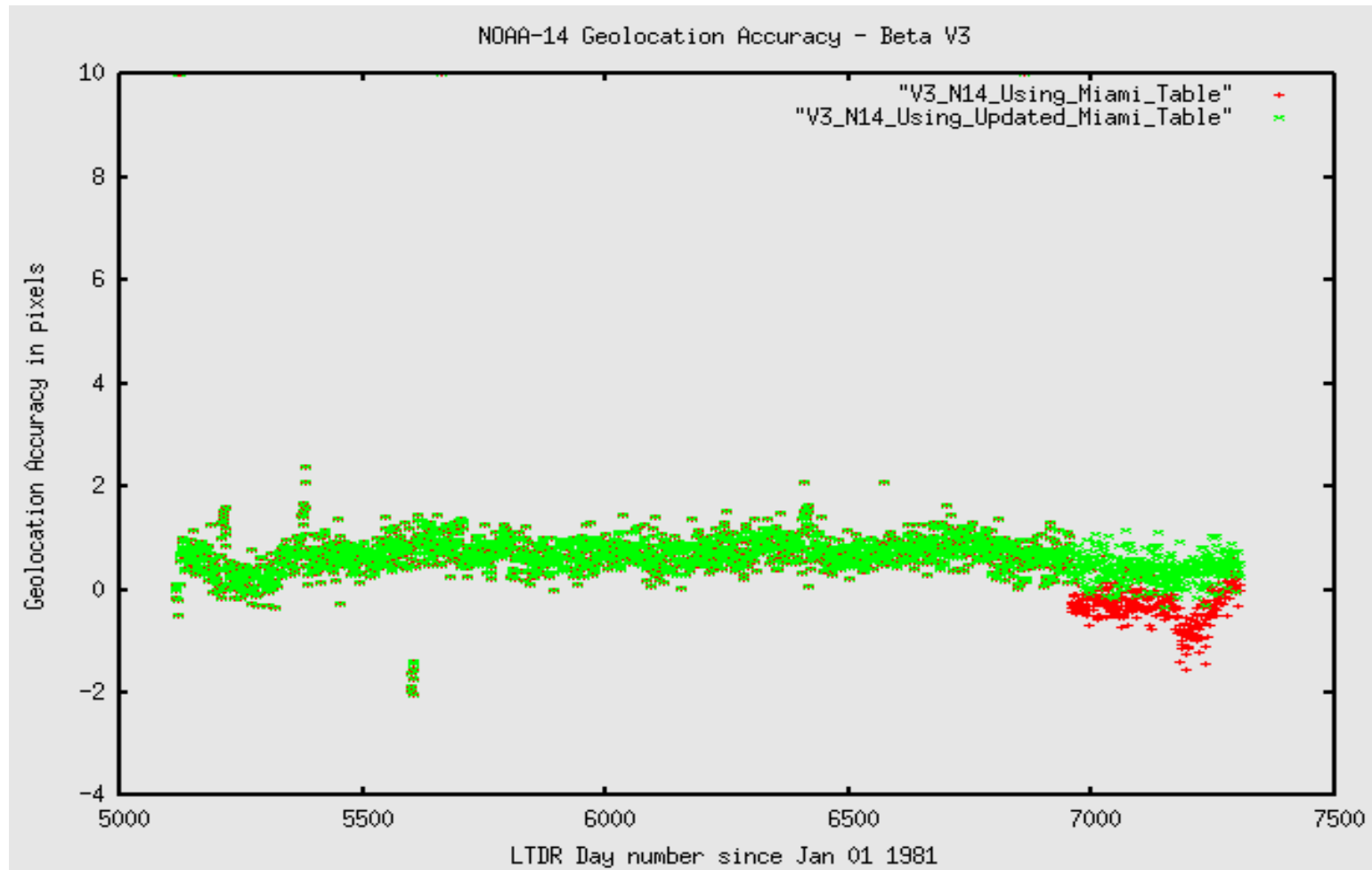[a] University of Maryland, Department of geography and NASA GSFC Code 614.5, United States
[b] SAIC and NASA GSFC Code 614.5, United States

