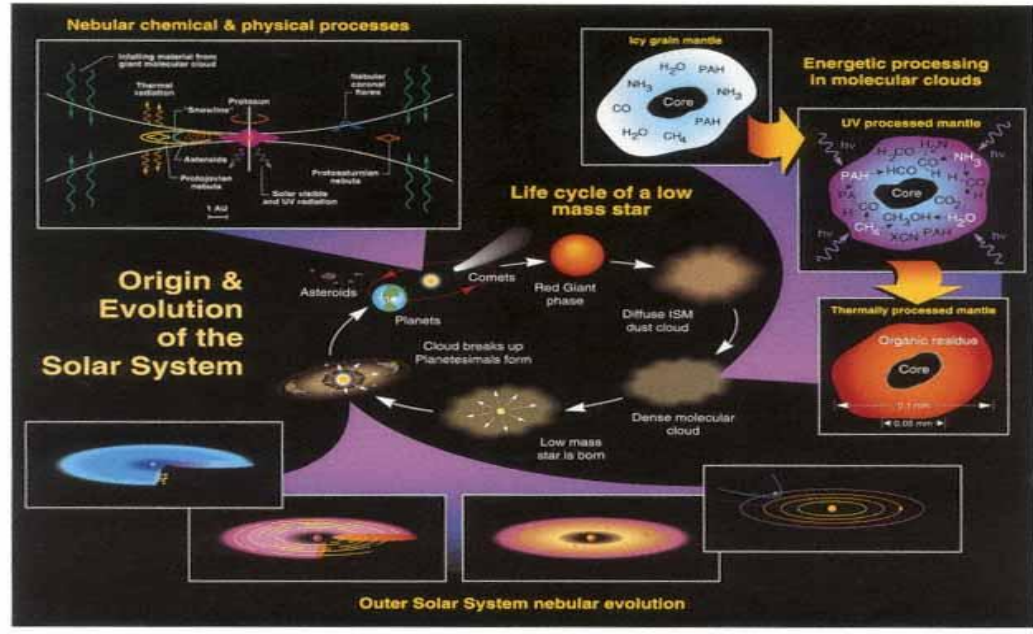
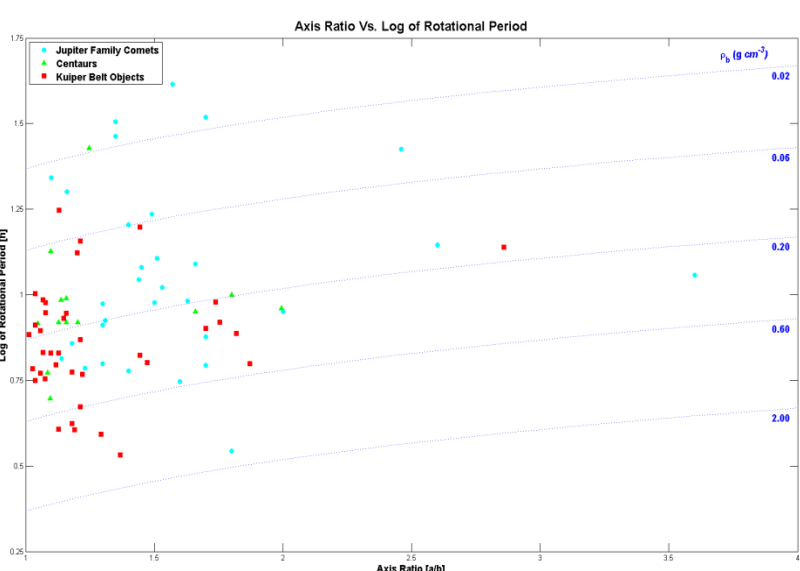


Determining composition and morphology of Jupiter-family comet 209P/LINEAR using the Atacama Large Millimetre Array (ALMA)

