衝突論文セミナー 15分発表

2009.10.13 豊田丈典 (東大地震研, D1)

気になる論文2009

- “Distribution of Mid-Latitude Ground Ice on Mars from New Impact Craters”, Byrne et al., **Science**
- ”Latitude dependence of Martian pedestal craters: Evidence for a sublimation-driven formation mechanism”, Kadish et al., **JGR**
- “One-handred-km-scale basins on Enceladus: Evidence for an active ice shell”, Schenk and McKinnon, **GRL**
- “Compaction experiments on ice-silica particle mixtures: Implication for residual porosity of small icy bodies”, Yasui and Arakawa, **JGR**

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- “Results from the Mars Phoenix Lander Robotic Arm experiment”, Arvidson et al., **JGR**
- “Data’s shameful neglect”, **Nature**
- “The rate of granule ripple movement on Earth and Mars”, Zimbelman et al., **Icarus**
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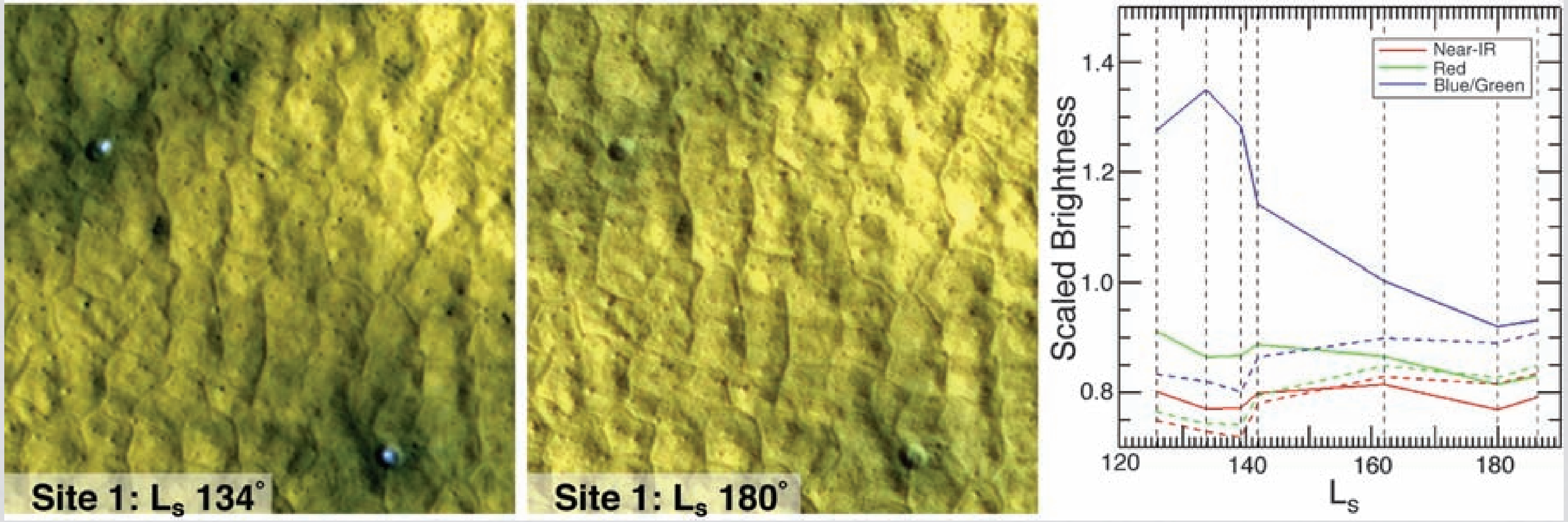

Fig. 2. HiRISE false-color data (see Table 1 for image details) showing sublimation of icy material at site 1. Panels are 75 m across. Images here and in Fig. 3 have north at the top and are illuminated from the lower left. Plot shows the brightness evolution of the lower-right icy patch (solid) and dark impact zone (dashed) in each HiRISE filter scaled by the brightness of the surrounding undisturbed terrain (to remove incidence angle and first-order atmospheric effects). Vertical lines show observation dates. Blue-green and near-infrared bands at L_s 126° were summed 4 × 4.

