I believe that Saturn is the best choice of destination for the Cassini probe. Following the vernal equinox in August 2009, Saturn's northern hemisphere has moved into spring, which is producing major changes in temperature distribution across the planet. Due to the long Saturn year – equivalent to approximately thirty Earth years – we will only have one opportunity with the Cassini probe to observe the induced changes in atmospheric conditions produced by this change. Hence it is vital to seize this unique opportunity to gather the depth of high quality data collectable by Cassini due to its location and broad range of sensors.

The change in season has already produced significant weather effects. In December 2010, the Radio and Plasma Wave Science instrument on board Cassini detected radio emissions indicating a new lightning storm. Following the appearance of a white spot, the storm developed into a planet-encircling storm which finally disappeared this June. This storm is potentially one of Saturn's Great White Spots (GWS), which are planetary disturbances that have occurred approximately every 30 years since first reported in 1876 and are still little understood. This is the first time that a probe has been orbiting Saturn while this phenomenon occurs, providing a rare opportunity to follow it from its origin to its final decay.

The atmosphere mainly comprises hydrogen and helium, with an upper layer of ammonia ice and middle and lower layers containing ammonium hydrosulphate and water respectively. A GWS is a giant storm, similar in nature to thunderstorms, where vertical convection currents carrying water carrying clouds from the lower levels break through the outer layer of ammonia ice cloud, and become visible.

This storm was unusual not only in the fact that it arrived far earlier than the 2016 prediction, but also in that it exceeded the lifespan of previous GWSs. Although the storm has dissipated, it is reported that there is a persistent gap in the cloud layers below the upper haze allowing us to look deep into Saturn's atmosphere. I believe that we should continue to observe the storm until all evidence of disturbance has gone in order for us to gain a fuller understanding of this unique weather pattern.

In addition to this storm, an extremely large, six-sided weather system has been previously photographed at Saturn's North Pole. On all other planets that have atmospheres, it is sinuous cloud forms which are normally observed, meaning this hexagonal system is unique in the solar system. Previously, the weather system could only be seen using infrared detectors, but now the structure should be observable in visible-light wavelengths. Saturn's actual rotation is not fully understood, and as the hexagon appears to have remained fixed with Saturn's axis and rotation rate, an understanding of it may lead to a greater knowledge of Saturn's rotation itself.

In conclusion, I believe that Saturn is potentially the most scientifically rewarding and time sensitive use of Cassini. We will not only be able to observe the current weather system, but in view of the storms early arrival there is also the real prospect of observing other evolving and potentially new phenomena.