

City Talk



A suspected Chinese surveillance balloon is monitored by a US pilot. A weather balloon is being readied for launch. REUTERS, XINHUA



WANDERING BALLOONS KEEP WEATHER WATCH

The international news these past few weeks has been hot on flying objects. Airships and balloons have been reported seen in the sky in many parts of the world.

But to the technically minded, there is a large difference between airships and balloons.

Balloons are smaller and airships are much larger. Airships are used to carry a large payload and usually have some form of motive power to fly in a direction.

Probably the most famous of all airships is the Zeppelin, invented by the Germans in the late 19th century. It was a means of transporting a heavy load across countries and oceans, and suitable for both military and civil applications. Hydrogen gas was used to fill the airbag as it was the lightest form of gas available in that era. Motive power was provided by engines driving propellers.

Unfortunately, hydrogen – being inflammable – caused many fire accidents and eventually the airship was superseded by conventional aircraft.

Weather balloons are used extensively to obtain weather data in the atmosphere, as they are relatively inexpensive and are usually not recovered after being let up into the sky and the weather data such as temperature, pressure and wind directions have been transmitted to the observatory. Helium gas is normally used to provide their buoyancy, and as the volume of gas required is relatively small, the higher price is not a concern. And helium gas is not inflammable so is safer.

These weather balloons will continue to fly in the atmosphere until the balloon membrane fails. It falls back to the ground or sea, together with its weather-data collection equipment. The detection and signaling systems are often not recovered as the costs far exceed the value of the low-tech balloon.

Balloons fly high in the sky due to



Nuts and bolts

Edmund Leung

buoyancy. The latex material of the balloon surface is stretchable. The helium gas will provide the buoyancy force to allow it to rise. As it rises, the balloon continues to expand. The relatively light assembly of the balloon and its payload will continue to rise to high levels until the buoyancy force is balanced by its total weight. At ground level the balloon may seem small in size but it could become huge when the atmospheric pressure at high altitude diminishes.

The atmosphere is made up of layers. The lowest layer where we live is called the troposphere, with thickness of about 18 kilometers. This comprises the major part of the air, together with its water vapor and aerosols, and is therefore responsible for the weather conditions.

Temperature in this layer of the atmosphere increases with altitude. This is because of the effect of ultra-violet light which heats up the air. Weather balloons operate in this layer to provide us with measurements of weather conditions.

The next level of the atmosphere is called the stratosphere, with thickness of about 15 km. The air is thin and the temperature distribution reverses. Temperature decreases with increasing altitude. Weather balloons seldom reach this altitude.

Most of the flying objects we see in the sky are balloons. As they have no motive power their flight path cannot be controlled and they will drift with the wind. They fly until their latex membrane breaks and they drop.

Thus there should be no surprises if we see these “flying objects” drifting in the sky.

Veteran engineer Edmund Leung Kwong-ho casts an expert eye over Hong Kong's iconic infrastructure