Literature Values Search

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1 Escape Velocity from Dust Disk

2 Lifetime of Biological Material on Rocks in Space

Ginsburg et al. (2018) gives

$$f_{survived} = e^{-\frac{t}{\tau_{bio}}} \tag{1}$$

In Equation 1, τ_{bio} is the biological lifetime, and t is the time the biological material spends inside the rock.

We can take $t = \tau_{rock}$, assuming the time the biological material spends inside the rock is the same as the time the rock spends in space.

Mileikowsky et al. (2000) gives a survival fraction according to Equation 2.

$$f_{tot,S} = f_{1,S} f_{2,S} f_{3,S}(\tau_{rock}) f_{4,S}(\tau_{rock}) f_{5,S}(\tau_{rock}) f_{6,S} \tag{2}$$

In Equation 2, S represents the size group of the rock, and the subscript number represents the risk type with respect to the biological material in the rock.

Substituting in the values from Mileikowsky et al. (2000), Equation 3:

$$f_{tot,S} = 0.5 \times 0.8 f_{3,S}(\tau_{rock}) f_{4,S}(\tau_{rock}) f_{5,S}(\tau_{rock}) \times 0.8, \tag{3}$$

where $f_{3,S} = f_{GCR+SR} = ...$ and $f_{5,S} = f_{nat\ rad} = ...$ 'Galactic cosmic rays' is shortened to GCR; solar radiation is shortened to SR; and natural radiation is shortened to 'nat rad'

2.1 Lifetime of These Rocks

References

Ginsburg, I., Lingam, M. & Loeb, A. (2018), 'Galactic panspermia', *The Astrophysical Journal Letters* **868**(1), L12.

Mileikowsky, C., Cucinotta, F. A., Wilson, J. W., Gladman, B., Horneck, G., Lindegren, L., Melosh, J., Rickman, H., Valtonen, M. & Zheng, J. (2000), 'Risks threatening viable transfer of microbes between bodies in our solar system', *Planetary and Space Science* **48**(11), 1107–1115.