The count rate in the BEW is the sum of:

- The atmospheric \(^{222}\text{Rn}\) concentration, exponentially increasing with height.
- Constant component, due to the radioactivity of the aircraft and the equipment.
- Atmospheric \(^{222}\text{Rn}\) altitude dependent component, reflecting \(^{222}\text{Rn}\) distribution in the atmosphere.

The atmospheric \(^{222}\text{Rn}\) count rate is modeled on the basis of:

- \(^{222}\text{Rn}\) concentration vertical profile.
- Constant for height \(s < 0\) and 0 for height \(s > 0\).
- Mean free path of \(^{214}\text{Bi}\) photons. The AGRS detector field of view is approximable to a sphere of radius \(r \sim 400\) m.

The mean \(^{222}\text{Rn}\) concentration vertical profile.
- Is equal to \(C\) at sea level and at height \(s\), corresponding to the half sphere field of view.
- Saturates to \(2C\), when the whole sphere field of view is enclosed within the \(^{222}\text{Rn}\) layer.
- Exponentially approaches 0 for flight altitudes greater than \(s\).

\[ C = \frac{A_{\text{Rn}}}{m^2} \times \exp(-\frac{s}{\lambda_{\text{Rn}}}) \]

The best fit curve models the count rate due to a \(^{222}\text{Rn}\) layer having

\[ a_s = (0.96 \pm 0.07) \text{ Bq/m}^3 \]

homogeneously distributed up to \(s = (1318 \pm 22)\) m.

The mean \(^{222}\text{Rn}\) concentration and mixing layer depth are in agreement with literature data:

\[ a_s = 1 \text{ Bq/m}^3, s \sim 1500\text{ m} \]

The Radgyro is a prototype aircraft for multiparametric airborne surveys.

- Two energy ranges: \(^{214}\text{Bi}\) energy window (BEW, 1.66-1.86 MeV) and cosmic energy window (CEW, 3.0-7.0 MeV).
- \(^{214}\text{Bi}\) and \(^{222}\text{Rn}\) with origin detected.

\[^{222}\text{Rn}\] is a noise source of background in Airborne Gamma-Ray Spectroscopy (AGRS)

\[^{222}\text{Rn}\] is a severe source of background in Airborne Gamma-Ray Spectroscopy (AGRS)

\[^{222}\text{Rn}\] gas is responsible for ~43% of global human exposure to ionizing radiation.