Over the past decade new sensors, algorithm developments, and innovative applications have provided new perspectives on Earth's changing snow and glaciers. Areas of advancement include improved algorithms for mapping snow and glacier extent, albedo, snow grain size, snow water equivalent, melt detection, surface elevation and surface roughness, and glacier velocity. New instruments, techniques and applications have emerged that enable exciting new uses of multiangular, lidar, radar, and gravity remote sensing. I will discuss challenges and synergies of present-day sensors and offer a vision for future that includes suborbital missions, multisensor mapping, scaling issues, and data assimilation.