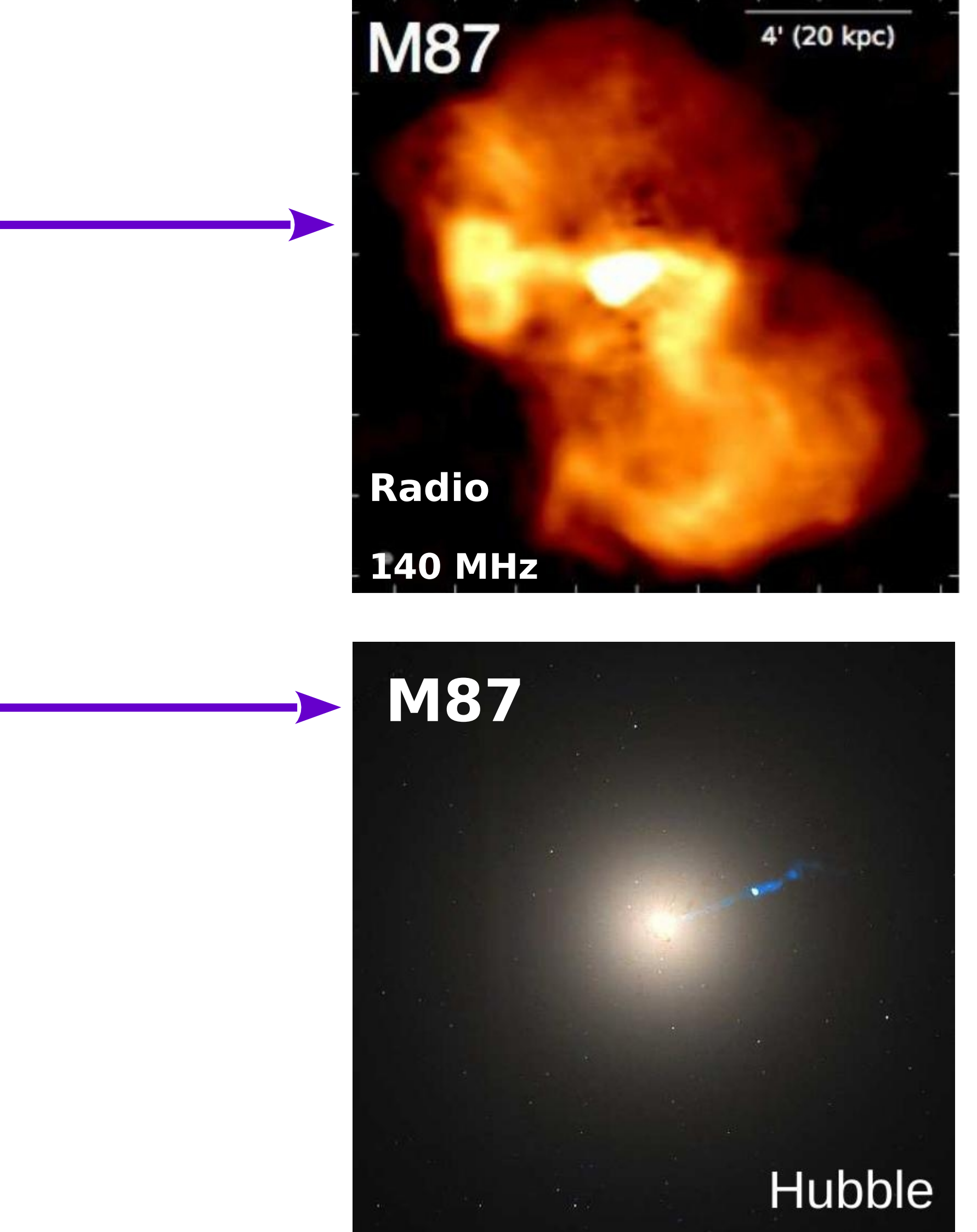
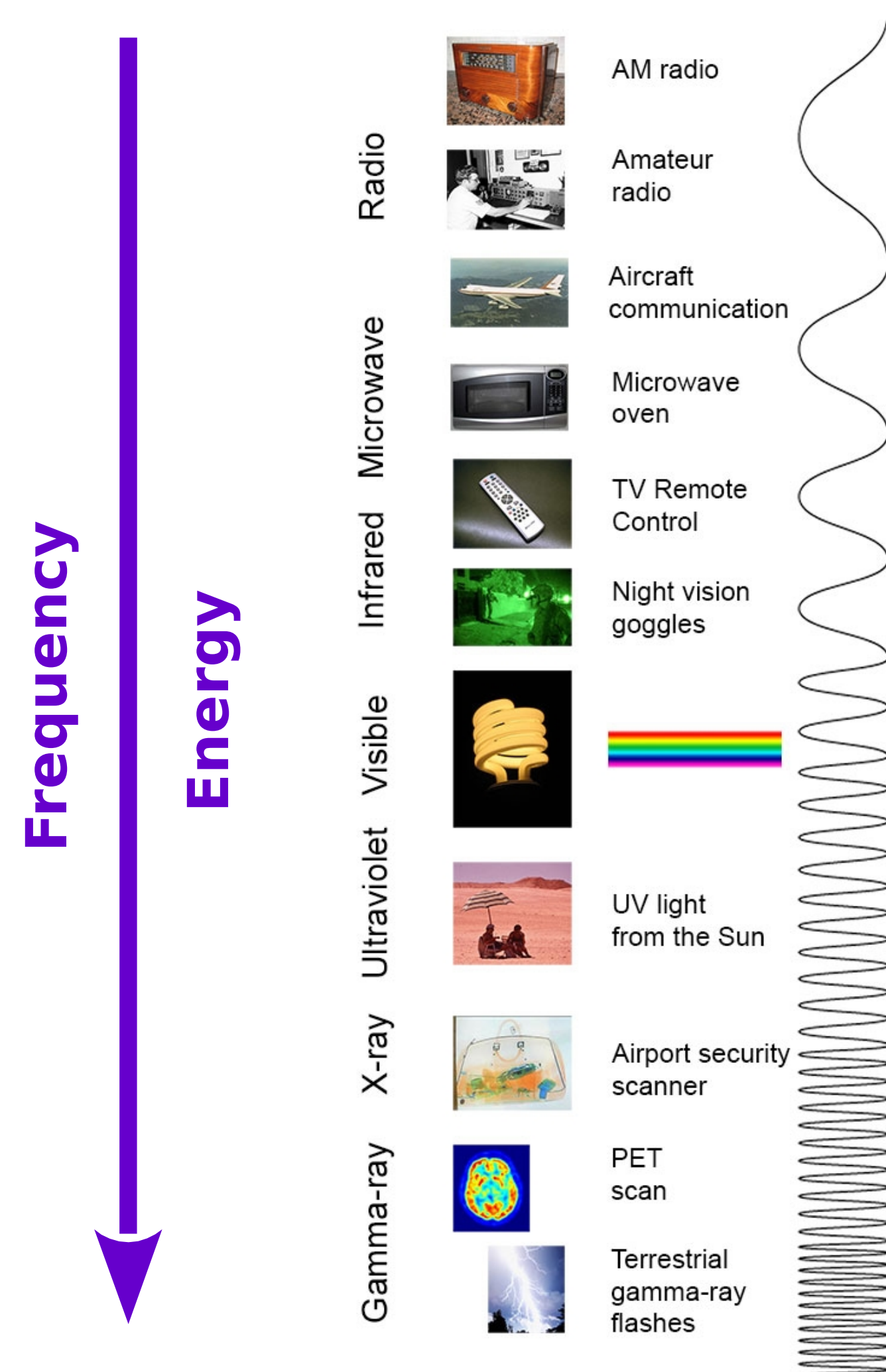
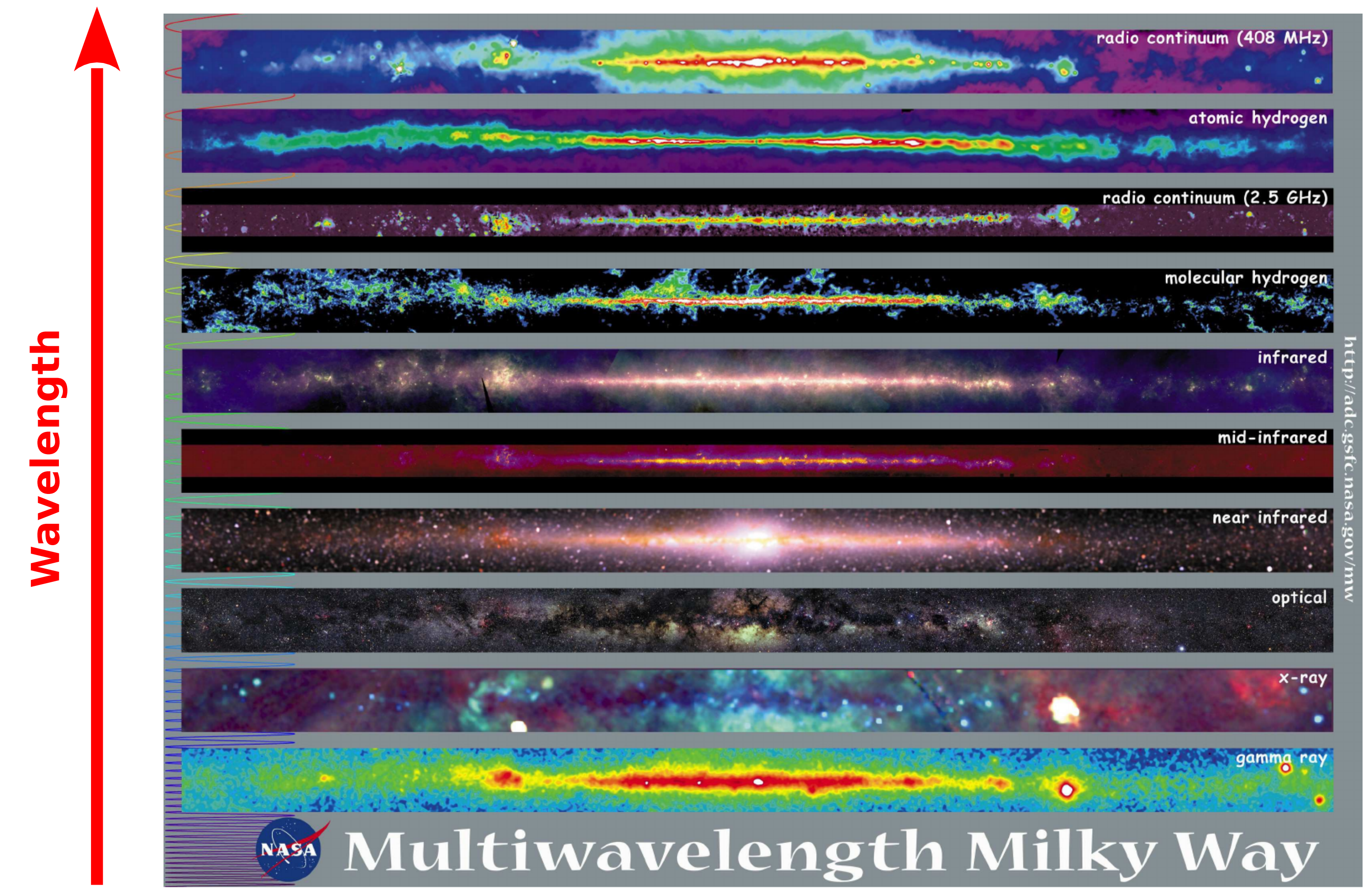
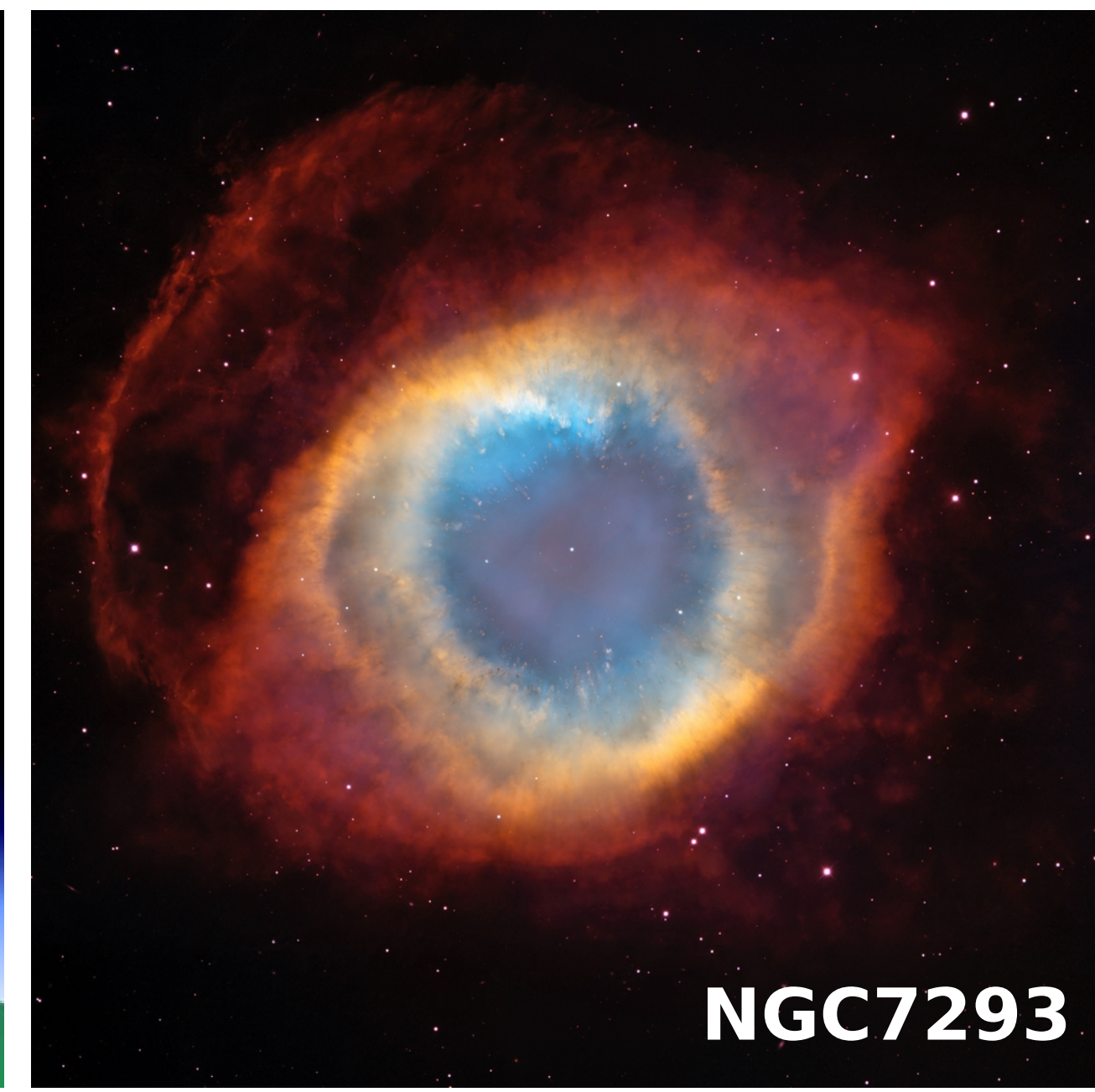
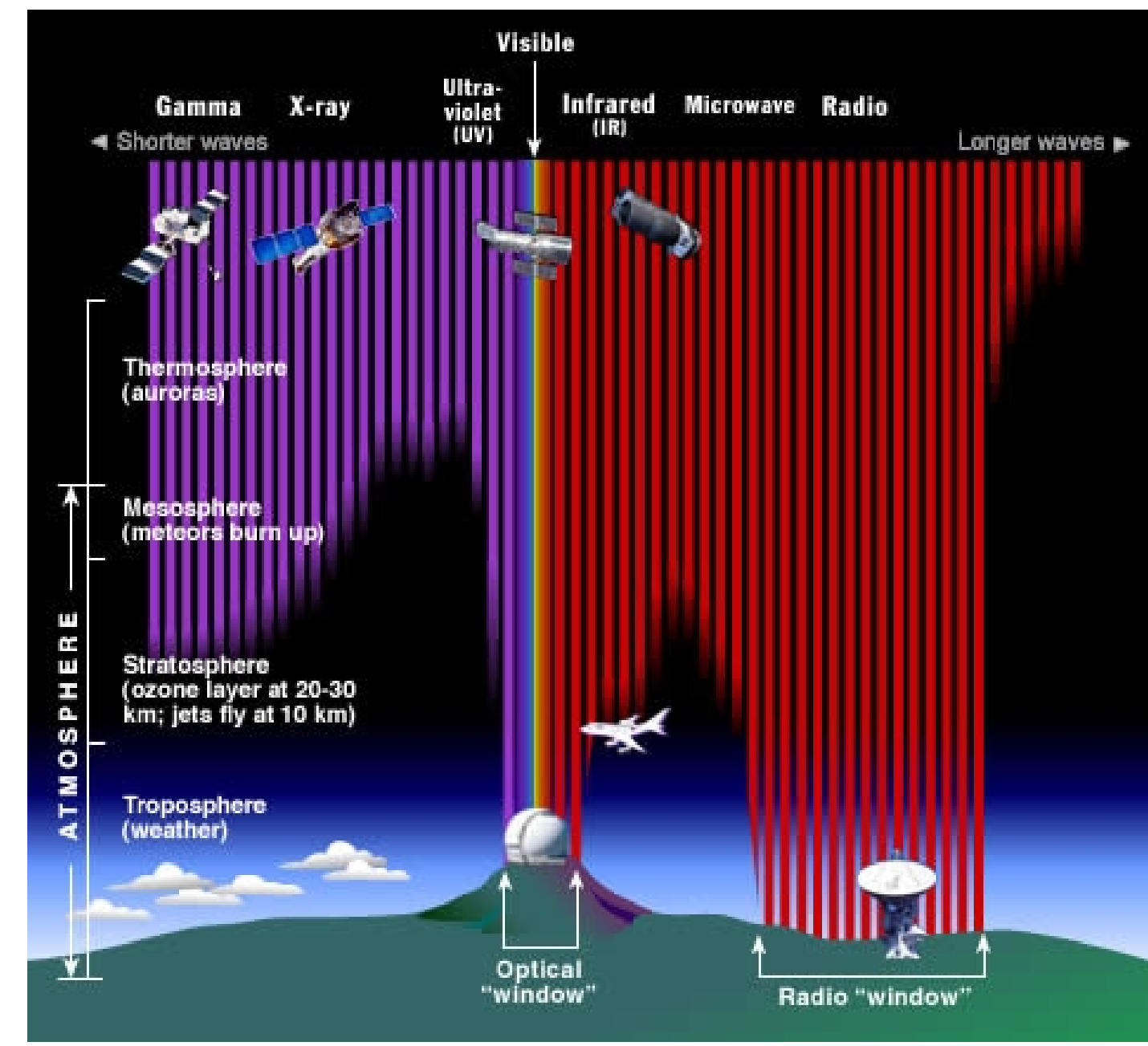
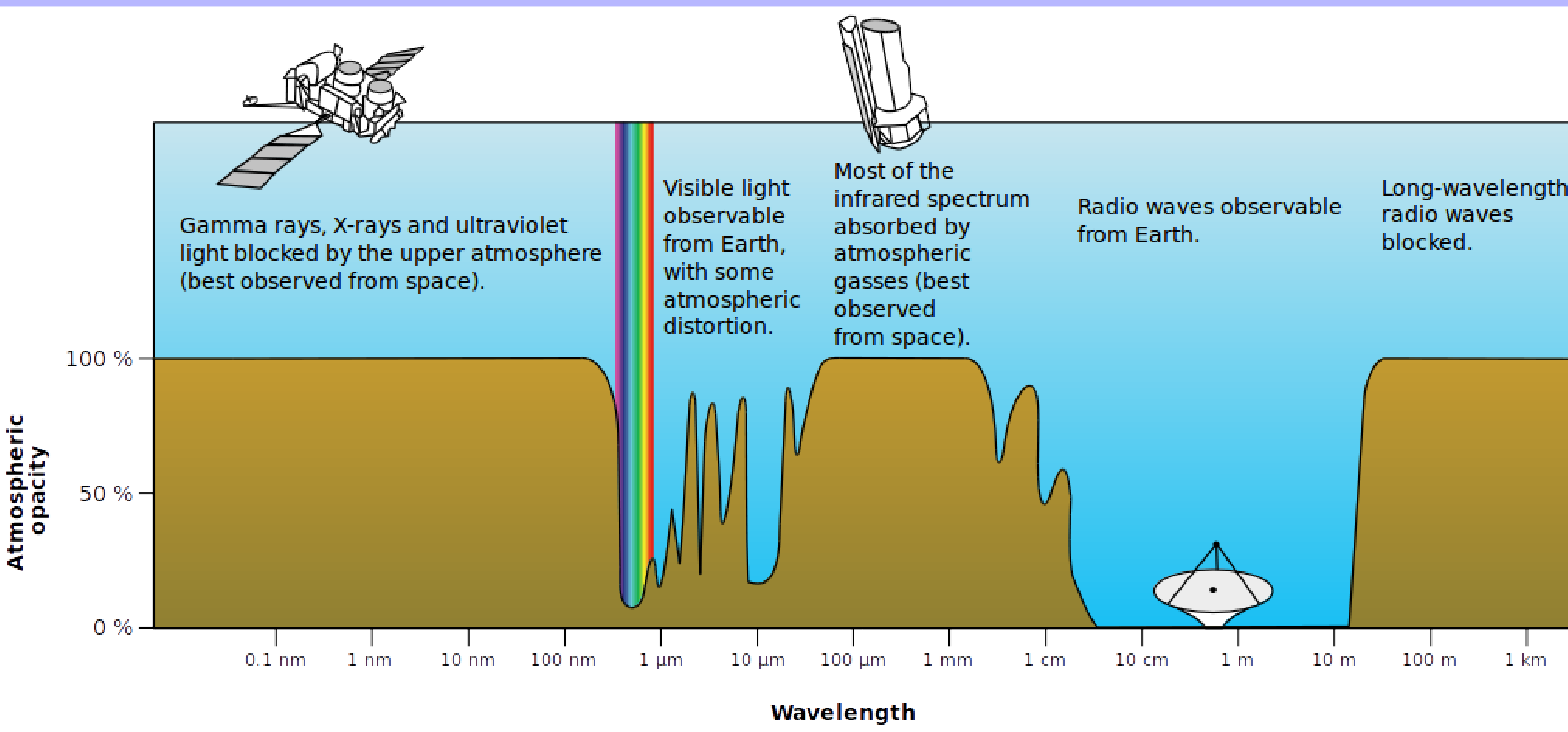


