

MINUTES OF FOURTH CLOUD-NET PROGRESS MEETING
(Corrected version 2 produced 7 May 2004 + {} for progress of the actions)

5-6 April 2004, Met Office, Exeter, UK.

Present: Dominique Bouniol (IPSL), Anne Mathieu (LMD); David Donovan, Henk Klein-Baltink, Gerd-Jan van Zadelhoff (KNMI); John Goddard, Charles Wrench, Judith Agnew (RCRU); Oleg Krasnov (TUD); Robin Hogan, Ewan O'Connor, Anthony Illingworth (co-ordinator.), Nicolas Gaussiat (Administrator) (UR). Damian Wilson, Malcolm Brooks, Jeremy Price (Met Office); Francois Bouyssel (MeteoFrance); Pekka Ravilla (Vaisala); Juergen Mehl (Gematronik).

1. GENERAL REMARKS and PROGRESS ON DELIVERABLES.

1.0 Apologies for absence. Adrian Tomkins (ECMWF), Jacques Pelon, Martial Haeffelin, Alain Protat (IPSL), Jean-Marcel Piriou (MeteoFrance), G Kadner (Gematronik), Pierre Claeys (Degreane).

Actions arising from the minutes not dealt under other headings. V. OLD ACTION 1.1 - AJI has met Gerhard Adrian of DWD who reiterated his interest in participating. He has not responded to subsequent emails. It was decided not to pursue the matter further.

1.1. Overview of deliverables, third annual report, publications and data policy. CloudNET is in good shapes: the pending deliverables are on target and the data on the web site is impressive. The requirements for the third annual report were discussed and specifically the updating on the 'breakthroughs' and publications. See item 8.1 and actions therein. An updated list of publications was gathered. Eight CloudNET papers will be presented at the forthcoming ICCP conference in Bologna (July 2004). One general CloudNET review paper has been accepted for ERAD3 in Sweden (Sept 2003). Others will be submitted for 1 May deadline.

ACTION 1.1. NG to place updated publication list on the web site.

ACTION 1.2 All to highlight cloudnet (including logo) in ICCP/ERAD3 presentations. The data policy statement on the SIRTAs web site was discussed and it was decided that, with slight modification, it was suitable for CloudNET.

ACTION 1.3 – NG to place the modified data policy on the CloudNET web site.

1.2 The current state of the web site with all the model data, observations, and meteorological products with their errors and quality status in netCDF format was described by E O'C. E O'C highlighted very recent new products, such as iwc via different algorithms, and cloud droplet size and concentration. EOC presented statistics showing that the 94GHz attenuation produced by the different models was essentially identical, so it was decided to continue using the Met Office humidity.

ACTION 1.4 D Wilson to enquire if sonde ascents can be put on the cloudnet web site. The status of the flux products was discussed. It was decided to derive those from ECMWF, but, for the other models this is much more difficult as diagnostics have to be re-run, and so at present not judged not to be necessary.

ACTION 1.5 Ewan O'Connor to arrange to put the fluxes from the ECMWF model in the data base and flux profiles for rain for the MO model, and to enquire if rain profiles available for the other models. {being tested, various fluxes OK from Meteo-France}

ACTION 1.6 DW and E O'C with AO to complete the work arranging for the MO global model output to be on the web site in NetCDF. {in progress}

The categorisation code was discussed and modifications agreed.

ACTION 1.7 RJH to modify the categorisation code for temperatures close to the melting layer, the discrimination between clutter and insects. Problems associated with the SIRTA code and placing it on the web were discussed. {being tested}

ACTION 1.8 . EOC and DB to modify categorisation code to account for the characteristics of the LD40 ceilometer at SIRTA in identifying liquid clouds and then arrange for the SIRTA data to be on the web. {being tested}

ACTION 1.9 DB and NG to agree on calibration for RASTA data. (SEE 3.1) {complete}

ACTION 1.9. EOC Release of V1.0 data when the problems of categorisation and calibration of radars have been resolved.

