Could comets have brought water and organic materials to Earth?

Voice-over:
With such a long mission, it's proved useful to have a double of Rosetta at Darmstadt. This is more or less exactly the same as the main spacecraft, and is used for testing new software, troubleshooting problems on the real Rosetta, and training staff.

Once Rosetta catches comet 67P Churyumov-Gerasimenko near the planet Jupiter, it starts work immediately; firstly mapping the surface, identifying potential landing spots, and studying the nucleus.

Paolo Ferri:
The orbiter has a, has a full compliment of experiments that go from what we call remote sensing - so taking pictures of the nucleus and of the surrounding of the comet in optical, in ultraviolet, infrared, and then we have chemical analysis experiments, we have even, well, various mass spectrometers and various experiments for analysing the particles; the gas and the dust that is actually collected by the spacecraft in the surroundings of the comet.

Voice-over:
The lander, known as Philae, will be dropped onto a truly alien world. Once safely down, it will scan the area and drill twenty centimetres below the surface to collect samples. This is the first time space scientists have tried a controlled landing on a comet, and a lot of questions remain unanswered.

Paolo Ferri:
The surface of a comet looks very similar, optically, to the one of an asteroid, so it's, imagine like a very big mountain with a lot of craters on it.

But nobody knows how soft this surface is, or how hard it is. There are theories, there are educated guesses, but there is no, no real knowledge.

Voice-over:
As the comet approaches the Sun, it heats up, producing a tail of gas and dust. Rosetta will test whether the water in the comet is the same as the water on Earth. And it will examine the complex organic molecules made from carbon, hydrogen, nitrogen and oxygen that comets could have brought to our planet.

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