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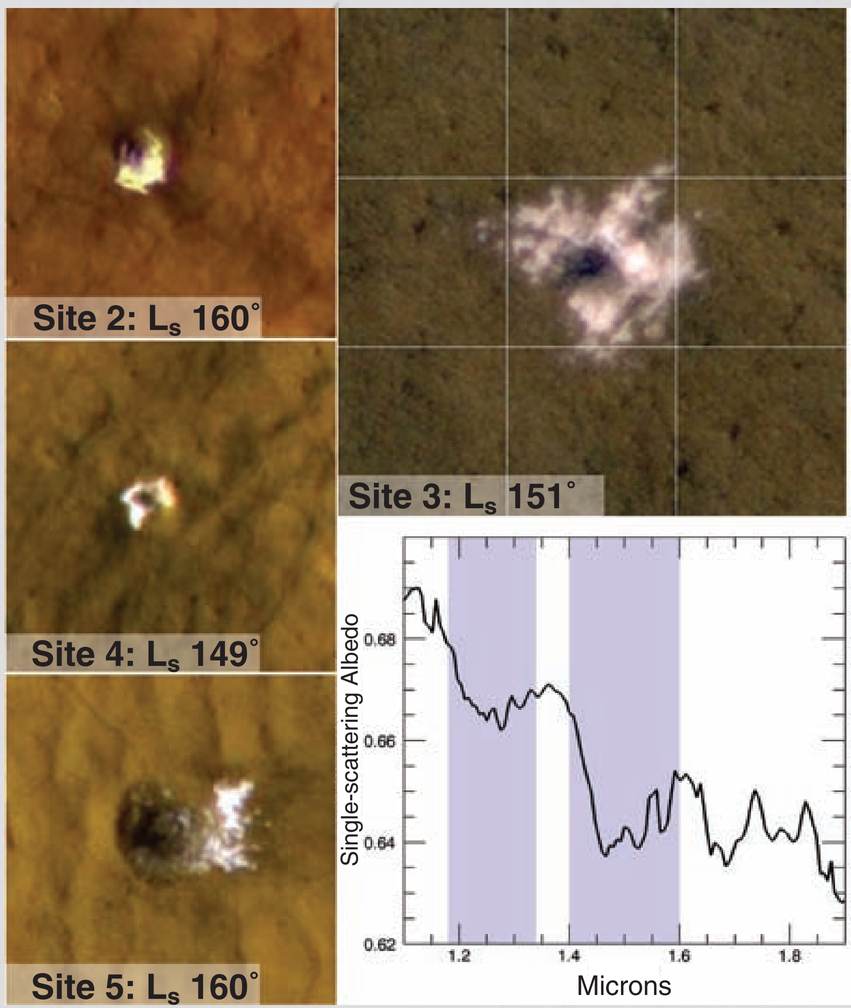

Fig. 3. HiRISE false-color data of sites 2 to 5 (see Table 1 for image details). Left panels are 35 m across; gridlines at site 3 show the scale (18 m) (but not location) of CRISM pixels. CRISM spectrum at lower right with water ice absorption bands indicated is an average of four adjacent pixels in observation FRT0000D2F7.

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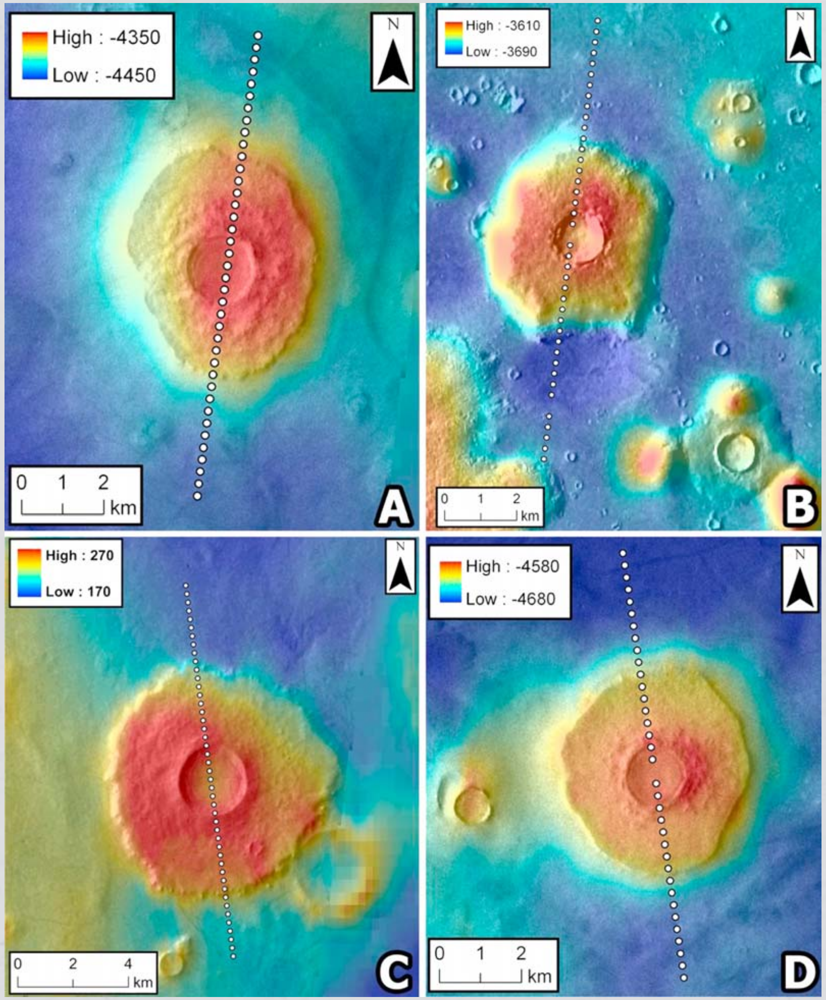

