

## Parameters used to calculate $M^2(z)$ in Eq. (16)

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$C_n^2(t, z)$ ,  $\epsilon(t, z)$ ,  $\frac{dV(t, z)}{dz}$ :

provided by the radar every 15 min

$\alpha^2(t)$  lower layers:

from a 15 min interpolation between the radar–RS1 and radar–RS2 calibration coefficients

$\alpha^2(t)$  upper layers:

from a 15 min interpolation between the radar–RS1 and radar–RS2 calibration coefficients

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## Parameters used to retrieve $q(z)$ from Eq. (12)

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$\theta(t, z)$ ,  $P(t, z)$ :

15 min interpolated profiles from RS1 and RS2  $\theta(z)$  and  $P(z)$

$q_o(t)$  bottom:

15 min interpolated  $q$  from RS1 and RS2 at the lower common level

$q_o(t)$  top:

15 min interpolated  $q$  from RS1 and RS2 at the upper common level

$H_{\text{lim}}(t)$ :

extracted from the radar  $C_n^2$  profile every 15 min (usually the peak value)

constraint of sign of  $M$  at level  $z$  and time  $t$ :

depends on the sign of  $M(z, t)$  (or humidity vertical gradient) for RS1 and RS2

$q(t, z)$  saturated value (to constraint  $q(t, z)$ ):

from a 15 min interpolation of  $T(z)$  and  $P(z)$  between RS1 and RS2

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