Abstract

This paper presents a new approach to AVHRR-sensors cross-calibration in the visible to shortwave-infrared spectral domain using an a-priori, well calibrated sensor (MODIS). The approach has been tested over a stable Sahara desert site and was initially applied to compare the absolute calibration coefficients of three different bands of the Terra and Aqua MODIS instruments. The observed agreement was better than 1% for bands 1 (0.67 μm), 2 (0.87 μm) and 7 (2.13 μm). The approach was then applied to cross-calibrate the AVHRR sensor onboard NOAA16. The absolute calibration coefficients derived for bands 1 and 2, using the Terra MODIS as a reference, were compared to the vicarious coefficients derived using the ocean and clouds method [Vermote E.F. and Kaufman Y.J. (1995). Absolute calibration of AVHRR visible and near-infrared channels using ocean and cloud views, International Journal of Remote Sensing, 16, 13, 2317–2340.]. The coefficients were consistent within less than 1%.
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Keywords: Calibration; AVHRR; MODIS

LYBIA

TIBESTI

NIGER   CHAD

Fig. 2. Location of the 20 km by 20 km calibration site (centered on the red square) The image represents an area of 1000 km by 1000 km

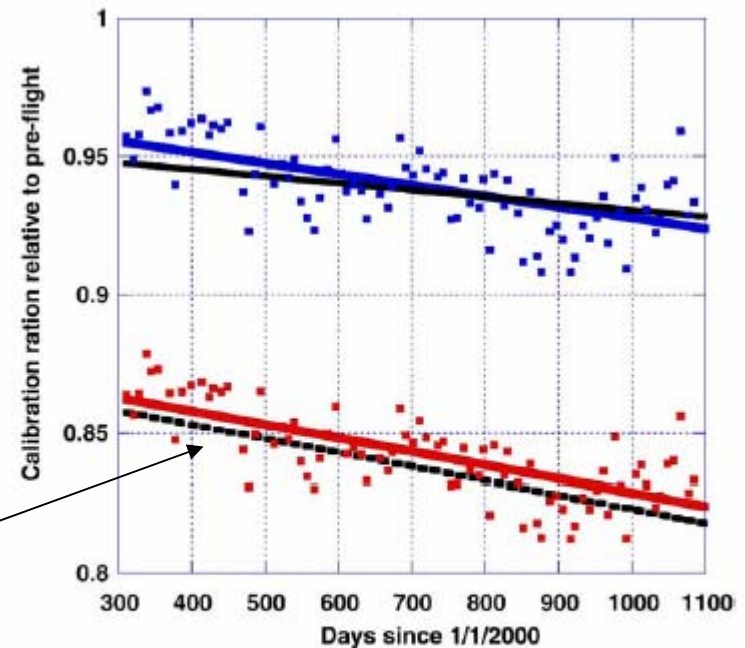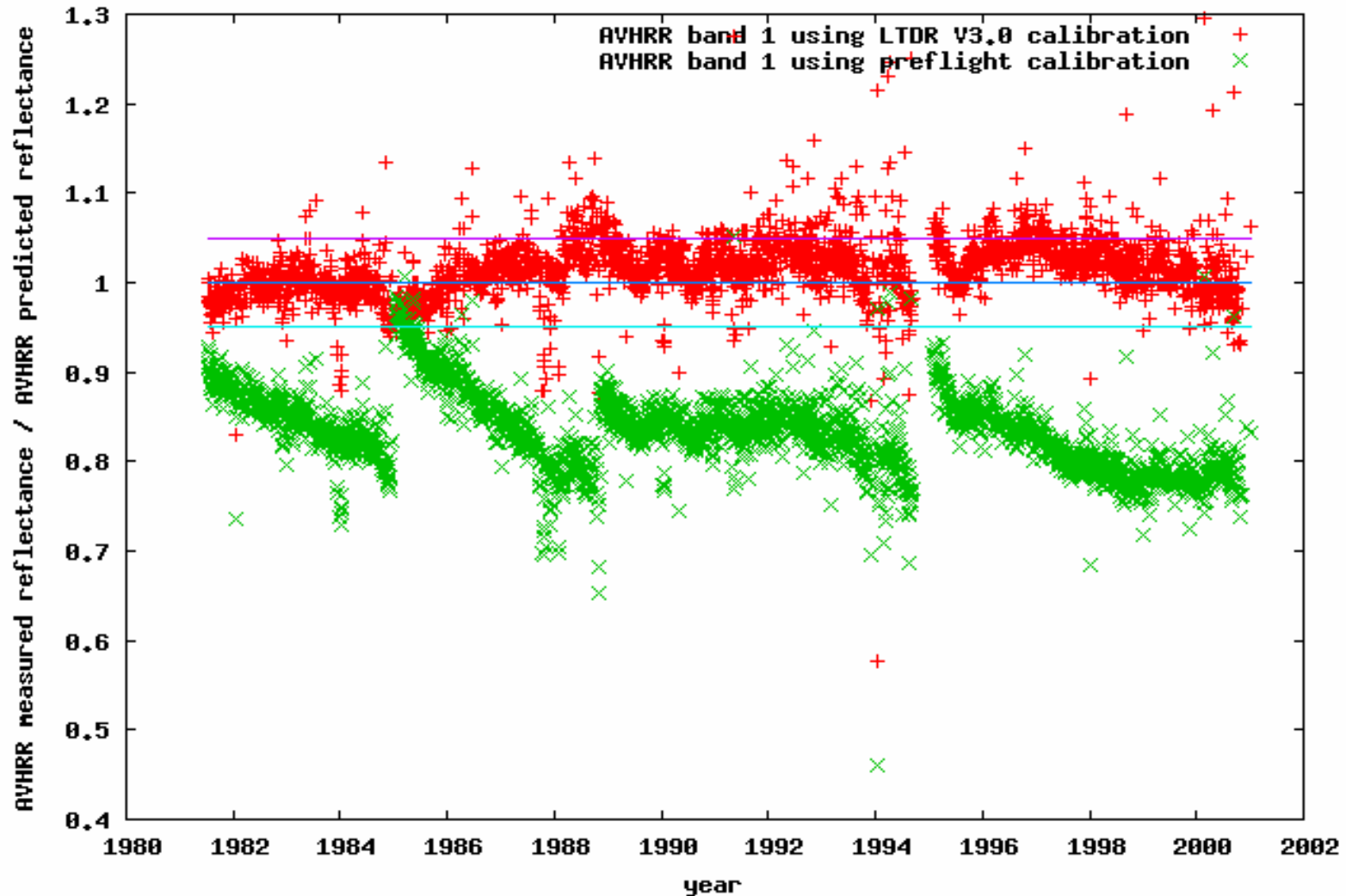**The coefficients were consistent within less than 1%**

