

VISUALIZATION

linear

log

false colour

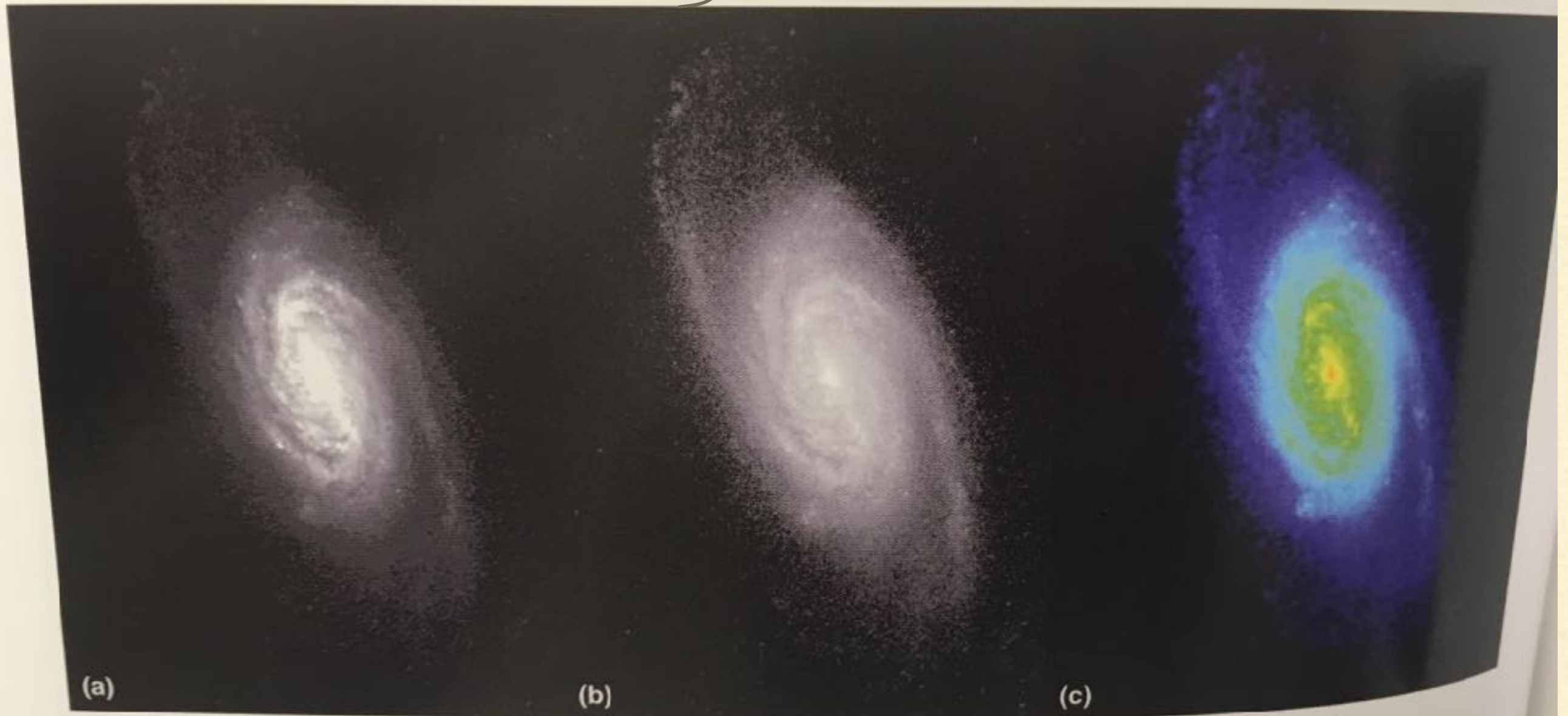
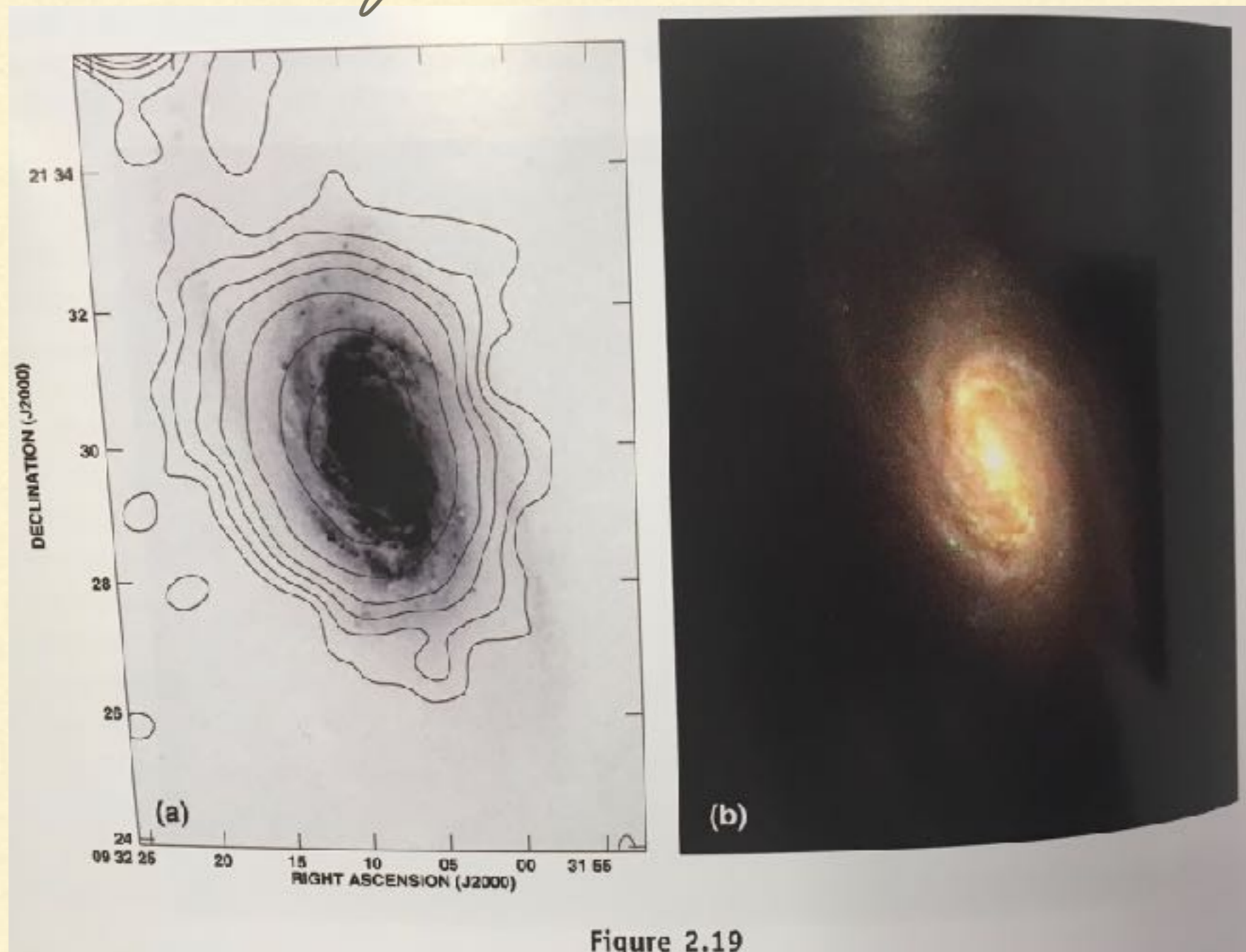