ACTION 1.10 HKB and FB to arrange with EOC for the model real time quick looks from MeteoFrance and RACMO to be on web {MeteoFrance done, RACMO pending}

2. DATA GATHERING AND PROCESSING.

2.1 JWFG reported on Chilbolton performance and provided an update on the rain detection algorithm suggesting that a reliable algorithm would be to use gauge values +/- 2mins. It was decided to use spectral width in the rain to define periods of wet radome.

ACTION 2.1 RJH. To incorporate spectral width to categorise rain. {being tested}

2.2 Sirta performance. DB reported on the situation. The RASTA data need to have 6dB added to them. The radar has been operating 24h/7d since last autumn. Doppler spectra have been recorded for one minute every hour since Feb 04. The LD40 data has speckle on it but should be adequate for deriving liquid cloud base. The radiometers will be calibrated during the VAPIC experiment in June 04.

ACTION 2.2 EOC to check netCDF conformity of SIRTA data and modify if needed.
{conversion program written}

ACTION 2.3 MH/AP to supply calibrated backdated radiometer data when calibrated.

2.3 HKB reported on Cabauw performance. The vertical alignment of the radar has been corrected and should be OK to 0.1deg. since Oct 03. From 9 Dec 03 – 13 Jan 04 a formatting/computer error means there is no reliable data. The spectral width convention at Cabauw is twice that at Chilbolton and SIRTA.

ACTION 2.4 EOC to adjust Cabauw data to conform to convention of other two sites. Since September 03 the AGC on the ceilometer has not been working properly and much of it has been recorded on low sensitivity. {done – will appear in release V 1.0}

ACTION 2.5 HKB to arrange with Vaisala to get this AGC problem fixed.

Intermittent LWP data is available from microwave radiometers from Oct 01 to Sep 03 (note – this is not so vital as attenuation is less for the 35GHZ cloud radar).

2.4 OK reported on the performance of the 3GHz TARA radar. Half second raw profiles will be averaged to 30secs for CloudNET. The FM system is leading to a range dependent gain. For data since May 03 this can probably be recovered. Two weeks ago the variable gain with range was 20dB but has now been reduced to 7dB.

ACTION 2.6 OK to refine the range dependent correction further as a matter of urgency so reliable data can be loaded onto the CloudNET site.

3. INSTRUMENT ISSUES – CALIBRATION.

3.1 NG produced data on the decay of the 94GHZ tube from CPI since its installation by examining the value of Z during rainfall >3mm/hr.

3.2 DB presented the results of the cross-calibration of SIRTA at Chilbolton in Feb '04 and Cabauw in March '04. The sensitivity of Galileo seemed to be constant during the Feb visit but the technique of NG suggested a change. A 3dB correction towards less sensitivity was suggested for the Cabauw radar – but no account had been taken of the 94GHz gaseous attenuation which model quick looks suggested could be up to 1.5db
ACTION 3.1 DB and NG to resolve the apparent calibration drift at Chilbolton. DB to refine the comparisons at Cabauw using the model 94GHz attenuations.

3.4 Judith Agnew presented data of RAMAN UV lidar taken at Chilbolton during C-WAVE in may-June 03.

ACTION EOC – to compare RAMAN humidities with those in the model if there is time.

3.5. Action on EOC to look at the light level of CT75 is still outstanding.

ACTION –3.2 EOC to examine further if there is time.

3.6 RJH confirmed that lidar 2deg off zenith should be OK to prevent specular. It was noted that the precise elevation of the SIRTA LNA lidar was unknown.

ACTION 3.3 MH – to report if this is a problem for the LNA data.

3.7 CLW reported on the LWP retrievals from radiometers at Chilbolton. For the period 15 May 03 – 29 Feb 04 95% of the data is good but the other 5% is affected by dew on the radiometer. The use of GPS data is a useful constraint to identify such periods of dew.
ACTION 3.4. CLW to check the effect of using an average lens temperature in the correction rather than the external temperature as at present.

3.8 NG reported on using model data of temperature and humidity as a first guess for the radiometer retrievals rather than climatology.

ACTION 3.5 NG to continue this work.

3.9 DB reported that Anne Armstron has analysed one month of two channel radiometer data at radiometer at SIRTA for cloudnet.

