48. In the solution to exercise 4, we found that the force provided by the wind needed to equal $F = \mu_k mg$. In this situation, we have a much smaller value of μ_k (0.10) and a much larger mass (one hundred stones and the layer of ice). The layer of ice has a mass of

$$m_{\text{ice}} = \left(917\,\text{kg/m}^3\right)(400\,\text{m} \times 500\,\text{m} \times 0.0040\,\text{m})$$

which yields $m_{\text{ice}} = 7.34 \times 10^5$ kg. This added to the mass of the hundred stones (at 20 kg each) comes to $m = 7.36 \times 10^5$ kg.

(a) Setting $F = D$ (for Drag force) we use Eq. 6-14 to find the wind speed v along the ground (which actually is relative to the moving stone, but we assume the stone is moving slowly enough that this does not invalidate the result):

$$v = \sqrt{\frac{\mu_k mg}{4C_{\text{ice}}\rho A_{\text{ice}}}} = \sqrt{\frac{(0.10)\,(7.36 \times 10^5)\,(9.8)}{4(0.002)(1.21)(400 \times 500)}}$$

which yields $v = 19$ m/s which converts to $v = 69$ km/h.

(b) and (c) Doubling our previous result, we find the reported speed to be 139 km/h, which is a reasonable for a storm winds. (A category 5 hurricane has speeds on the order of 2.6×10^2 m/s.)