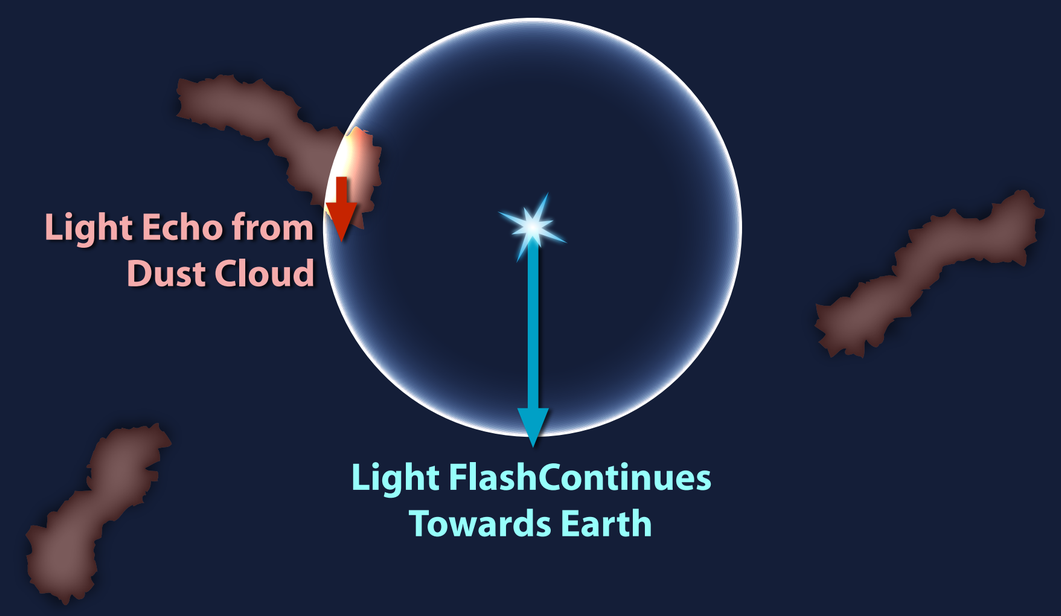
A neutron star emits a brilliant flash that travels outward at the speed of light. Nearby are dark, cold dust clouds, soon to be illuminated by this flash. Earth is toward the bottom of the page. Downward-pointing arrows indicate light that will eventually reach Earth and be seen by astronomers.

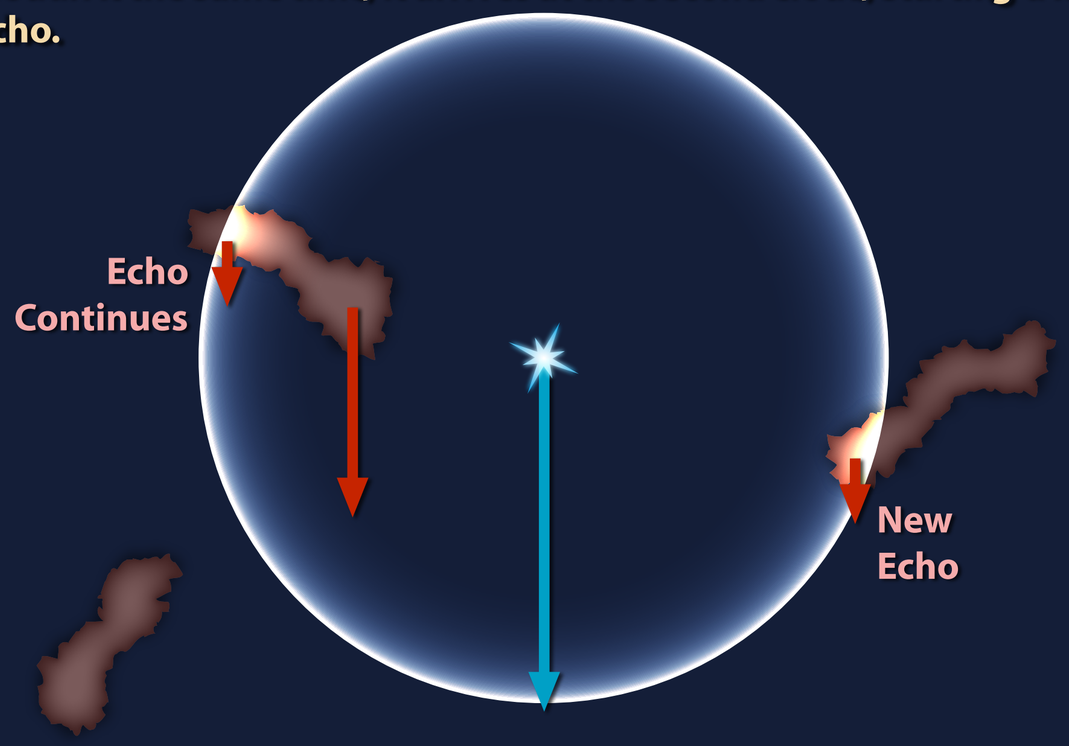
A

Light from the flash reaches the first, closest dust cloud, heating it up. The cloud, in turn, begins to emit infrared light. This "echo" travels towards Earth, though it lags behind the original flash and will arrive later.