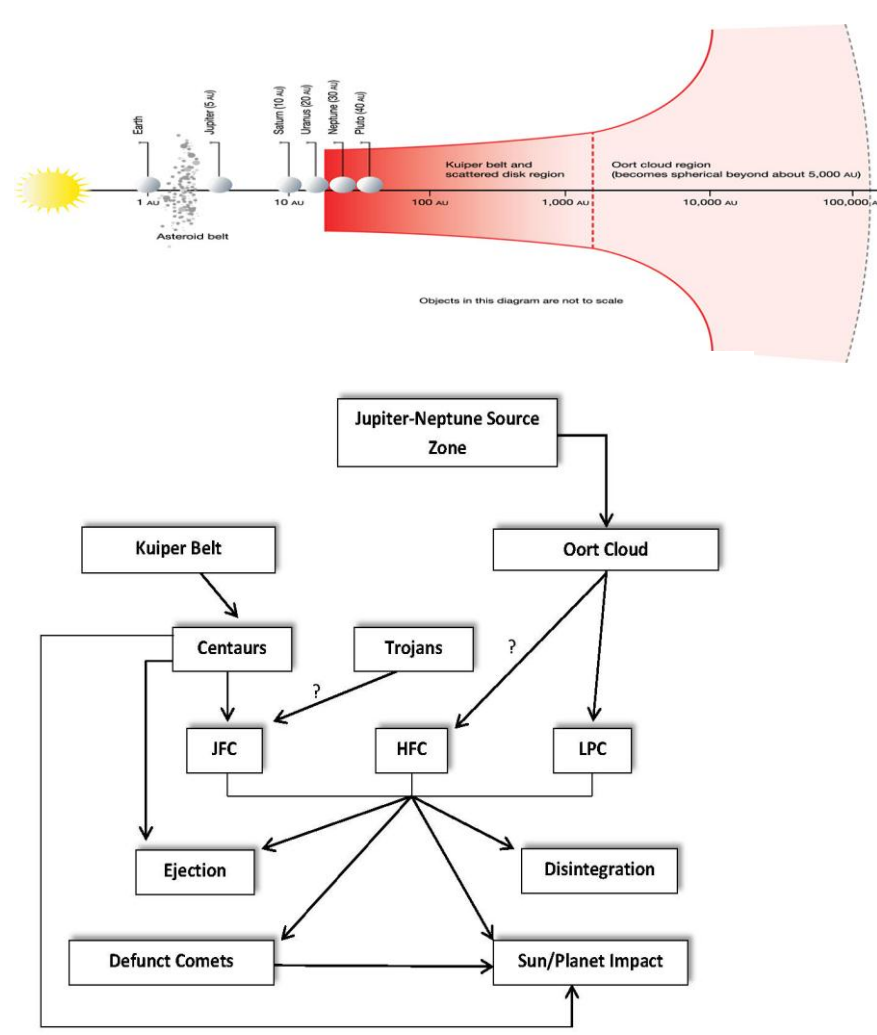
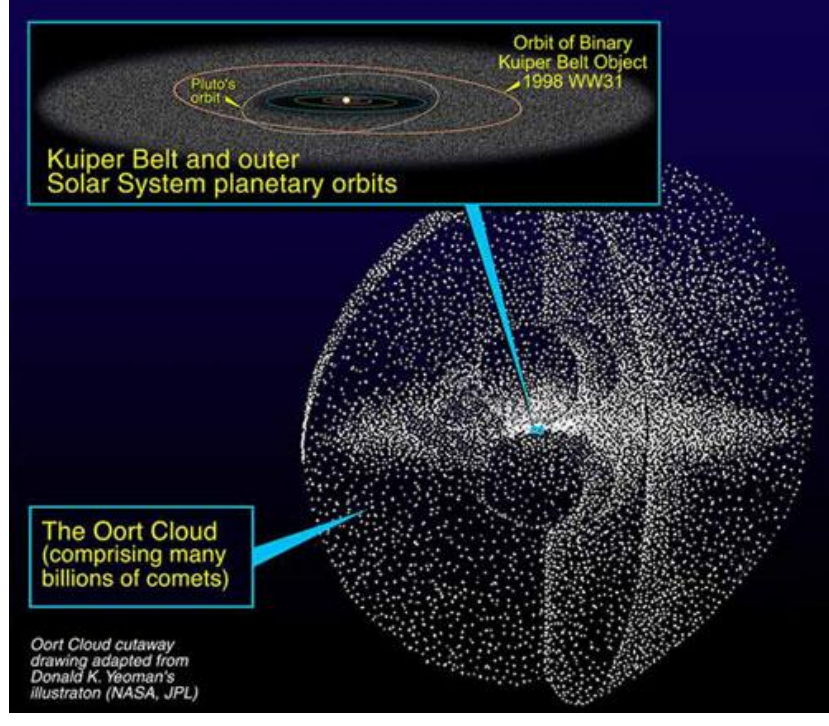
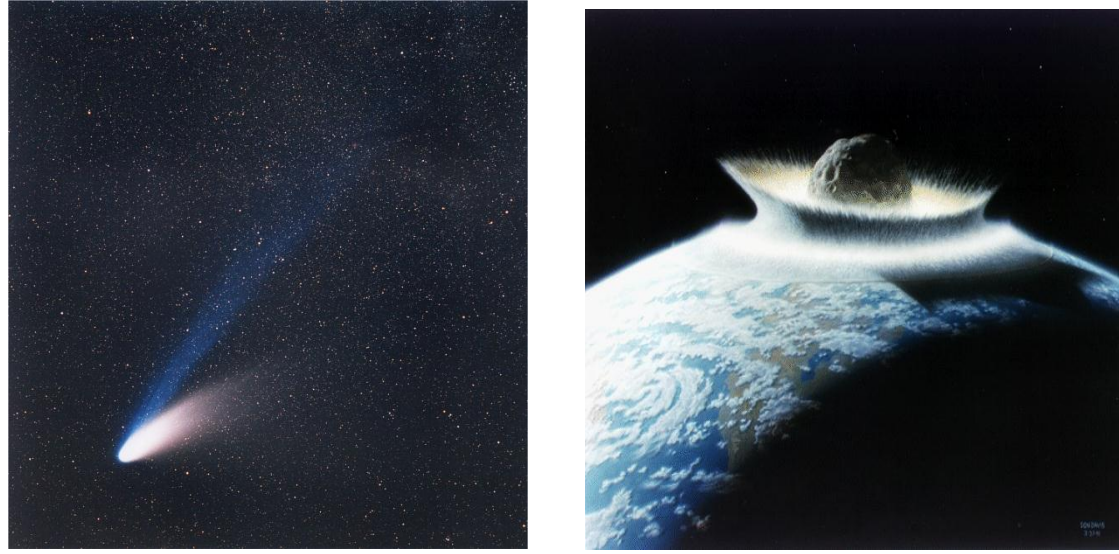


