Classes drops -1 met -4
acraft -2
nozbm -3

Variables other than XV, DV, T used by Agbkg
nvar -1
isw -1
xv
edov
dcut -1
denf -1
denn -1
ldry -3
nvor -2
ybar, zbar -2
ybal, zbal -2
lmcrs -4
nprp, yprp, zprp -2
cpur, cpxi -2

```
1   C**AGBKG
2   C  Continuum Dynamics, Inc.
3   C  AGDISP Version 8.29 06/16/16
4   C
5         SUBROUTINE AGBKG(XV,DV,T)
6   C
7   C  AGBKG evaluates the background at every drop location
8   C
9   C  XV     - Array of current locations, velocities, etc.
10  C  DV     - Array of background information (determined here)
11  C  T      - Time
12  C
13        DIMENSION XV(9,2),DV(6,2)
14  C
15        INCLUDE 'AGCOMMON.INC'
16  C
17        DATA UXI,UVI / 0.0 , 0.0 /
18  C
19        DATA AEVAP,BEVAP / 0.240 , 0.240 /
20  C
21  C  Loop for all drops
22  C
```

– Actually for all nozzle positions

```
23        VMAX=0.1
24        DO I=1,NVAR
25          IF (ISW(I).NE.0) THEN
26            X=XO+XV(1,I)
27            Y=XV(2,I)
28            Z=XV(3,I)
```

ISW → 1 = Active droplet above surface
0 = Drop hits, penetrates
-1 = 4 stdev below surface and finish

```
29  C
30  C  Determine mean velocity at the drop position
31  C
32            CALL AGVEL(X,Y,Z,U,V,W)
```

1st Call

```
33            VMAX=AMAX1(VMAX,
34       $      SQRT(ABS(XV(5,I)**2+XV(6,I)**2)),SQRT(ABS(V*V+W*W)))
35  C
36  C  Determine decay constant
37  C
38            VREL=SQRT(ABS((XV(4,I)-U)**2+(XV(5,I)-V)**2+(XV(6,I)-W)**2))
39  C
40  C  Time decay evaluation
41  C
42            D=EDOV(I)
43            DENC=((D**3-DCUT**3)*DENF+DCUT**3*DENN)/D**3
44            DTAU=3.12E-06*D*D*DENC
45            ETAU=0.0   !PROTECT FOR DRY EVAPORATION AND CALPUFF
46            REYNO=0.0688*D*VREL
47            IF (VREL.GT.0.0) THEN
48              IF (LDRY.EQ.0) THEN
49                DTAU=DTAU/(1.0+0.197*REYNO**0.63+0.00026*REYNO**1.38)
50              ELSE
51                DTAU=DTAU/(1.0+APSPH*REYNO**BPSPH+CPSPH*REYNO/
52       $          (1.0+DPSPH/REYNO))
53              ENDIF
54            ENDIF
```

3,12×10⁻⁶ ?

.0688 ?

Is not vrel always > 0 ?

Constants?

55-79 Evaporation

```
55            IF (LEVAP.NE.0) THEN
56              IF (D.GT.DCUT) THEN
57                EFACT=0.5+0.25*AMIN1(REYNO,2.0)
58                DTEM=DTEMP
59                IF (LCANF.GT.0.AND.Z.LE.HCAN) DTEM=DTEMC
60                ETAU=D*D/DTEM/ERATE/EFACT
61                IF (VREL.GT.0.0) ETAU=ETAU/(1.0+0.27*SQRT(REYNO))
62                DT=AMIN1(DT,0.002*ETAU)
63                  IF (LSPFLG.EQ.1) THEN
64                  CALL AGDISPcalcEvaporation(D,VREL,DCUT,DT,EDNV(I))
65                ELSE
66                  IF (ETAU.EQ.0.0) THEN
67                    EDNV(I)=DCUT
68                  ELSE
69                    EDNV(I)=D*SQRT(AMAX1(1.0-DT/ETAU,(DCUT/DIAM)**2))
70                    ETAUN=DIAM*DIAM/DTEM/ERATE/EFACT
71                    IF (VREL.GT.0.0) ETAUN=ETAUN/(1.0+0.27*SQRT(REYNO))
72                    TEM=T/ETAUN
73                    TEM=AEVAP*TEM*(1.0+BEVAP*TEM)
74                    EDNV(I)=DIAM*SQRT(AMAX1(1.0-TEM,(DCUT/DIAM)**2))
75                  ENDIF
76                  ETAU=ETAUN   !PROTECT FOR CALPUFF OUTPUT
77                ENDIF
78              ENDIF
79            ENDIF
```

