GRAPE Meeting (Oxford)

02/10/2007

Present: *Claire Bulgin, Elies Campmany, Elisa Carboni, Don Grainger, Caroline Poulsen, Andy Sayer, Richard Siddans, Andy Smith (OX), Philip Stier, Gareth Thomas and Rosalind West*
Apologies: *Brian Lawrence*

1 PROCESSING

- Since the last meeting 1 year has been processed (1999). Some months (09-12) had 0 orbits retrieved in version 1 but now have been successfully processed.
- 1 year of data left to process (2000) so the whole dataset is expected to be completed in a month.
- ACTION: Elies to update the GRAPE products documentation for Version 2 and will circulate a draft before the completion of the processing.
- ACTION: Elies to show V2 diagnostics at next meeting

2 ALGORITHM

- Richard proposed to run the retrieval assuming all is cloud/aerosol for a test month. This may be a task for the MPhys student whose project is to investigate cloud flagging.
- Elisa reported some conclusions about using IR SEVIRI channels to retrieve aerosol in different scenarios. In general the agreement with AERONET is good. It was suggested she try adding in the BRDF surface to see what improvement this gives. In addition she may see if the 2/3 difference against AERONET changes as a function of solar illumination angle.
- A discussion then followed (and some subsequently) on future algorithm progress.
  - As the QUANTIFY ship track analysis does not require reprocessing the data there is no urgency to reprocess the data - better to look at the science. However Elies will investigate the practicality of extending V2 processing to post 2001 ATSR/2 data.
  - Gareth recommended we move to code updating using SVN. He suggested all the different versions of ORAC code into one new version - V3. The V3 code would include the SEVIRI IR, dual view and Globaerosol codes as well as
    * aerosol and cloud retrieval from ATSR/2, AATSR (single & dual view) & SEVIRI using all channels
    * common implementation of sea surface model and land BRDF models
    * implementation of Andy's error model
    * higher resolution LUT
    * possible consideration of change in surface pressure, cloud shadowing and finite cloud effects

Other improvements may well occur through various bug fixes and updates. Also to decide is whether we move to the Globaerosol approach of many atmospheric forward models or whether we rely on better scene identification. It is worth noting Gareth wishes to address this issue in a bid for a NERC fellowship. The date of implementation of this version is TBD. Subsequent algorithm changes e.g. ingestion of full day of SEVIRI data would be a future development and should be an agenda item at a future meeting.

3 PUBLICATIONS:

- Kokhanovsky's book (Gareth) Partly complete. Don requested that the draft be circulated by Nov 2nd to allow comments.
- Aerosol Algorithm Paper (Gareth) Since this paper overlaps with Kokhanovsky's book, a description of the algorithm has been completed.
- Aerosol Validation Paper (Richard/Caroline) No progress since the last meeting. A draft will be circulated by 15th November
- Cloud Validation Paper (Elies) No progress since the last meeting. A draft will be circulated by 15th November.
- Cloud Algorithm Paper (Caroline) No progress since the last meeting. A draft will be circulated by 15th November.
- Claire Bulgin's Paper: Reviewer's comments were discussed and some responses were proposed. Claire will circulate a first draft and the rest of the group will send their contributions in a week.
- SEVIRI IR paper (Elisa) this was added to the list of papers. Draft TBD.

4 MEETINGS

- Elisa and Richard reported some interesting conclusions from the EUMETSAT meeting and have since circulated pdfs.
- A-Train, 22-25 October, Lille: Caroline, Elisa & Andy Sayer
- Aerocom, 25, 26 October, Lille: Philip, & Andy Sayer
- ADIENT, 23 October, Manchester: Don, Gareth & Andy Smith
- Globcolour, 20-22 November 2007, Oslo: Andy Sayer
- AGU, 10-14 December, San Francisco: Gareth

5 OTHER

- Wu Lin is expected to arrive at mid November
- A DPhil project will be proposed based in Chris Arnold MPhys. Don to discuss this with Brian/Richard next week.
- We have proposed 4 ORAC related MPhys projects for next term
  - **Reducing Numerical Error in the ORAC Retrieval System**
    The ORAC algorithm (http://www.atm.ox.ac.uk/project/ ORAC/) is an Optimal Estimation scheme which determines cloud and aerosol properties from multispectral images of the Earth's atmosphere and surface. Understanding the interplay between aerosol and cloud is important to quantify the

Earth's radiative balance and understand current and future climate. To make this problem tractable the radiative transfer calculations are performed off-line as Look-Up-Tables (LUTs). Recent improvements in the understanding of AATSR instrument (envisat.esa.int/instruments/aatsr/) noise suggest these LUTs are contributing numerical noise to the retrieval scheme. In this project the student will investigate optimal LUT size and interpolation uncertainty to maximise retrieval speed while minimise error.

- **Accounting for Surface Pressure Variation in the ORAC Retrieval System**
  The ORAC algorithm (http://www.atm.ox.ac.uk/project/ ORAC/) is an Optimal Estimation scheme which determines cloud and aerosol properties from multispectral images of the Earth's atmosphere and surface. Understanding the interplay between aerosol and cloud is important to quantify the Earth's radiative balance and understand current and future climate. To make this problem tractable the radiative transfer calculations are performed off-line as Look-Up-Tables (LUTs). These LUTs assume a constant surface pressure. In this project the student will modify the radiative transfer algorithm to account for a variation in surface pressure. This will be achieved by generating a new LUT and its first derivative with respect to surface pressure. The retrieval code will be modifi ed to read a fi eld of surface pressure and use it to provide a fi rst order correction to the radiative fields read from the LUTs.
- **Quantifying Noise in the ORAC Retrieval System**
  The ORAC algorithm (http://www.atm.ox.ac.uk/project/ ORAC/) is an Optimal Estimation scheme which determines cloud and aerosol properties from multispectral images of the Earth's atmosphere and surface. Understanding the interplay between aerosol and cloud is important to quantify the Earth's radiative balance and understand current and future climate. In this project the student will investigate how an improved noise model of the AATSR instrument (envisat. esa.int/instruments/aatsr/) will modify ORAC results.
- **Scene Identifi cation in the ORAC Retrieval System**
  The ORAC algorithm (http://www.atm.ox.ac.uk/project/ ORAC/) is an Optimal Estimation scheme which determines cloud and aerosol properties from multispectral images of the Earth's atmosphere and surface. Understanding the interplay between aerosol and cloud is important to quantify the Earth's radiative balance and understand current and future climate. One of the problems with the current scheme is the identifi cation of the scene type before a retrieval is performed. Currently the pre-processing algorithm has difficulty distinguishing snow & ice covered surfaces from cloud. Additionally a "dust-flag" which allows heavy dust events over ocean (which may otherwise be fl agged as cloud, especially by the ATSR SST cloud flag) to be correctly identified would be very benefi cial. Similarly a biomass burning and volcanic ash flags could be investigated.

- Next meeting: 6th November at RAL