Advancing the AVHRR FCDR – a SCOPE-CM cooperation project between EUMETSAT, NOAA and ESA

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Background

- **The historic AVHRR GAC dataset (1978➔present➔2025+ (?) ➔∞) offers the longest data record of observations from a single high resolution multispectral passive sensor**
  ➔ Highly interesting for climate change studies!

- **Several Thematic Climate Data Records (TDCRs) prepared in recent years (e.g. PATMOS-X and CLARA-A1)**

- **Currently used AVHRR Fundamental Climate Data Record (FCDR) based primarily on visible radiance calibration corrections (Heidinger et al., 2010, IJRS)**
  (infrared calibration relying on nominal onboard calibration methodology)

Justification of SCOPE-CM project

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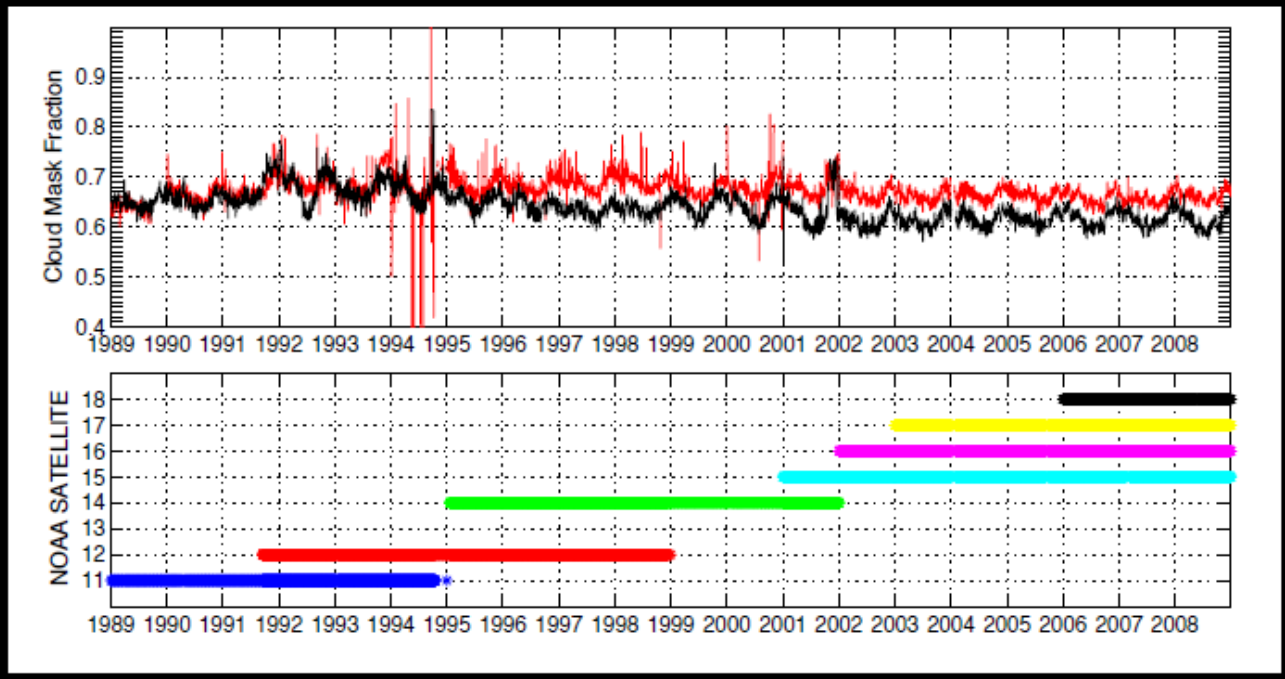
1. **Achieved TCDR results indicate trends and discontinuities which are likely due to a mix of method differences and inherent remaining calibration and/or sampling weaknesses (example for global cloud cover below)**

Daily Cloud Fraction

PATMOS-x

CMSAF



Results from SCOPE-CM Phase 1 Pilot project 1 on AVHRR TCDRs

Justification of SCOPE-CM project

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2. Visible calibration corrections partly suffer from using a non-stable MODIS reference (TERRA MODIS) in MODIS Collection 5

3. Inconsistencies found for AVHRR infrared onboard calibration methodolody (Mittaz et al., 2011, JAOT)

4. Basic navigation of AVHRR imagery shows remaining problems for some of the early NOAA satellites

➔ **A revised AVHRR FCDR is essential for assuring climate quality of derived TCDRs!**

Components of AVHRR FCDR project

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1. Upgraded visible calibration corrections (MODIS Collection 6)

2. Revised infrared calibration (new physical model)

3. Revised navigation based on image-retrieved (coast-line matched) update of orbital model (yaw, pitch,roll corrections)

Timeplan and responsibilities

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1. Upgraded visible calibration corrections (MODIS Collection 6)

Responsible partner: NOAA (A. Heidinger)

Planned end: August 2014

TENTATIVE AVHRR FCDR RELEASE 1

SEP 2014 VISIBLE CALIBRATION UPDATE

Timeplan and responsibilities

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2. Revised infrared calibration (new physical model)

Responsible partner: ESA (ESA-SST-CCI, Jon Mittaz)

Planned end: June 2015

TENTATIVE AVHRR FCDR RELEASE 2

JUL 2015 INFRARED CALIBRATION UPDATE

Timeplan and responsibilities

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3. Revised navigation based on image-retrieved (coast-line matched) update of orbital model (yaw, pitch,roll corrections)

Responsible partner: EUMETSAT (CM SAF, K-G Karlsson)
+ ESA (ESA-CLOUD-CCI, M. Raspaud)

Planned end: June 2016

TENTATIVE AVHRR FCDR RELEASE 3

JUL 2016 NAVIGATION UPDATE

Additional activities and end goal

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1. **Creating white (useful) and black (corrupt) list of GAC orbits**

2. **Investigating alternative approaches for visible calibration corrections**

   Specific suggestion: Workshop on this subject should be arranged as soon as possible!

3. **Extended monitoring after inclusion of all corrections**

➔

TENTATIVE FINAL AVHRR FCDR RELEASE

2018 CONSOLIDATED FINAL VERSION

Secured resources and kickoff

NOAA: ½-1 scientist 2014-2016

EUMETSAT CM SAF: ½ scientist 2014-2017

ESA ESA-SST-CCI: ½ scientist 2014-2016

ESA ESA-CLOUD-CCI: ½ scientist 2014-2016

(Additional funds are or will be sought for)

After finally securing these resources

Project can be kicked off!

Remaining open issues to solve

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1. **Who takes responsibility of releases?**
2. **Several releases or just one final consolidated?**
3. **Virtual (software-based) or physical (stored in archive) releases?**

SCOPE-CM project a good forum for addressing those open issues!