Fig. 11. Comparison of the desert calibration trends for band 1 (black solid line) and band 2 (black interrupted line), with the trends obtained using the Ocean and Clouds method (Vermote and Kaufman, 1995) for band 1 (blue line and square) and band 2 (red line and square).

Extension of calibration evaluation to NOAA 7,9,11 and 14 (on-going)

V3.0 Calibration evaluation over Lybian desert

AVHRR band 1 using LTDR V3.0 calibration +
AVHRR band 1 using preflight calibration ×

AVHHR AND MODIS daily time series used to investigate vegetation onset in Europe

Click Here for Full Article

Mild winter and spring 2007 over western Europe led to a widespread early vegetation onset

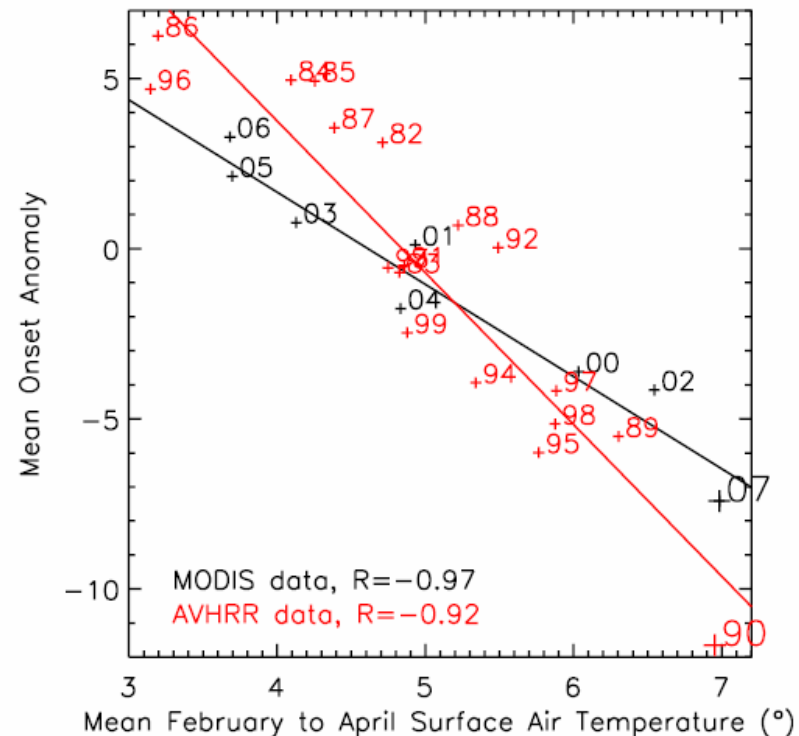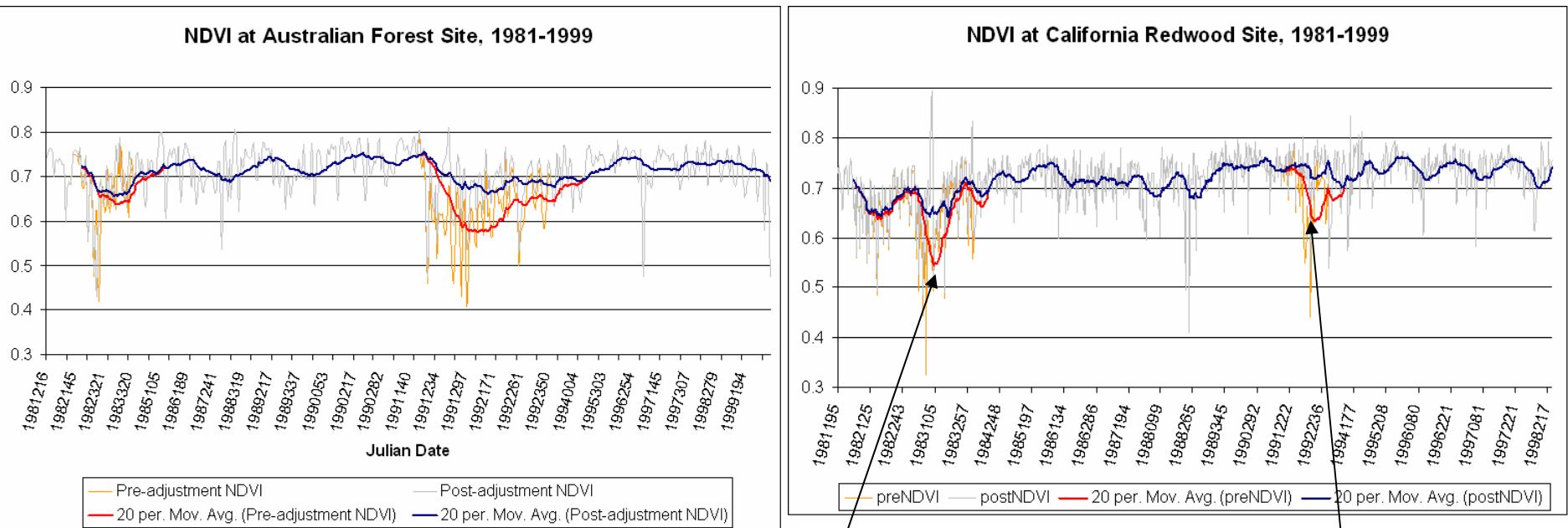F. Maignan,[1] F. M. Bréon,[1] E. Vermote,[2] P. Ciais,[1] and N. Viovy[1]

Figure 2. Scatterplot of the vegetation onset date anomaly against the February–April mean temperature. Both parameters have been averaged at the subcontinent scale. The phenology parameters have been derived from the MODIS data for the 2000–2007 period and AVHRR data for the 1982–1999 period. The temperatures are 2m air temperatures from the NCEP reanalysis [Kalnay et al., 1996].