Comets supply information about

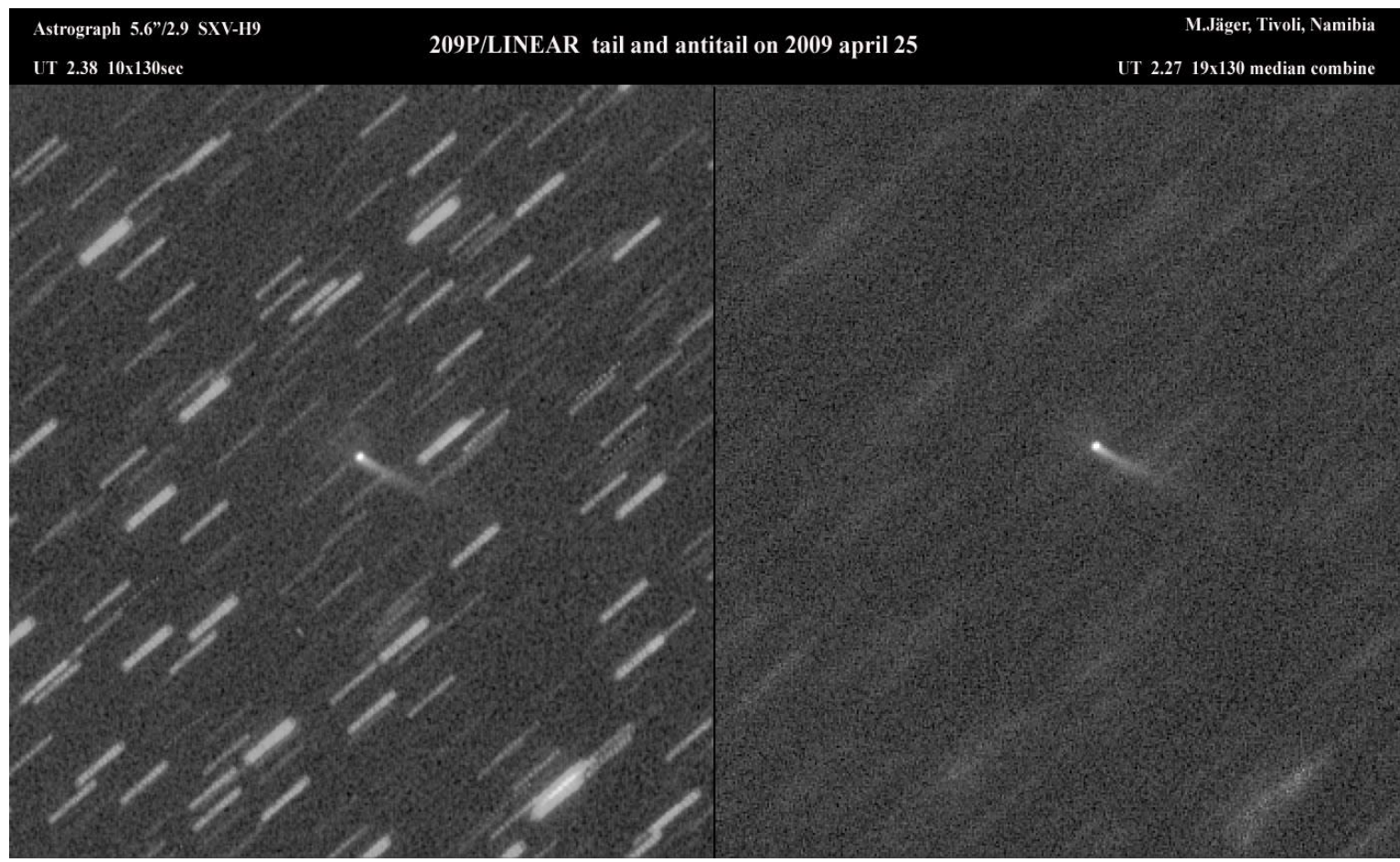
- formation, evolution, thermal and collisional history of solar system
- record of accretion processes
- original material of solar nebular
- evolution of planetary atmospheres
- Earth impact hazard