4. ALGORITHM IMPLEMENTATION AND MODEL COMPARISONS – ICE.

4.1 Malcolm Brooks presented analysis of vertical profiles of cloud fraction and ice water content observations compared to model representation and also as a function of weather regime. There was some discussion that the rejection of observations when it was raining might bias the data set with respect to ice water content. It might be better to reject that same fraction of model rain as for the observations, or maybe the integrated water path could be used as a proxy for model rain.

ACTION 4.1 MB to continue this work and to consider these sampling biases. It could be fruitful to separate the MeteoFrance model data in terms of pre and post April 03 when there was a major change in representation of clouds.

ACTION 4.2 RJH to investigate cumulative LWP distribution comparison with models as a possible way to overcome the sample bias problem.

ACTION 4.3 Modellers (DW, J-P M/FB, AT) each to produce short document listing relevant changes to the model, particularly for clouds, during the CloudNET period and send to NG.

ACTION 4.4 EOC to arrange for monthly means of profiles of observations and model parameters to be produced and placed on the web site including quick looks.

4.2 G-J van Z presented results of iwc retrievals, including pdfs, from the radar/lidar technique suggesting considerable biases in the simple $IWC = f(Z)$ and $f(Z,T)$ technique. Such retrievals are only performed if the lidar penetrates the cloud; it was suggested that this could bias the sample away from thick clouds. A parameterisation of ice particle size in terms of normalised cloud depth was presented and shows considerable promise.

ACTION 4.5. J-G van Z to examine such possible biases and continue this work.

4.3 RJH produced statistics and skill scores for the three models' representation of cloud fraction and iwc from $f(Z,T)$ and from $f(Z,V)$ – the Matrosov technique.

4.4. EOC presented some first results on the values of IWC from the three algorithms.

ACTION 4.6 EOC and RJH to continue this and with J-G van Z see if any discrepancies can be resolved.

5. ALGORITHM IMPLEMENTATION AND COMPARISON WITH MODELS – WATER CLOUDS AND RADIATION.

5.1 AM reported that for boundary layer clouds the cloud base in the MeteoFrance model seemed to be lower than observations. This may be due to biases in the model when compared to ECMWF.

ACTION 5.1 AM to extend this work to other sites and models.

ACTION 5.2 HKB to supply AM with turbulent fluxes of moisture derived from the Cabauw instrument mast to aid such analysis.

5.2/3 Comparisons of lwp/ice particle size from TARA/35 GHz radar comparisons, and LWC by comparing the Frisch v TUD algorithm require accurate TARA calibration.

ACTION 5.3 OK to complete these actions when TARA range dependent gain is resolved.

5.4 RJH presented some statistics on the pdf of dissipation of TKE derived from radar as a function of cloud type. It was suggested that shear could induce an increased terminal velocity of ice particles.

5.5 Case studies of observed profiles compared to radiative code. No progress owing to JP's accident and pressure of work on DD

ACTION 5.4. IPSL (JP) and KNMI (DD) to continue when this is possible.

6. UPDATE ON INSTRUMENT DEVELOPMENTS.

6.1 PR reported on a new ceilometer (CL31) for cloud base up to 25,000' (about 7km) like the CT25 but with an output every 2secs rather than 15 secs to see gaps in clouds to identify the next layer above a broken cloud deck. The backscatter profile has a vertical resolution of 10m (about 750gates).

ACTION 6.1 PR to provide software for the CT75 that, rather than recording only the most significant 16 of the 24 bits available, enables the 16 bits recorded to be changed leading to a potential increase in sensitivity.

6.2 JM reported that he is considering the feasibility of a 35GHz or X-band cloud radar. A new signal processor delivering 14 bit I,Q data is being designed.

ACTION 6.2 JM to report on the feasibility of an X-band cloud radar.

6.3 A short discussion on the ideal cloudnet instrument complement ensued; the need for reliable lwp from radiometer to correct for 35GHz radar reflectivity was again discussed. ACTION 6.3 DB to ask Pierre Flamant for details (including eye safety) on the LMD 'mini-lidar' costing about 40K euro which operates at 532nm and looked very impressive.