Correction for stratospheric aerosol

Red curve: AVHRR NDVI not corrected for stratospheric aerosol
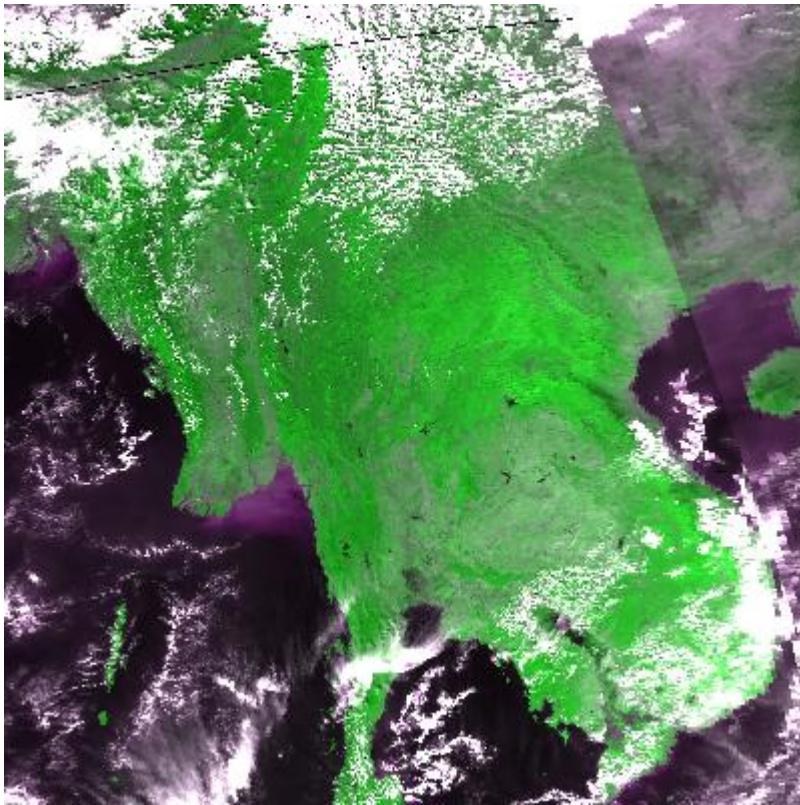Blue curve: AVHRR NDVI corrected for stratospheric aerosol
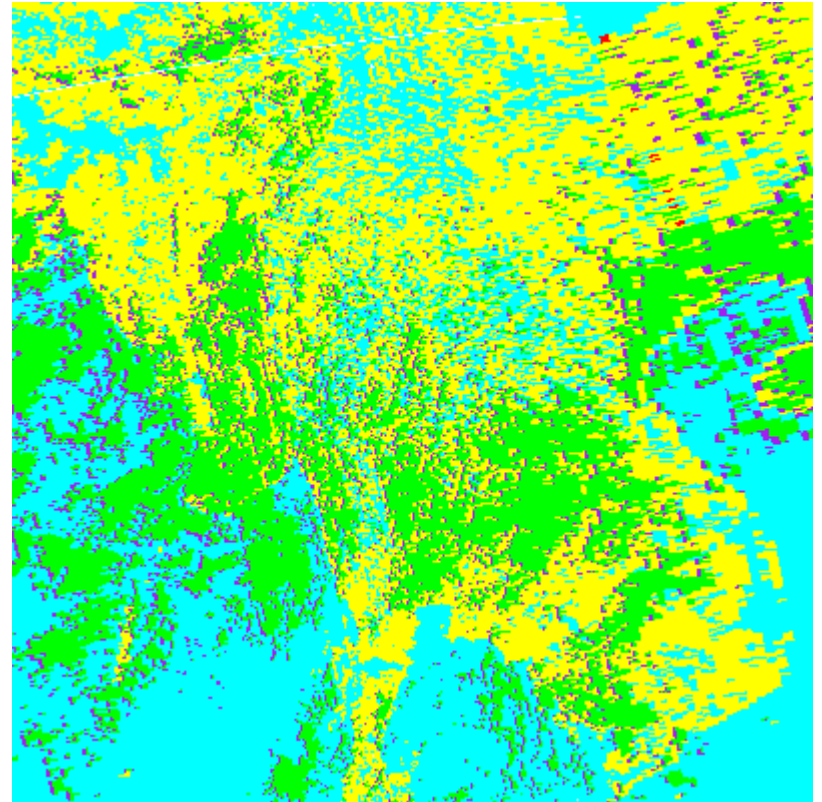