PH600 Project 2011/2012



Interrelations among planetary small body population

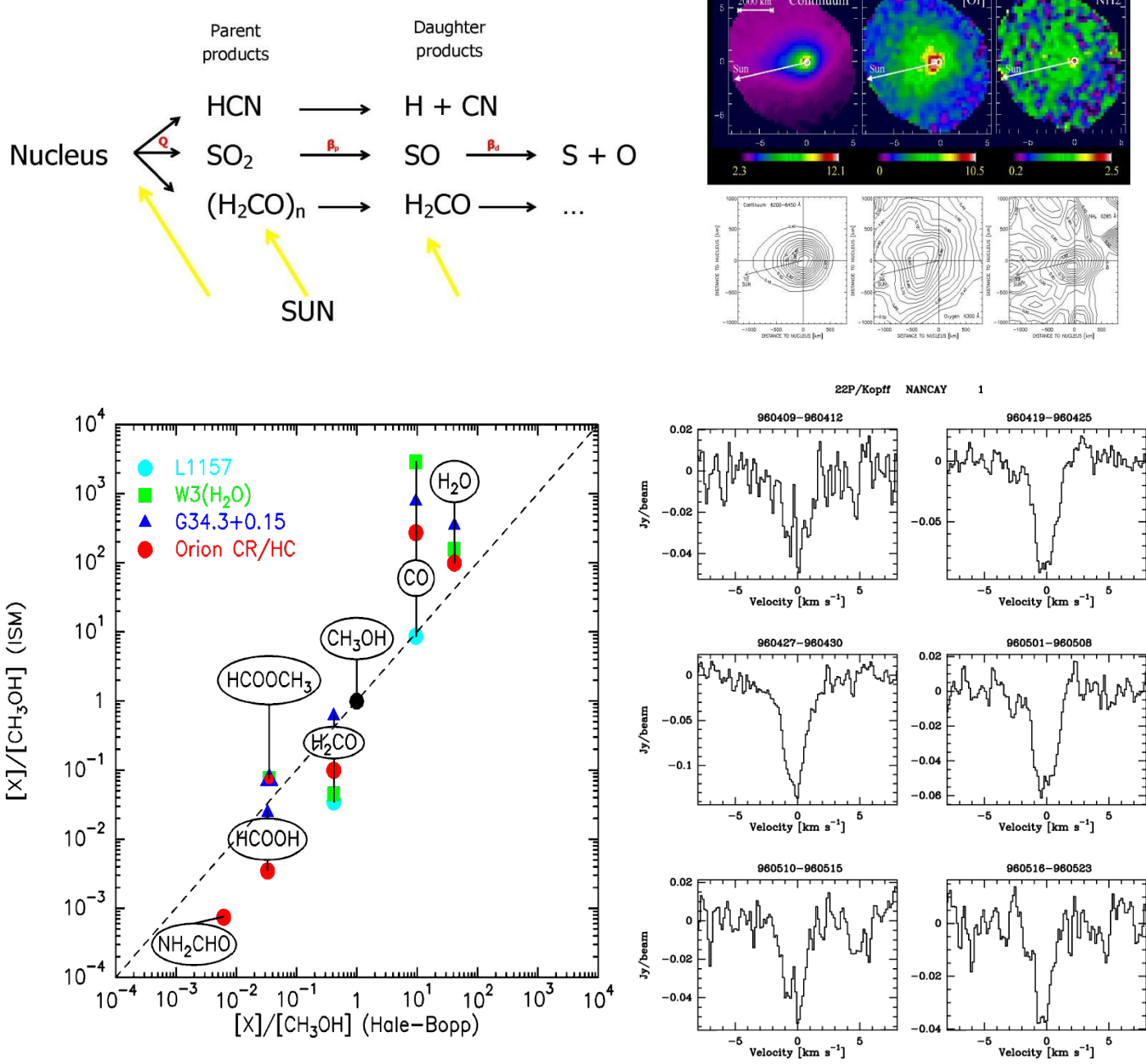


209P/LINEAR was discovered by the Lincoln Near Earth Asteroid Research (LINEAR) program in 2004. $T_J = 2.8$, orbital period: 5.04 years

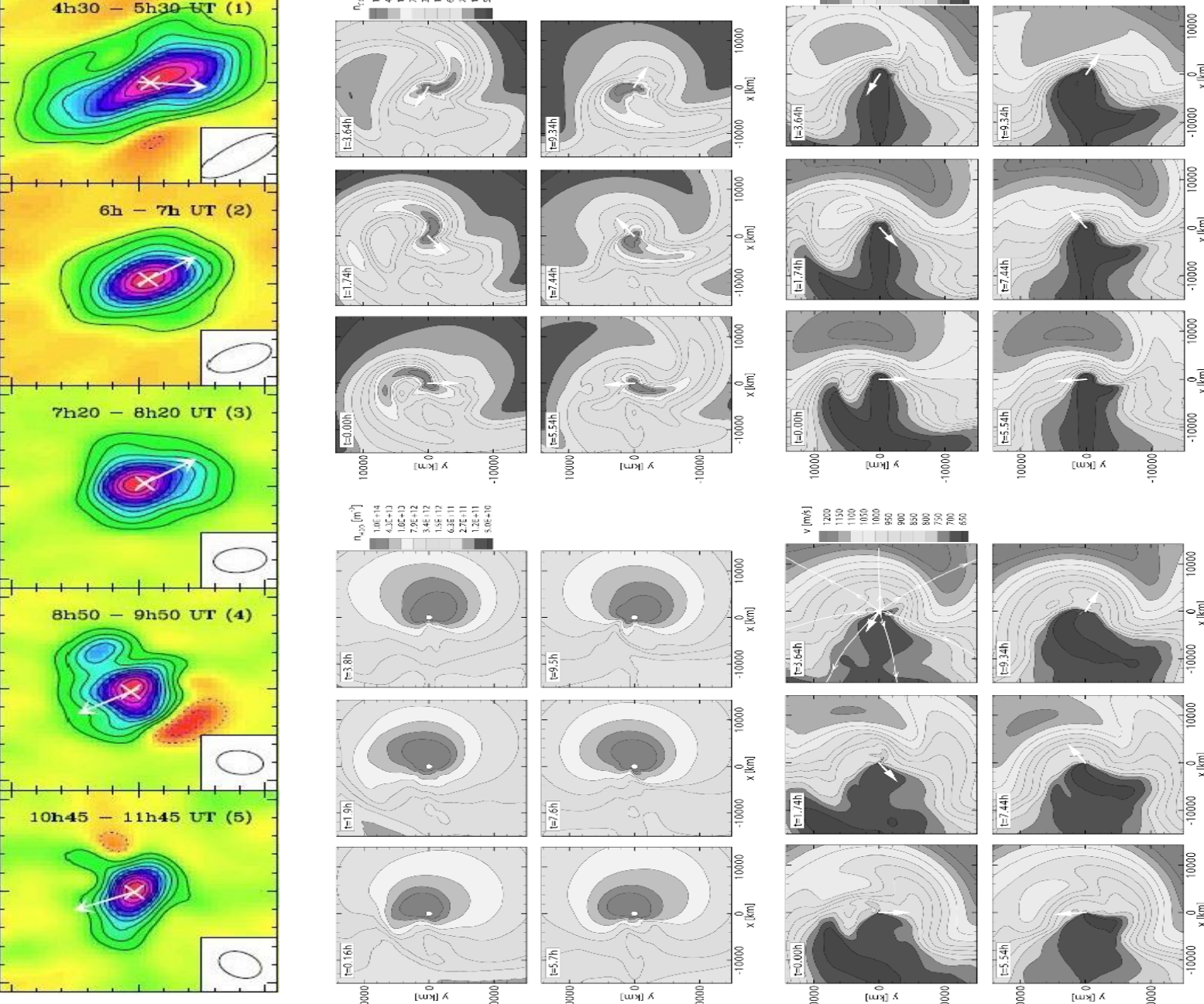
Objectives

Project intends to use ALMA to build extensive model of 209P/LINEAR. 4 science objectives will be accomplished.

