Atmospheric
Measurement
Techniques

Supplement of

A depolarisation lidar-based method for the determination of liquid-cloud microphysical properties

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======================================================================
The following lidar observation periods were used in
Figures 17, 18, B1 and B2

UV-depolarization lidar data (attenuated backscatter) as well
as radar and aerosol measurements can be downloaded from the
CESAR data base (www.cesar-database.nl)
======================================================================


======================================================================
YYYYMMDD | T1[UTC] | T2[UTC] | Height of ATB_para max at T1 [km]
======================================================================
20110605 13.5422 13.7922   0.725995
20110605 15.7678 15.9678   0.8336425
20110607 6.4501   6.8001   0.435597
20110607 10.9042 11.2042   0.7009606
20110613 3.3231   3.6731   0.7535327
20110613 7.74468.094601   0.5812966
20110614 0.5959001   0.8959   0.3730112
20110615 20.7574 21.0574   1.344342
20110620 16.4803 16.7303   1.419445
20110622 3.5348   3.8848   1.239198
20110622 7.1381   7.4881   1.164095
20110623 0.3478   0.6978   0.7410155
20110104 18.0517 18.3517   0.6909469
20110104 20.9064 21.2064   0.4956793
20110105 0.0979   0.4479   0.4381004
20110105 1.0399   1.189   0.5657755
20110105 3.220   3.5705   0.6834366
20110108 20.994 21.2494   0.7059675
20110112 0.069   0.4193   0.8111117
20110114 3.756   4.1066   0.580796
20110114 5.679   6.0739   0.4606313
20110115 16.393 16.6593   0.8036013
20110115 17.288 17.5888   0.8636837
20110115 19.203 19.5063   1.058951
20110115 22.363 22.6623   1.121537
20110116 0.165   0.5158   1.055947
20110116 8.757   9.1077   1.314301
20110116 9.874 10.2224   1.522086
20110116 14.681 14.7981   1.657271
20110117 0.484   0.5842   1.662278
20110117 2.338   2.6818   0.453121
20110117 22.994 23.2494   0.7034641
20110123 19.456 19.7546   0.6008235
20110123 21.677 21.9797   0.5542597
20110125 2.144   2.5442   0.4406039
20110125 17.208 17.4608   1.10902
20110125 23.387 23.6837   0.9588141
20110126 14.077 14.3767   0.4701443
20110126 17.132 17.4352   1.426956
20110127 0.093   0.4437   1.36437
20110127 5.291   5.5451   0.6203502
20080516 16.86   17.01   0.7854785
20080516 22.408 22.9908   0.6553993
20080517 1.819   2.1693   0.6804145
20080517 4.563   4.9193   0.4877972
```

```
20080517 21.577 21.8477  1.130689
20080518 0.305   0.6553   1.11568
20080518 5.211   5.261    1.260768
20080519 5.199   5.1599   1.3133
20080519 8.70199  8.9032   1.802598
20080519 14.534 14.7846   2.096277
20080519 15.587 15.6867   2.013727
20080521 11.984 12.0354   1.748565
20080521 13.307 13.5517   1.836119
20080521 23.181 23.2381   2.072763
20080522 5.492   5.6928   2.156314
20080522 8.453   8.7013   2.348931
20080522 15.297 15.5797   2.629102
20080522 17.044 17.3914   2.716655
20080523 1.455   1.8059   3.121902
20080523 3.212   3.4132   2.226356
20080523 6.818   7.1628   3.091884
20080523 22.781 22.8581   2.649114
20080524 3.099   3.4499   3.492127
20080524 19.985 20.2785   2.771688
20080524 22.558 22.8588   2.273885
20080525 0.138   0.4889   2.058754
20080525 14.663 14.9863   0.7454541
20080526 12.024 12.3244   1.055643
20080526 15.964 16.2664   0.8805364
20080527 9.00501  9.0553   0.5028062
20080527 9.776 10.0268   0.5378276
20080529 15.325 15.6725   1.470896
20080529 20.293 20.5923   0.8605242
20080530 11.356 11.6596   0.3977423
20080531 9.2919.341501   0.4827941
```

===
 The following IDL/GDL code selects the proper values of the interchannel
 depolarization calibration coefficient (Cr) and the cross-talk coefficient
 delta^c
===