Figure 2.18

VISUALIZATION

overlays



Bottom line:
Choose whatever
best conveys the
info you want to
show

Example 2.2

A galaxy at a distance of $D = 25$ Mpc will be observed with a spatial resolution of $1''$ at a frequency of 4.57×10^{14} Hz and bandwidth of $\Delta\nu = 2 \times 10^{12}$ Hz in order to detect the HII regions (these are ionised hydrogen regions around hot stars, see Figures 3.13 and 8.4) within it. The map noise expected for the integration time proposed is $N = 2 \times 10^{-17}$ erg s^{-1} cm^{-2} Hz^{-1} sr^{-1} . Could a spherical HII region of typical diameter, $d = 500$ pc, and luminosity, $L = 10^{39}$ erg s^{-1} , in this frequency band be detected from these observations? Would it be resolved?

$$D = 25 \text{ Mpc}$$

$$= 7.71 \cdot 10^{25} \text{ cm} = r$$

$$\text{flux} = \left[\text{eq 1.9 : } f = \frac{L}{4\pi r^2} \right] = 1.34 \cdot 10^{-14} \text{ erg/s/cm}^2$$

$$f_\nu = \left[\text{eq 1.7 : } f_\nu = \frac{df}{d\nu} \right] = \frac{\text{flux}}{\Delta\nu} = 6.89 \cdot 10^{-27} \text{ erg/s/cm}^2/\text{Hz}$$

$$d = 500 \text{ pc} = \left[\text{B1 \& B3 : } s = r\theta, \Omega = \frac{\pi}{4} \theta^2 \right] \Rightarrow \Omega = 3.4 \cdot 10^{-10} \text{ sr}$$

$$I_\nu = \left[\text{eq 1.13} \right] = 2.13 \cdot 10^{-17} \text{ erg/s/cm}^2/\text{Hz/sr}$$

specific intensity

$$N = 2 \cdot 10^{-17} \text{ erg/s/cm}^2/\text{Hz/sr}$$

not enough for detection!

need longer time!

b) ang res: $1''$ [eq B.1 $s = r\theta$] = 121 pc < 500 pc resolved!!