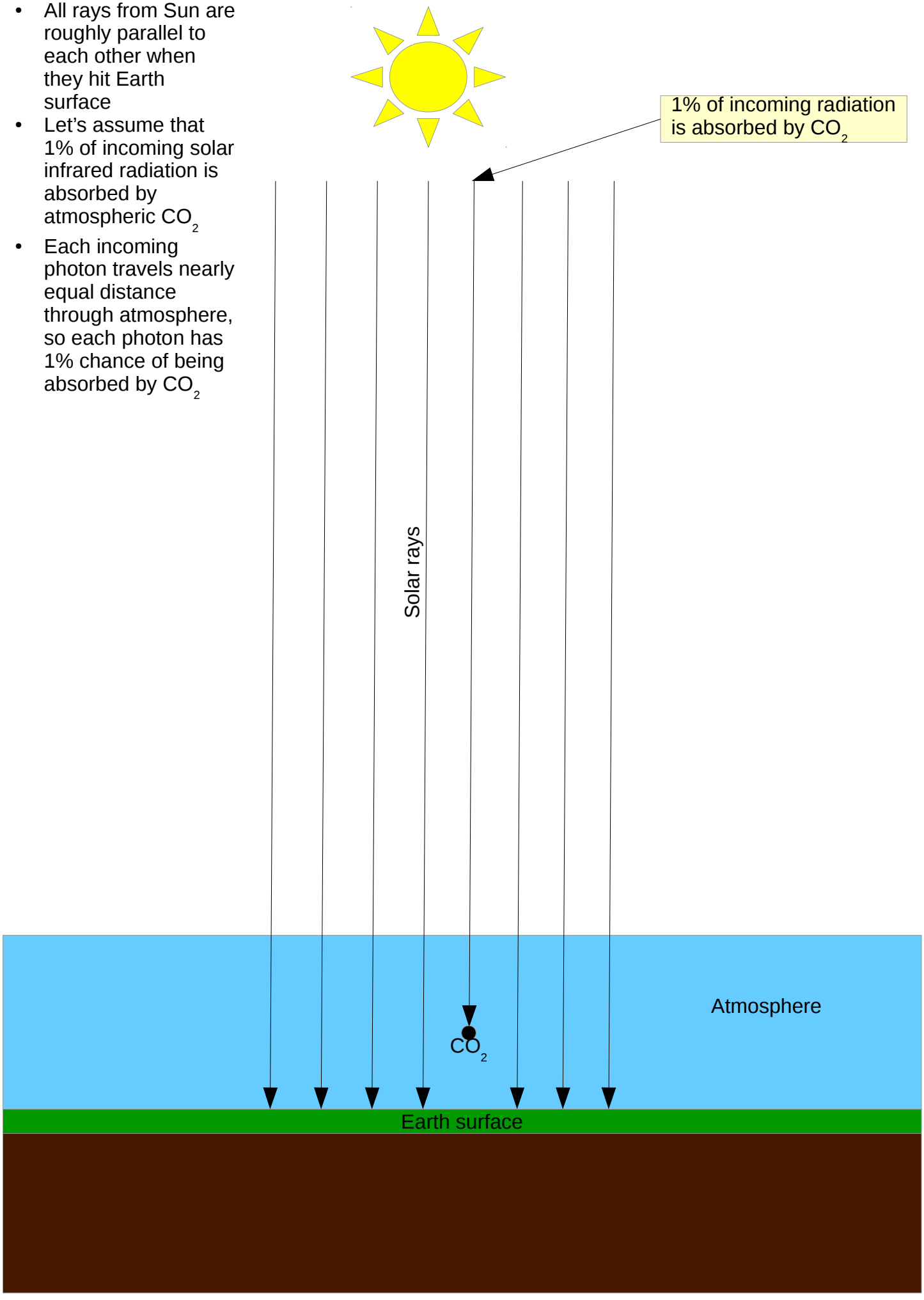
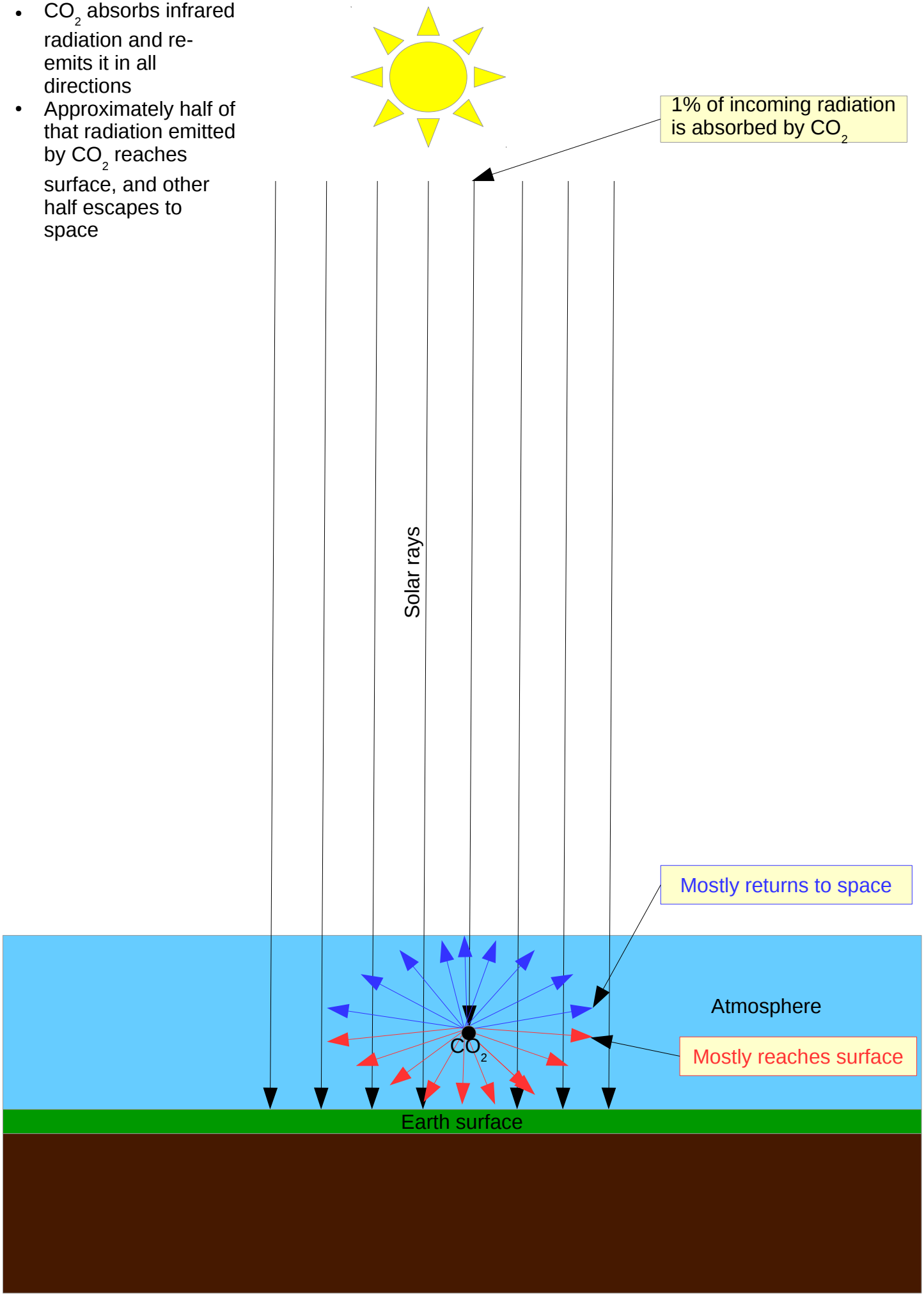
How CO_2 cause global warming

- All rays from Sun are roughly parallel to each other when they hit Earth surface
- Let's assume that 1% of incoming solar infrared radiation is absorbed by atmospheric CO_2
- Each incoming photon travels nearly equal distance through atmosphere, so each photon has 1% chance of being absorbed by CO_2



How CO_2 cause global warming

- CO_2 absorbs infrared radiation and re-emits it in all directions
- Approximately half of that radiation emitted by CO_2 reaches surface, and other half escapes to space



How CO_2 cause global warming

- Thermal emission from surface is approximately equal in all directions
- **Thermal radiation emitted in directions other than perpendicular to surface, has longer path through atmosphere, so it has higher chance to be reabsorbed by CO_2 than incoming solar radiation**
- Solar radiation reflected from surface is also largely scattered in random directions