```
 if (thedate lt 20071231) then begin
     deltaC=0.019
     Cr=1.45
 endif else begin
     if ((thedate gt 20080101) and  (thedate le 20081231)) then begin
        deltaC=0.011
        Cr=0.3125
     endif else begin
        if ((thedate gt 20081230) and (thedate le 20091213)) then begin
           deltaC=0.012
           Cr=0.194
        endif else begin
           if ((thedate gt 20091213) and (thedate le 20100716)) then begin
              deltaC=0.014
              Cr=0.18
           endif else begin
              if ((thedate gt 20100716) and (thedate le 20101231)) then begin
                 deltaC=0.022
                 Cr=0.165
              endif else begin
                 if ((thedate ge 20110101) and  (thedate le 20110511)) then begin
                    deltaC=0.019
                    Cr=0.165
                 endif else begin
```

```
                    if ((thedate ge 20110511) and (thedate le 20111231)) then begin
                       ;deltaC=0.019
                       deltaC=0.015
                       Cr=0.165
                    endif else begin
                       if ((thedate gt 20120101) and (thedate le 20120507)) then begin
                          deltaC=0.0215
                          Cr=0.038
                       endif else begin
                          if ((thedate ge 20120508) and (thedate le 20120523)) then begin
                             deltaC=0.013
                             Cr=0.077
                          endif else begin
                             if ((thedate gt 20120524) and (thedate lt 20120701)) then begin
                                deltaC=0.013
                                Cr=0.077
                             endif else begin
                                if ((thedate ge 20121114) and (thedate le 20130101)) then begin
                                   deltaC=0.013
                                   Cr=0.077
                                endif else begin
                                   print,'UNKOWN DATE!!'
                                   print,thedate
                                   stop
                                endelse
                             endelse
                          endelse
                       endelse
                    endelse
                 endelse
              endelse
           endelse
        endelse
      endelse
  endelse

======================================
 The following IDL/GDL code fragment
 gives the approximate overlap function
 parameters to be used with the 'overlap'
 function defined at the end of the file as
 well as the receiver fov in mrads (rho)
======================================

      if ((thedate ge 20070101) and (thedate le 20080101)) then begin
         P_overlap=1.0e+01*[-0.000096912888864,0.099548050715032,8.865314690035643,0.569896566579018]
         rho=1.35
      endif else begin
         if ((thedate gt 20080101) and (thedate le 20080420)) then begin
            P_overlap= 1.0e+02*[-0.000029768958175,0.009981617472143,1.013029972383840,0.055138536182247]
            rho=1.25
         endif else begin
            if ((thedate ge 20080421) and (thedate le 20090101)) then begin
               P_overlap=1.0e+02*[0.000088011851200,0.010035290464341,1.152685926299159,0.074920062306023]
               rho=1.1
            endif else begin
               if ((thedate gt 20090101) and (thedate le 20100101)) then begin
                  P_overlap=1.0e+02*[-0.000056108285225,0.010095346206298,1.757573431283257,0.04855504695691]
                  rho=0.7
               endif else begin
                  if ((thedate gt 20100101) and (thedate le 20110101)) then begin
                     P_overlap=1.0e+2*[-0.000020578348779,0.009875986564359,1.641041633867177,0.050608968416181]
                     rho=0.75
                  endif else begin
                     if ((thedate ge 20110101) and (thedate le 20120101)) then begin
                        P_overlap=1.0e+02*[-0.000016238373006,0.009847596962386,1.693095161080100,0.056535514335221]
                        rho=0.75
                     endif else begin
                        if ((thedate gt 20120101) and (thedate lt 20121101)) then begin
                           P_overlap=1.0e+2*[0.000027402331460,0.010312625137221,1.354128662058760,0.053603273766750]
                           rho=0.9
                        endif else begin
                           if ((thedate ge 20121101) and (thedate lt 20130101)) then begin
                            P_overlap=1.0e+2*[0.000070728793130,0.009832899364115,3.280368778478409,0.058218055994941]
                             rho=0.375
                           endif
                        endelse
                     endelse
                  endelse
               endelse
            endelse
         endelse
      endelse
```

```
function overlap,Pin,x
  ;
  ; x is altitude in km
  ;
  A1=Pin[0]
  A2=Pin[1]
  zo=Pin[2]
  p=Pin[3]
  ;
  overlap=A2+(A1-A2)/(1.0+(x/zo)^p);
  ;
  return,overlap
  ;
end
```