El Chichon

Pinatubo

Cloud Mask Issue

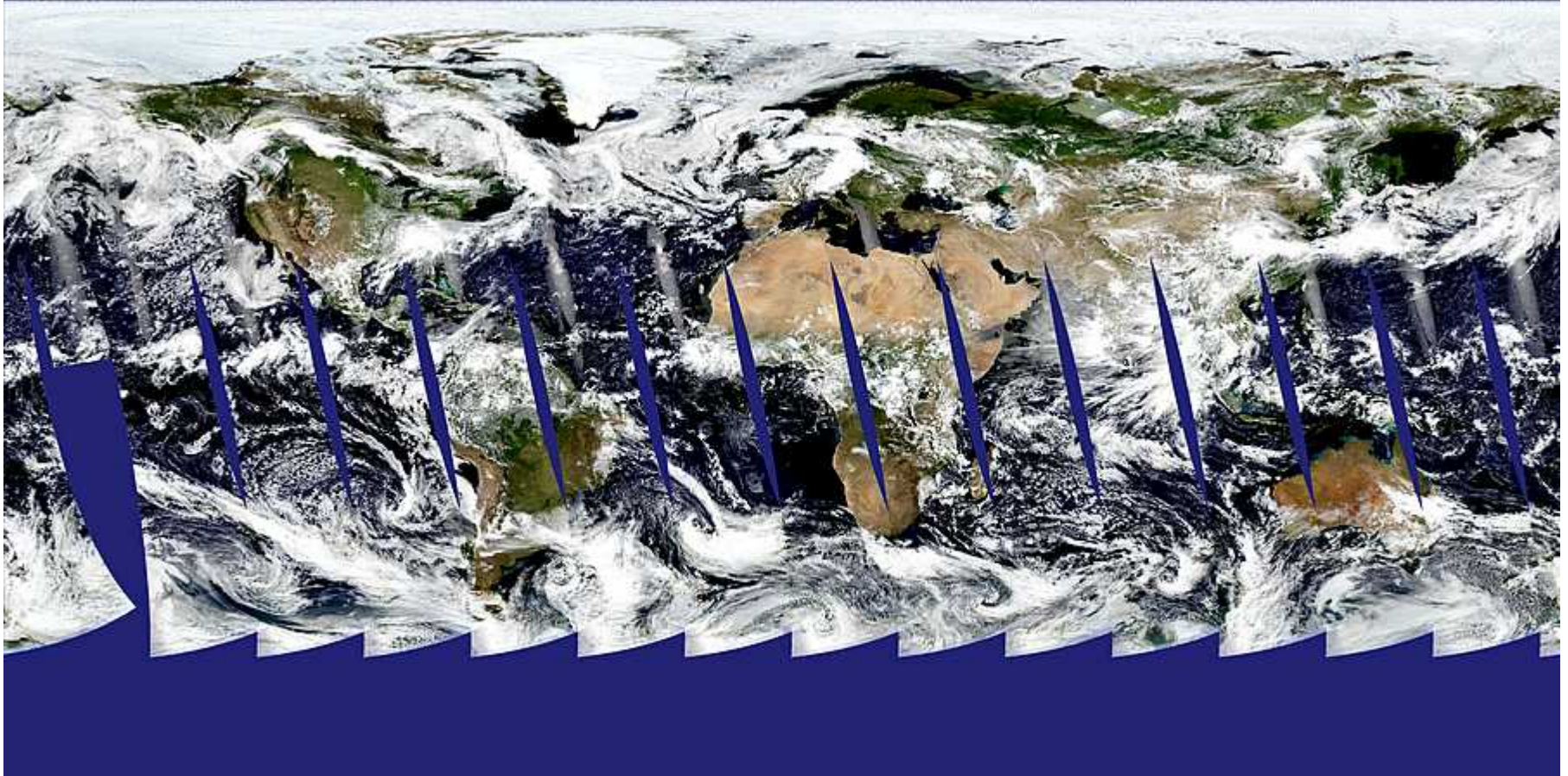AVH09C1.A1996001.N14.2007270140627.jpg

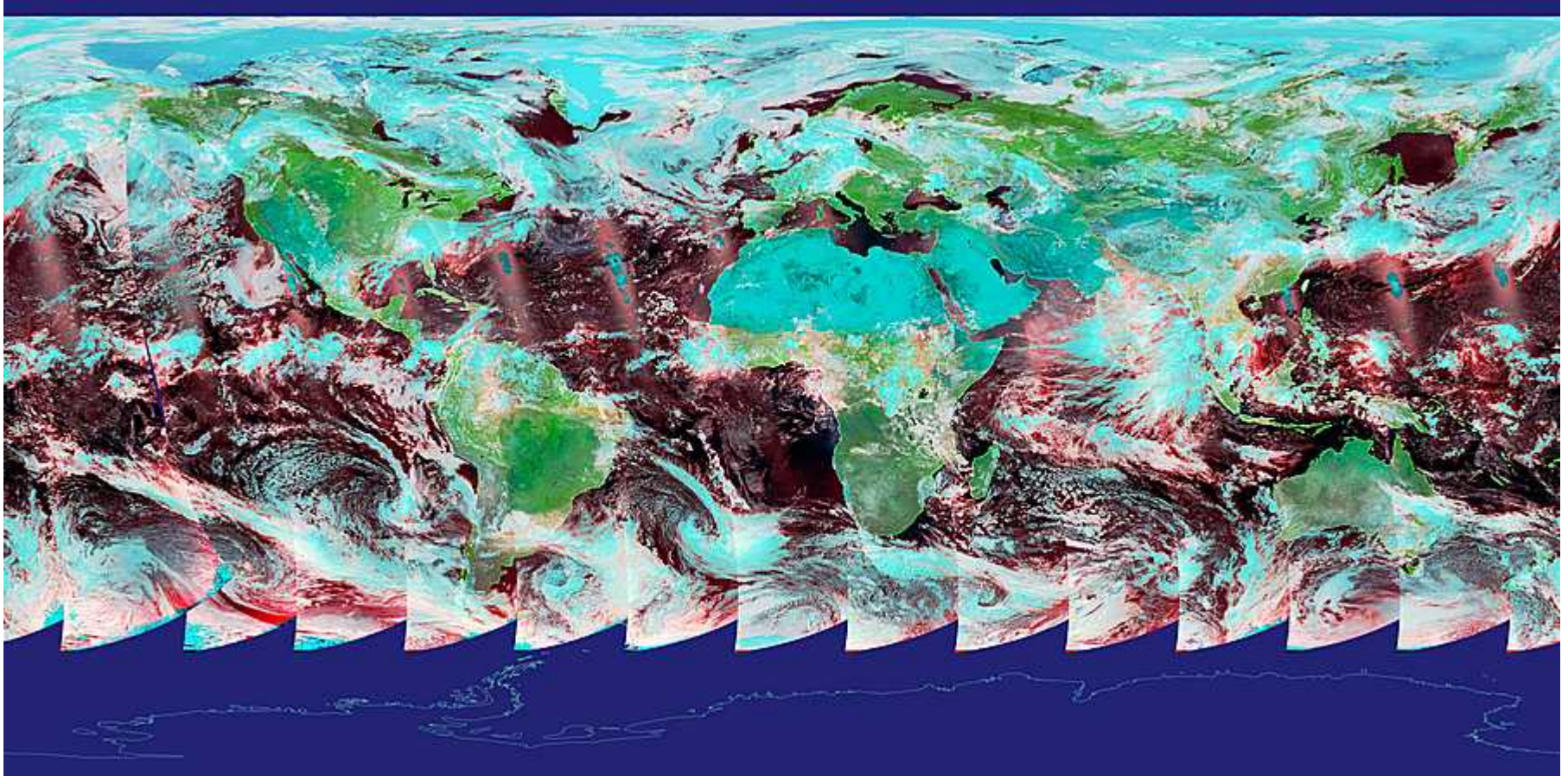RGB composite of Surf Ref from Ch1,Ch2

CLAVR-1 Cloud Mask: Green – Clear, Cyan – Cloud, Yellow – partial cloud

MODIS-Aqua CMG 07/01/2003

AVHRR CMG 07/01/2003

Version 3 Data Set

- Improvements in cloud screening and correction for tropospheric aerosol
  - developed from near-coincident NOAA16-Aqua MODIS data
- Correction for stratospheric aerosol
- Covers: 1981-1999, 2003
- Available: Late 2008