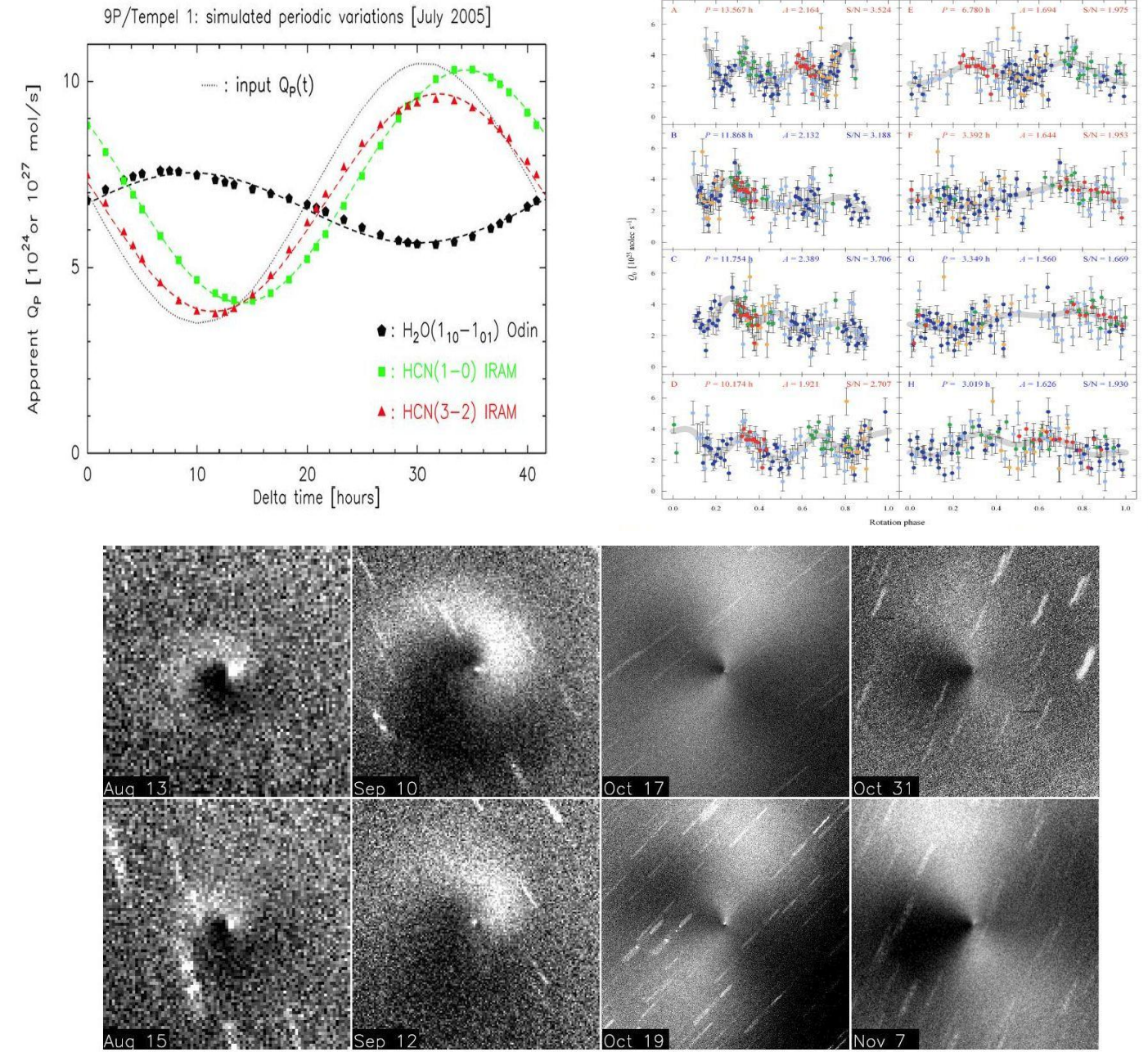
Chemical composition



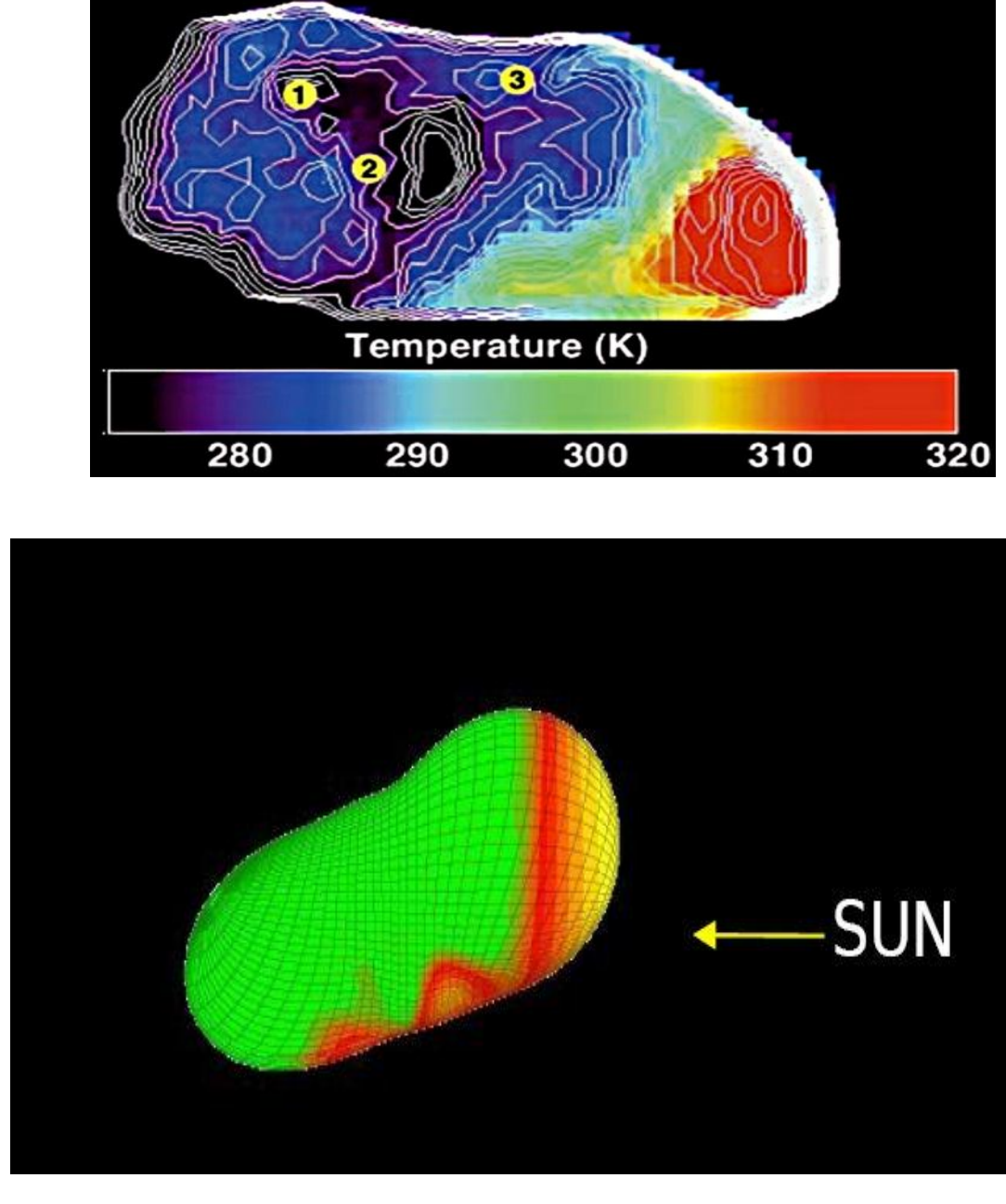
Spatial distribution of dust and molecules