7. UPDATE ON MODEL DEVELOPMENTS.

7.1 DW reported some tweaks to the MO global model. The new cloud scheme 'PC2' is scheduled for early Jan '05. Meanwhile, he will be running some test cases with CloudNET data for validation.

7.2 FB reported that a modification of the cloud scheme will be operational in early May in the MeteoFrance model. Since 14 Apr 03 cloud and fraction cloud cover has been diagnosed from total water content. In the modified scheme a new curve from RH to lwc and cloud fraction will be used with the aim of having less cloud fraction values of 0 and 1. Currently a simple radiative scheme is called every step; in the new model the Fouquet/Morcrette scheme will be called every 3 hours. By 2008 a new model using prognostic TKE and microphysics, and a new convective scheme (deep and shallow) for a 2km version of Arpege should be working.

8. WRAP UP SESSION:

8.1 The following new breakthroughs were identified.

ACTION 8.1 – ALL. Each person identified to provide a two page summary for the annual report using the style from last year's report which can be found on the wet site.

1. Observational products on web site + errors + model values in near real time. (EOC)
2. Objective categorisation. (RJH)
3. IWC by three methods – first comparison of stats. (G-J Z, EOC, RJH)
4. Different fractional cloud cover definition - statistics. (AJI, MB)
5. Ice Density by dual wavelength radar. (NG)
6. N, D in Sc from radar/lidar (EOC)
7. Improved radiometer LWP using model T and Water Vapour. (NG)
8. *IWC/re normalisation with cloud height – (G-J Z).
9. Comparison of long term iwc/re stats at Cabuaw,(Chilb) and Oklahoma. (G-J Z, DD)
10. First provision of statistics of model performance for cloud cover – demonstration of improved performance of MeteoFrance model by comparing pdfs. (MB)
11. Cross-calibration of three cloud radars. (DB)
12. Pdfs of Turbulence etc. (DB, RJH)
13. Skill scores. (RJH) .
14. Boundary layer evaluation of schemes.(AM).

8.2 Work priorities. The following were deemed to be of highest priority to be completed within one month.

1. Categorisation and produce version 1 with SIRTA calibrated data.
2. LWP for SIRTA from radiometers.

3. TARA data on web site.
4. Monthly mean on web site (level 3!) plus retrieval and sampling errors.

8.3 Summary of some problem areas to be tackled before next meeting. A general area of some concern identified during discussions was if the conditional sampling by the observations (e.g. not in heavy rain) was biasing the statistics.

1. Cloud fraction OK - throwing away data when not total attenuation
Try some extrapolation through heavy rainfall at 35GHz.
2. Resolve inconsistencies between IWC retrievals and identify any sampling biases.
3. What is the status of our LWC products?

8.4 Future plans – work division. The following was agreed.

TUD: Finalise correction to TARA gain – then correct and post on web site.

Look at dual wavelength data.

Sort out aircraft radar comparison inconsistency.

Conclusion of status of LWC algorithms.

KNMI: More work on lidar/radar ice algorithm.

Think about biases introduced by sampling – removal of thick clouds, rainy clouds.

Radiative fluxes and vertical profiles cloud/aerosol (and/or IPSL)

IPSL – More BL work all sites and models

Radiative fluxes and vertical profiles cloud/aerosol? (and/or IPSL)

Protat and Tinel schemes for ice (and water?)

UOR Stratocumulus and Drizzle

Compare IWC stats from n estimates (think about rain sampling error)

Skill scores. Regime analysis.

Dual wavelength ice water content (not affected by attenuation, rain).

LWP from radiometer using model.

RAL UV lidar analysis. (EOC)

LWP radiometer. Pulse coding for 35GHz. (+UOR)

OTHER SATELLITE DATA:

ACTION 8.2 UOR to contact R Wood re 250km swath MODIS data over sites.

ACTION 8.3 A Mathieu . Find out about MSG availability, ideally over all three sites.

ACTION 8.4 UOR/DD to enquire about MSG (GERB) radiances over each site.

9. ANY OTHER BUSINESS. There was none.

10. Date of next meeting.

Monday 18 - Tuesday 19 October 2004 starting at 9am at either KNMI or TUD in NL.

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