Ignore for now.

```
80  C
81  C  Scale length
82  C
83            SL=0.65*Z
84            QQ=0.0
85            IF (NVOR.GT.0) THEN
86              DO N=1,NVOR
87                R=SQRT(ABS((Y-YBAR(N))**2+(Z-ZBAR(N))**2))
88                SL=AMIN1(SL,0.6*R)
89                R=SQRT(ABS((Y-YBAL(N))**2+(Z-ZBAL(N))**2))
90                SL=AMIN1(SL,0.6*R)
91              ENDDO
92            ENDIF
93            IF (SL.EQ.0.0) GOTO 10
```

Why 0.65?

Why 0.6?

How to do this in Python?

```
94  C
95  C  Turbulence
96  C
97            IF (LMCRS.EQ.1) THEN
98              QQ=QQMX
99            ELSE
100             QQ=AGINT(NWIND,WINDHTV,WINDQQV,Z)
101           ENDIF
102           IF (LCANF.GT.0) THEN
103             IF (Z.LE.HCAN) THEN
104               QQ=QQMC*Z*Z*EXP(2.0*ALPHAC*(Z/HCAN-1.0))
105             ELSE
106               QQ=QQMX*(Z/(Z/HCAN-DOC+ZOC))**2
107             ENDIF
108           ENDIF
```

LCANF default = 0 Canopy Type
0 = none
1 = optical
1 = story

Ignore for now

HCAN default = 0
Canopy Height

```
109           IF (NPRP.NE.0) THEN
110             DO N=1,NPRP
111               R=SQRT(ABS((Y-YPRP(N))**2+(Z-ZPRP(N))**2))
112               E=15.174*R/CPXI(N)
113               UA=11.785*CPUR/CPXI(N)/(1.0+0.25*E*E)**2
114               QQ=QQ+0.2034*UA*UA
115             ENDDO
116           ENDIF
```

109-116
Only if not ground sprayer
Why 15.174, 11.785, 0.2034, etc...?

```
117 C
118 C  Determine analytic turbulent correlations with the droplet
119 C
120           IF (QQ.NE.0.0) THEN
121             WTAU=SL/(VREL+0.375*SQRT(QQ))
122             C=T/WTAU
123             EXPC=EXP(-AMIN1(C,25.0))
124             EXPT=0.0
125             IF (D.GT.0.0) EXPT=EXP(-AMIN1(T/DTAU,25.0))
126             B=(DTAU/WTAU)**2
127             IF (ABS(B-1.0).GT.0.01) THEN
128               SUM1=0.5*(3.0-B)/(B-1.0)**2
129               SUM2=0.5/(B-1.0)
130               XK1=SUM1*(1.0-DTAU/WTAU)+SUM2
131               XK2=SUM1*(EXPC-EXPT*DTAU/WTAU)+SUM2*EXPC*(1.0+C)
132               XK3=SUM1*(EXPC-EXPT)+SUM2*EXPC*C
133             ELSE
134               XK1=0.375
135               XK2=(3.0+3.0*C-C*C)*EXPC/8.0
136               XK3=(5.0-C)*C*EXPC/8.0
137             ENDIF
138             XK4=0.5*(1.0+EXPC*(C-1.0))
139             UXI=-DTAU*XK1+DTAU*EXPT*(XK2-XK3*DTAU/WTAU)+WTAU*XK4
140             UVI=XK1-EXPT*(XK2-XK3*DTAU/WTAU)
141           ENDIF
```

0.375? Find in documentation and add note

why 25?

0.375?

5+8?

```
142 C
143 C  Evaluate background parameters
144 C
145 10        DV(1,I)=DTAU
146           DV(2,I)=U
147           DV(3,I)=V
148           IF (LMVEL.EQ.0) THEN
149             DV(4,I)=0.0
150           ELSE
151             DV(4,I)=W
152           ENDIF
153           DV(5,I)=UXI*QQ/3.0
154           DV(6,I)=UVI*QQ/3.0
155         ENDIF
156       ENDDO
157       RETURN
158       END
```