# Welcome to the Radboud University Telescopes

## A brief introduction to Astronomy

### The electromagnetic spectrum and the atmospheric absorption



### Radio telescopes in the Netherlands

### Radio telescopes around the World



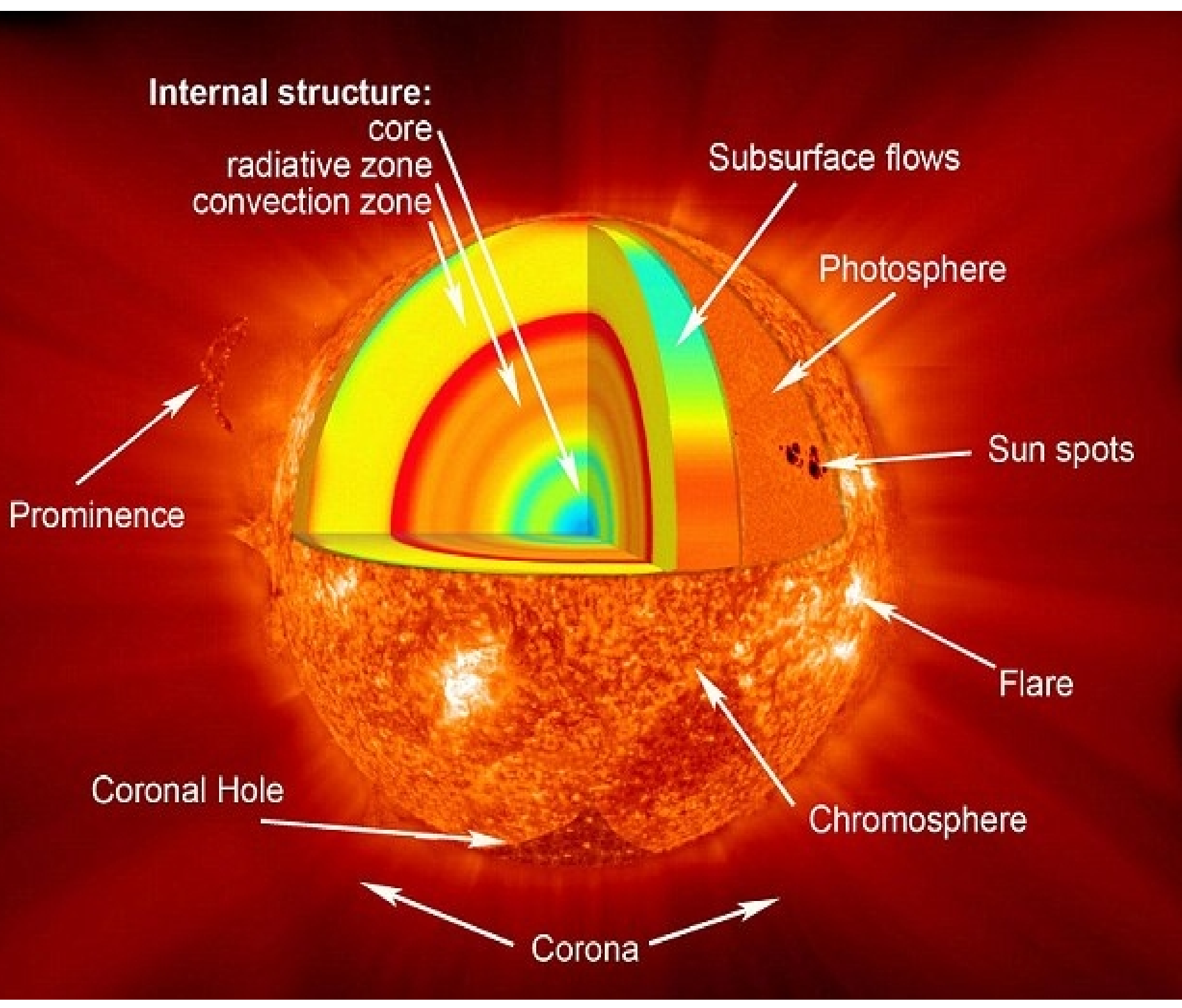