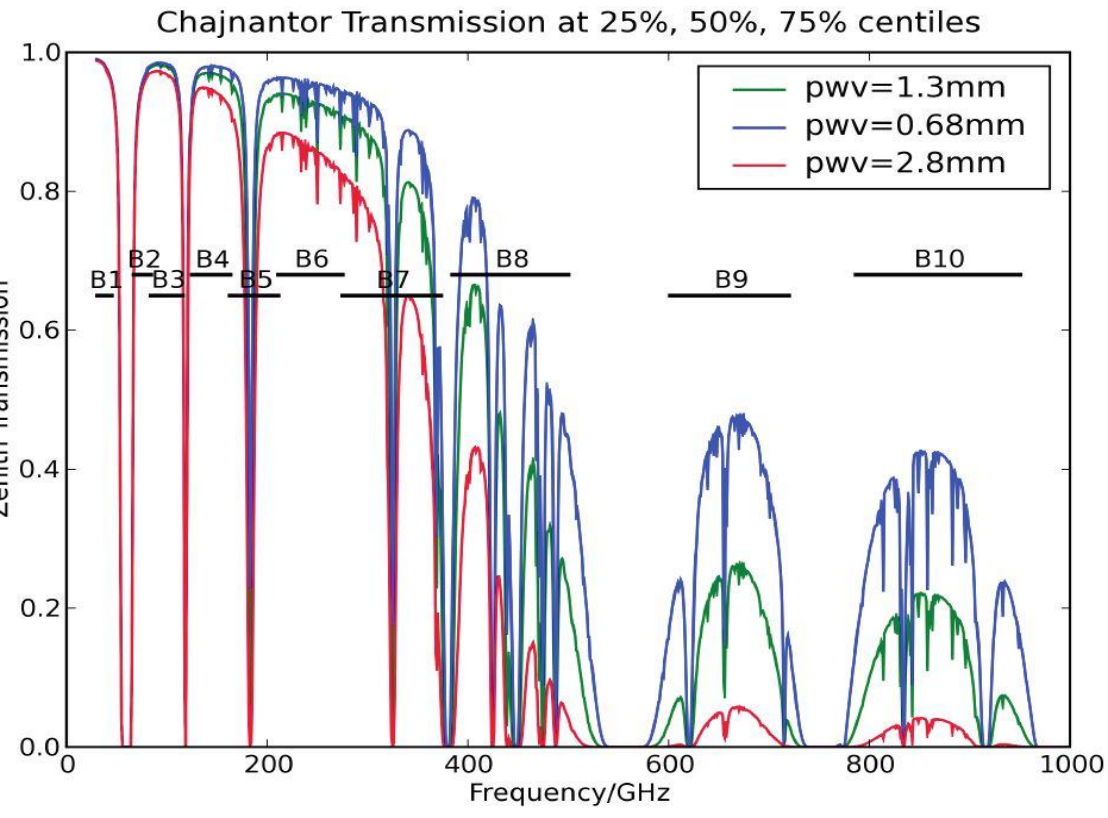
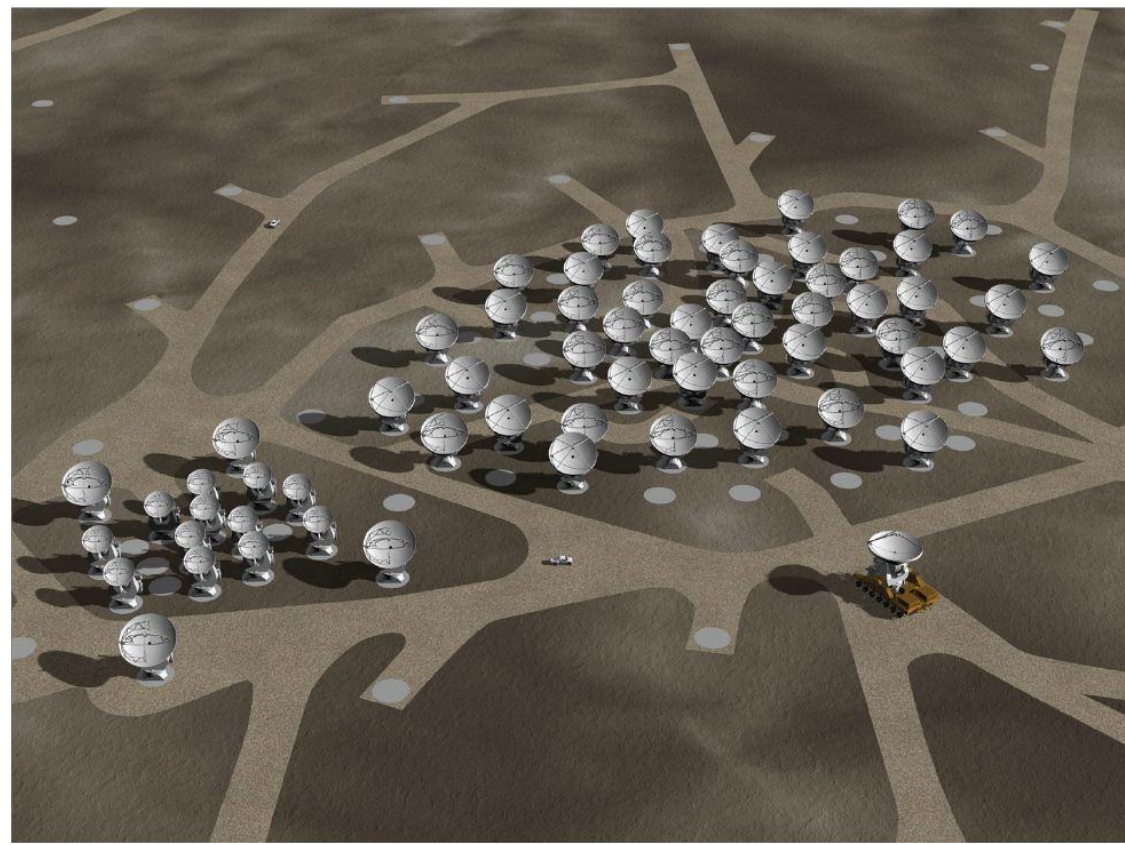
Gaseous jets



