Set of questions on comets and the Wow signal.

Chris Lintott, including contributions from Twitter astronomers.

Questions about the radio astronomy:

1. **The beam size of the telescope was 1.2 degrees, which in drift scan mode means objects should take about 5 minutes to cross the field; the detections are shorter. Why?**
2. How was RFI accounted for?
3. **How did you treat the side-lobes? : this comment makes a convincing argument that the detection is the Sun. https://t.co/279jdfoISR**
4. **What's the relative brightness of the comet and your detection of the galactic centre? If a single comet is this bright at 21cm - as bright as the brightest radio sources in the sky, why doesn't it and many other comets show up in the many surveys which have been taken?**
5. Comets are bright at 18cm (the OH line). Did you look there? Surely if it's this bright in 21cm it must be unmissable at 18cm as the ratio is normally thousands to one (at least).

Questions about comets:

1. **The comet you observed is inactive and far from the Sun. Searches for 21cm emission have failed to find anything in the brightest, active comets (e.g. from a quick search: http://adsabs.harvard.edu/full/1974A%26A....34..163B) . How is the discrepancy explained?**
2. Once material is in the comet coma, molecules don't collide. So if even if you create H in an excited state as water (H2O) splits into OH and H, or if it 's excited via absorption of a lyman-alpha photon, you then need it to decay spontaneously and emit those photons. **The decay lifetime is millions of years. What mechanism could turn a cloud of hydrogen which isn't collisional into a 21cm line?**
3. On a similar note, the column density - the amount of stuff in the line of sight - for a typical galactic sight line is 10^19 cm^-2. Comet Halley had column densities of <10^13 cm^-2. If you convert your detection into a column density, it would predict unphysical masses of hydrogen, with densities a million times greater than observed.
4. Similarly, **we constrain the amount of hydrogen around a comet from UV emission** (Here's a suitable reference, but there are thousands: http://adsabs.harvard.edu/full/1976SSRv...18..641K). How do you explain such a bright 21cm source without an accompanying spike in UV?

Questions about the experiment:

1. You wanted to observe the comet while it was in the same patch of sky as the Wow signal. Why? The comet doesn't care where in the sky it is. Surely observing comets at the same distance from the Sun would make more sense?
2. Even if the signal is real, it is different from the Wow signal - fainter, with different bandwidth and duration. **I therefore struggle to understand how observing this - even if real - tells you anything about the wow signal.**
3. **I don't agree with your positions.** Using the ephemeris at http://ssd.jpl.nasa.gov/horizons.cgi?find_body=1&body_group=sb&sstr=266P%20 we see that Comet 266/P Christensen, at the time the "WOW!" signal was observed in 1977, was nowhere near the position of "WOW!". (all positions are J2000).
   "WOW!" was at: RA 19h 25m 31s or 19h 28m 22s Dec -26 deg 57'
   266/P was at: RA 18h 32m 15s Dec -27deg 22'. The declination is near but the right ascension is nearly an hour off, placing 266P in a different part of the sky when the WOW! signal was observed.

Another comet, P/2008 Y2 was closer, at: RA 18h 39m 39s. Dec -29 deg 38' The declination was almost 3 degrees off and the right ascension 47 minutes off, placing P/2008 Y2 in a different part of the sky when the WOW! signal was observed.

These are huge differences even considering the beam of the telescope.

Questions about the paper

1. There aren't frequencies shown in plots. What are they?
2. Figure 4 seems to show a drift scan, but are labelled 'blueshifted' and 'redshifted' - what are these labels? Can you explain what they mean?
3. The journal is an odd place to publish; I've looked, and it doesn't appear to be available online. Did you consider publishing in one of the 'standard' astronomy journals where peer review would be carried out by astonomers? What made you choose this journal?