(3) In order of magnitude, the energy stored in ocean waves is as much as the Earth receives from the sun in what length of time?

Let h be the wave height from trough to crest; $h/2$ is the amplitude. If y is the height of the surface at any point, measured from the mean surface, the potential energy there per unit area is $\rho g y^2/2$. But averaged over many wavelengths $\overline{y^2} = h^2/8$, so the potential energy per unit area averaged over a large region is $\rho g h^2/16$. Doubling this to include the kinetic energy, we have $\rho g h^2/8$ for the total wave energy per unit area of ocean. For example if $h = 2$ meters, this gives 5 J/m^2 for the mean energy density. Sunlight with a power density of 1 kw/m^2 is being intercepted at any moment by an area equal to 1/4 the Earth's surface. If waves with $h = 2$ meters prevailed over half the Earth's surface, their energy would be equivalent to 1/100 second of sunlight.