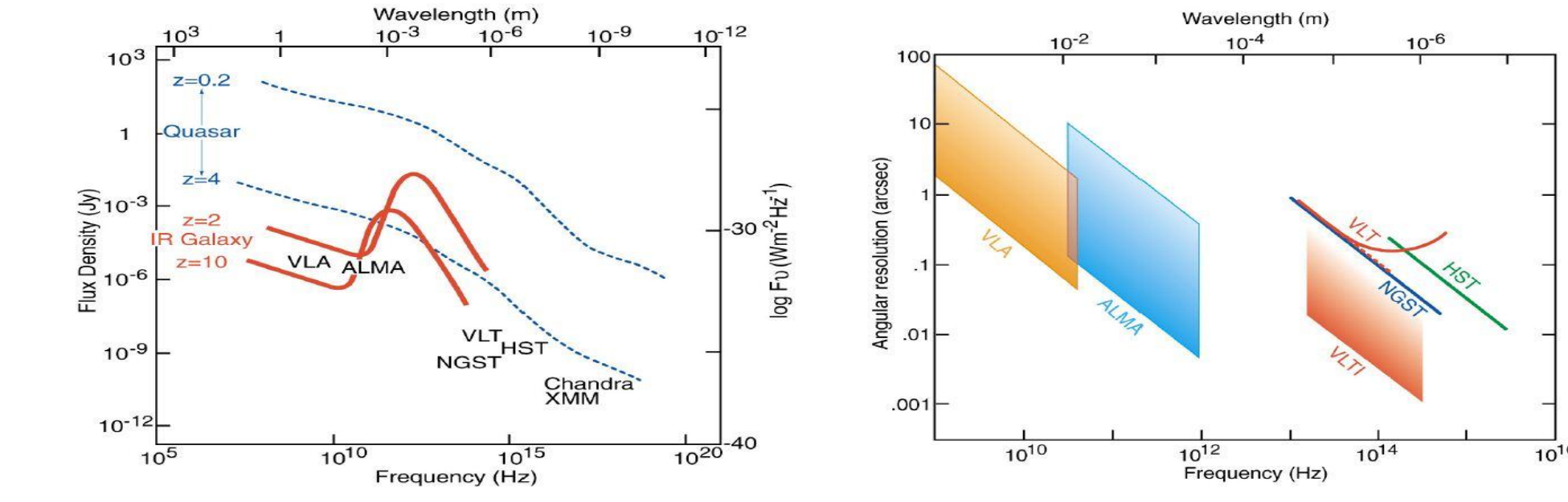
Thermal emissions



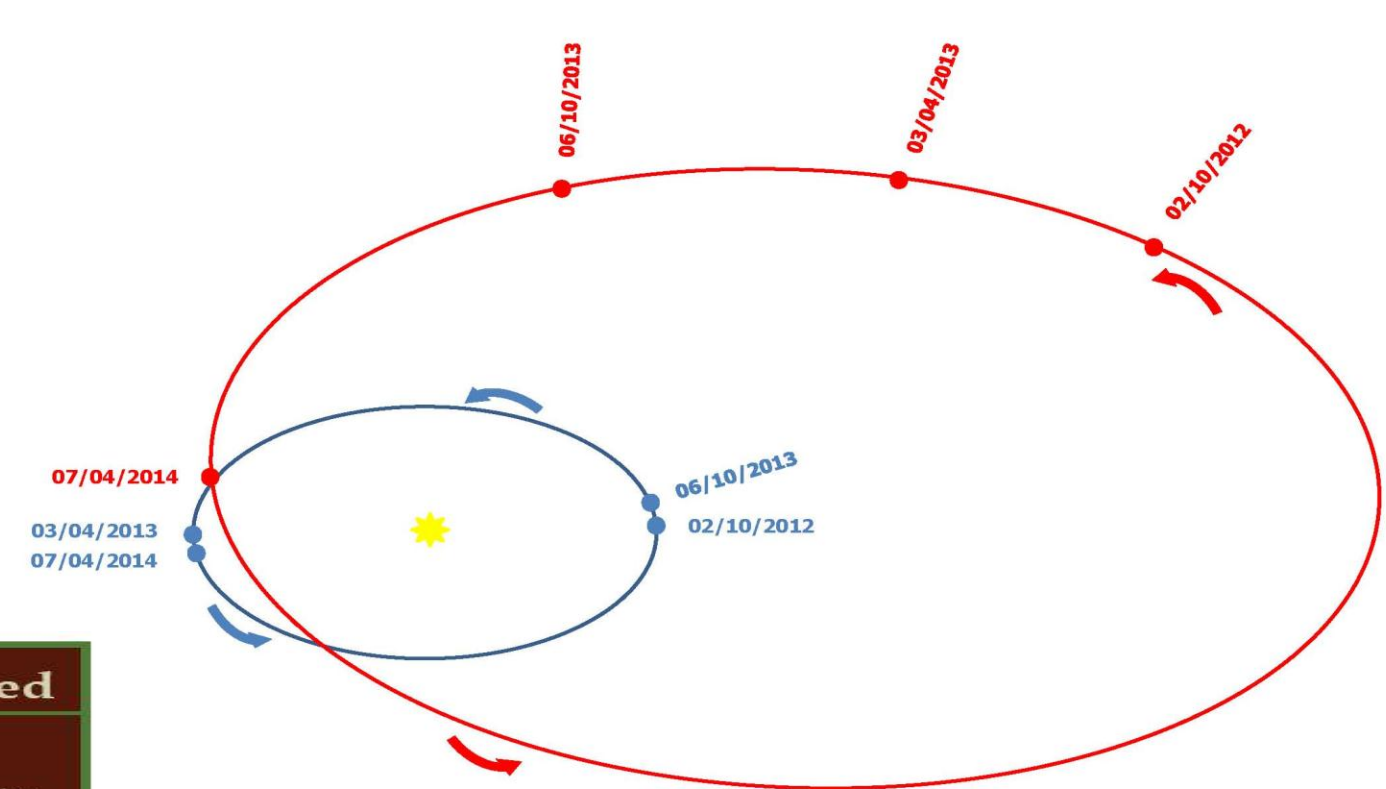
Method



4 observing session with extended configuration (66 antennas) with Bands 1-10

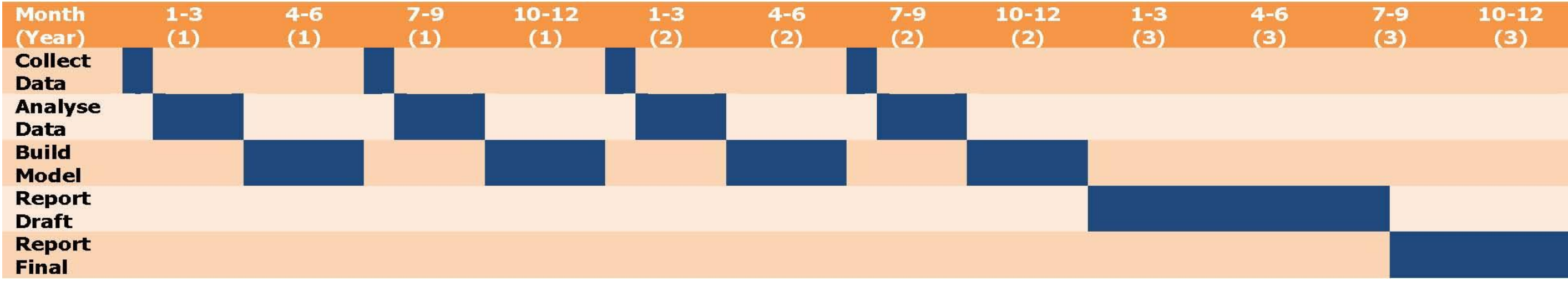


Band	Frequency (GHz)	Wave-length (mm)	Primary Beam (FOV, ")	Ap-prox. Largest Scale (")	Contin-uum Sensi-tivity (mJy/beam)	Compact	Most Extended
1*	31.3-45	6.7-9.5	145-135	93	±	13-9	±
2*	67-90	3.3-4.5	91-68	53	±	6-4.5	±
3	84-116	2.6-3.6	72-52	37	0.05	4.9-3.6	0.07
4	125-163	1.8-2.4	49-37	32	0.06	3.3-2.5	0.071
5	163-211	1.4-1.8	37-29	23	*	*	*
6	211-275	1.1-1.4	29-22	18	0.10	2.0-1.5	0.104
7	275-373	0.8-1.1	22-16	12	0.20	1.5-1.1	0.29
8	385-500	0.6-0.8	16-12	9	0.40	1.07-0.82	0.234
9	602-720	0.4-0.5	10-8.5	6	0.64	0.68-0.57	0.641
10	787-950	0.3-0.4	7.7-6.4	5	1.2	0.52-0.43	0.940



288 hours of observations in four 72 hours run:
02/10/2012 – 05/10/2012
03/04/2013 – 06/04/2013
06/10/2013 – 09/10/2013
07/04/2014 – 10/04/2014

Cost and Timeline



Proposal submission:
Cycle 1
Deadline:
March/April 2012

Expense	Amount
Living expenses (per year)	£ 13,000
Tuition Fees (per year)	£ 3807
Travel to ALMA regional centre	£ 6000
PC for data analysis	£ 2000
IDL Licencing and Journal Access	Provided
Total	£ 58,421

References

European Southern Observatory, 2012. *Comet Hale Bopp*. Available at <<http://www.eso.org/public/images/phot-mar14-hbs-2/>> [Accessed 22 February 2012]

Bockelée-Morvan D., Henry F., Biver J., Colom P., Corvisier J., Despois D., Moreno R., and Wink J. (2009) Interferometric imaging of carbon monoxide in comet C/1995 O1 (Hale-Bopp): evidence of a strong rotating jet. In *Astronomy & Astrophysics*, 505, pp. 825-842

ALMA Primer and Early Science Publication

Acknowledgements

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University of Cambridge
Atacama Large Millimetre Array