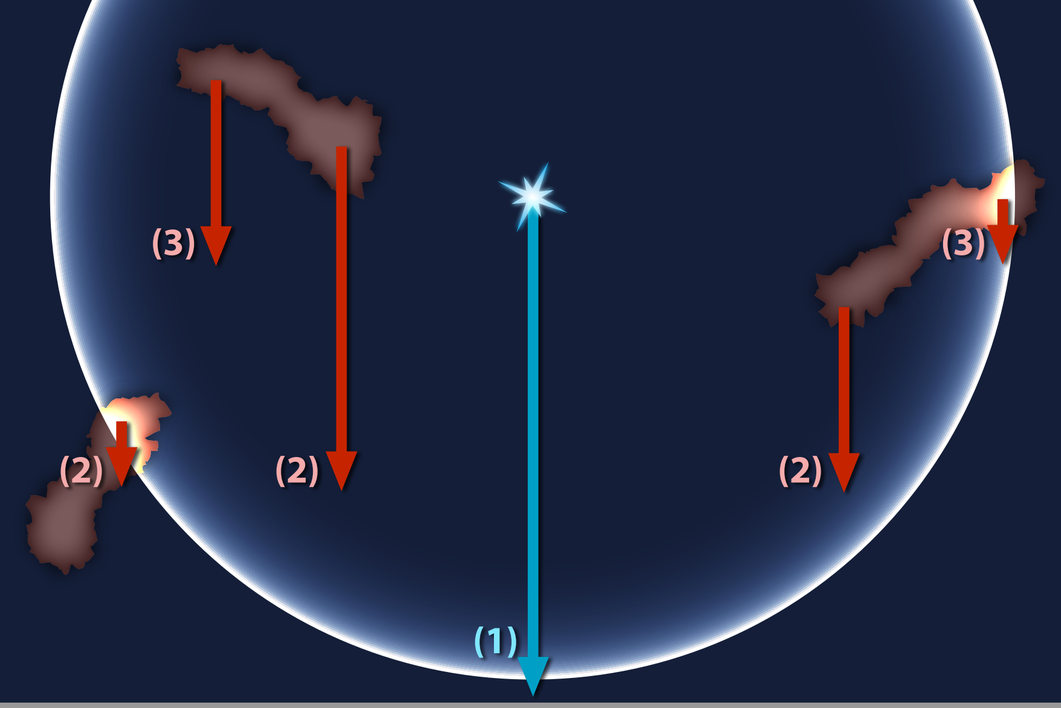
B

Light from the flash continues to move through and warm the first cloud. At the same time, it arrives at the second cloud, starting a new echo.



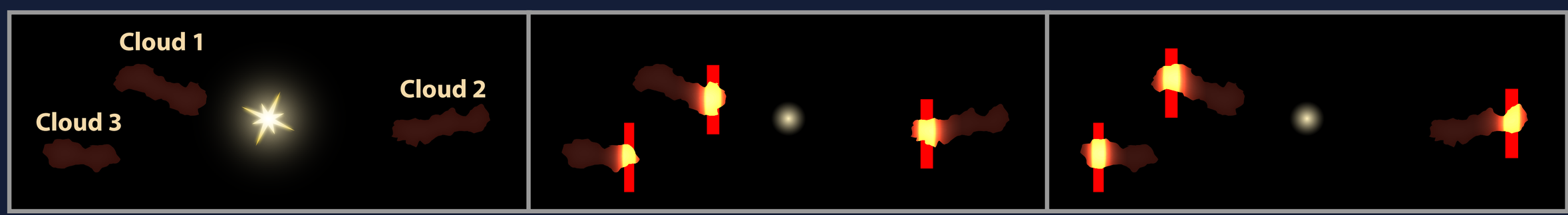
C

The flash continues expanding outward, warming a third cloud. The numbers on the Earth-bound light rays indicate the order in which they will arrive. The initial flash (1) will be seen first. The light echoes from all three clouds (2) will arrive next, at about the same time. Echoes from other parts of the clouds will arrive last (3).



D

These frames show the astronomer's view of the light echo event at the three different times noted above. Initially, the telescope sees only the flash from the neutron star (the clouds are nearly invisible). Next, the light echoes begin to appear. At later times, the echoes shift through the dust clouds creating the illusion of rapidly-moving dust. In fact the clouds are stationary and only the echo location moves.



Time (1) Time (2) Time (3)

E