**Top: LOW Frequency Array (LOFAR)** in Exloo, Drenthe Province.  
**Bottom:** picture of one Low Band Antenna 30 - 80 MHz (left), and High Band Antenna 110 - 240 MHz (right)

**Westerbork Synthesis Radio Telescope (WSRT)** in Drenthe - 14 dish-shaped antennas with a diameter of 25 meters each; observing frequencies between 120 MHz - 8.3 GHz

**ARECIBO radio telescope** in Arecibo, Puerto Rico - single-dish telescope with a diameter of 305 meters; observing frequencies: 8 MHz, 47 MHz, 430 MHz and 2.38 GHz

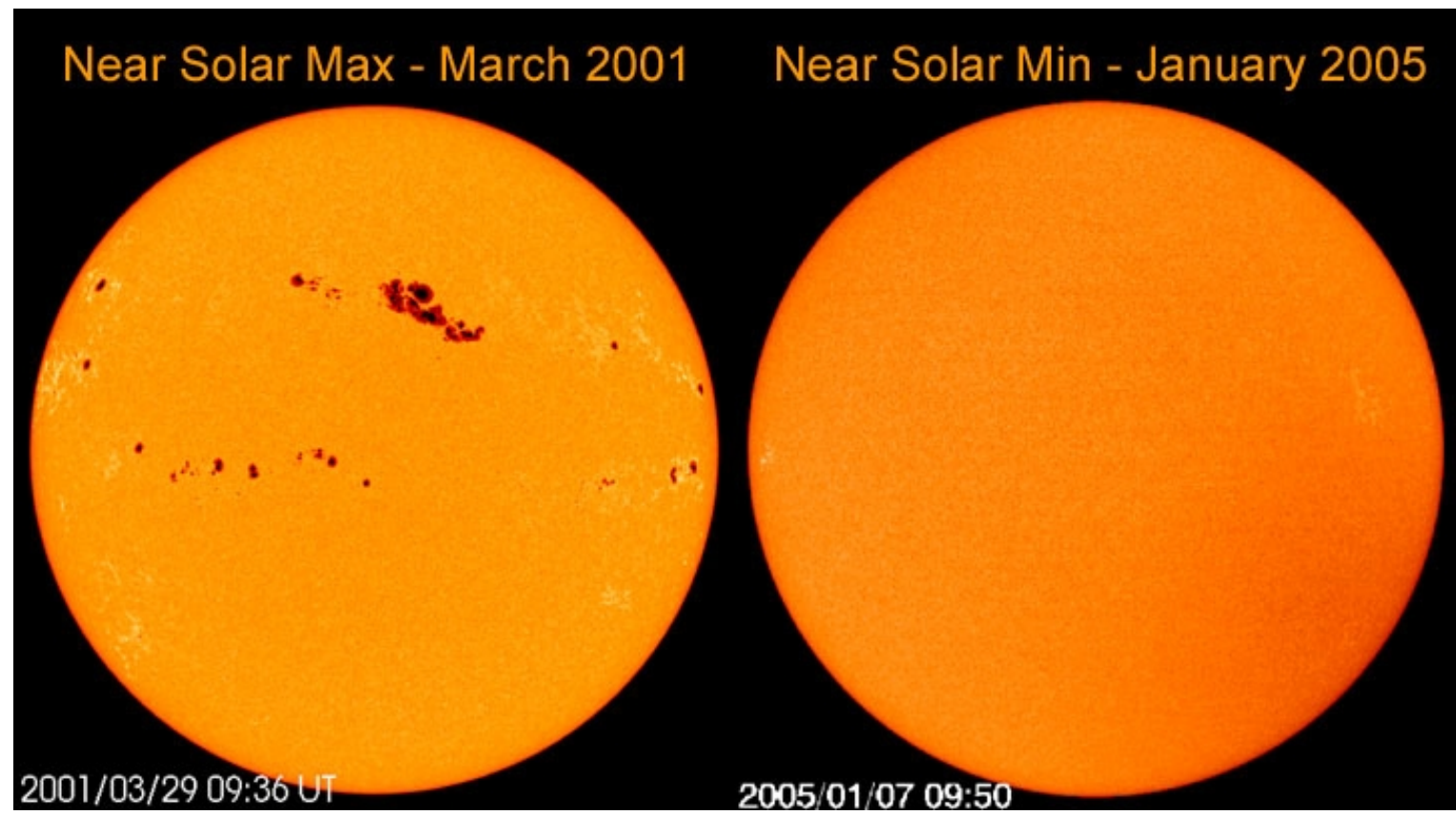
**Very Large Array** in New Mexico; 27 radio antennas with a diameter of 25 meters; the combination of all antennas reaches a sensitivity of an equivalent 130 meters diameter single-dish

### The internal and external structure of the Sun



**Radius** = 700000 km  
~ 109 times Earth's mass  
**Mass** =  $2 \cdot 10^{30}$  kg  
~ 333000 times Earth's mass

**Core:** 20-25% of Sun radius  
T = 15.7 millions Kelvins  
**Radiative zone:** 0.7 Sun radii; the temperature drops from 7 to 2 millions Kelvins; region of energy transfer via thermal radiation  
**Convection zone:** from 0.7 solar radii (200000 km) to near the surface; region of energy transfer via convective currents



Convection phenomena reduce the surface temperature in a local region, thus creating a darker spot (**Sun spot**) compared to the surrounding photosphere; Sun spots size can span from 16 km to 160000 km; **solar flares** can occur on sun spot location