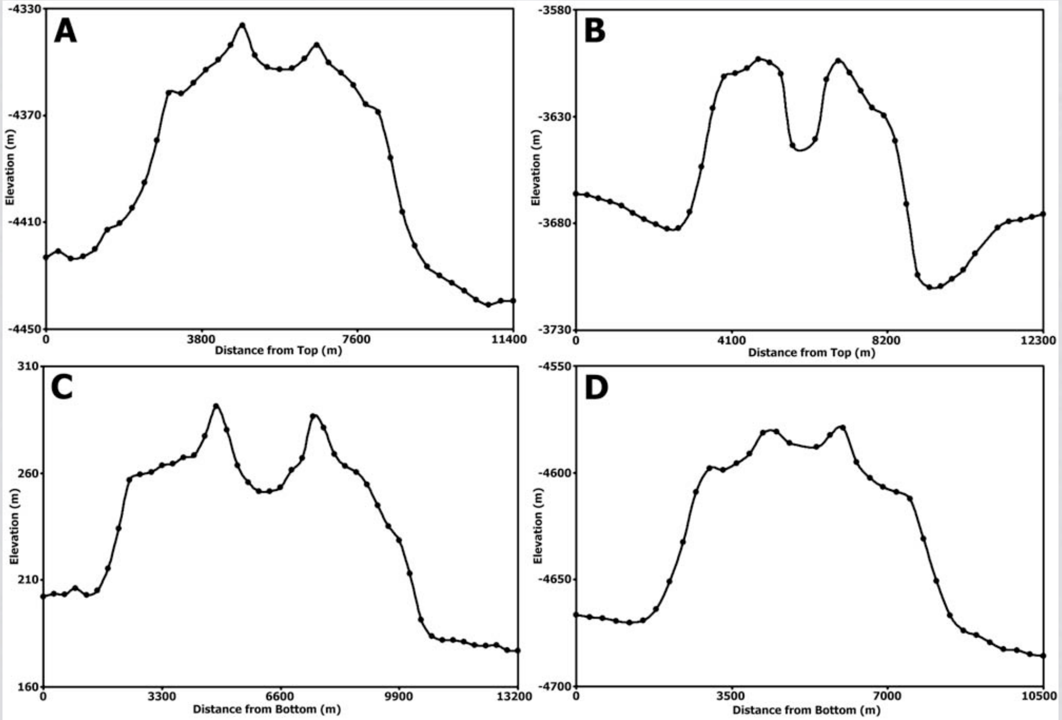

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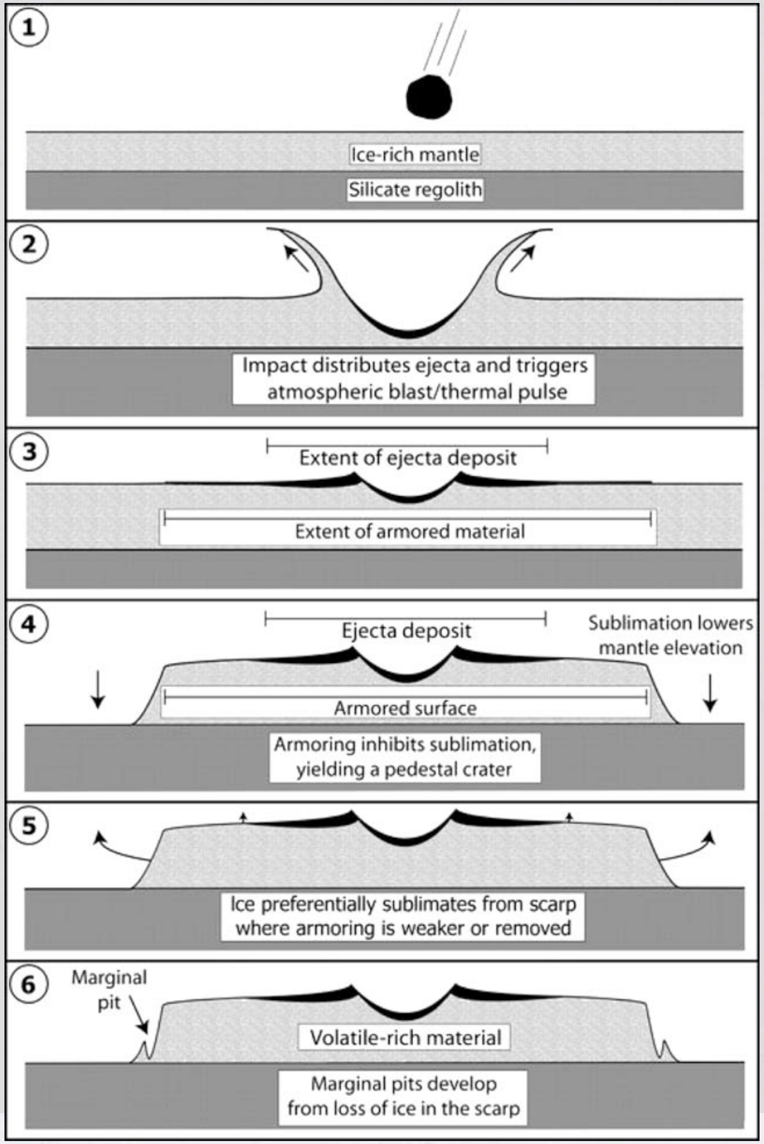

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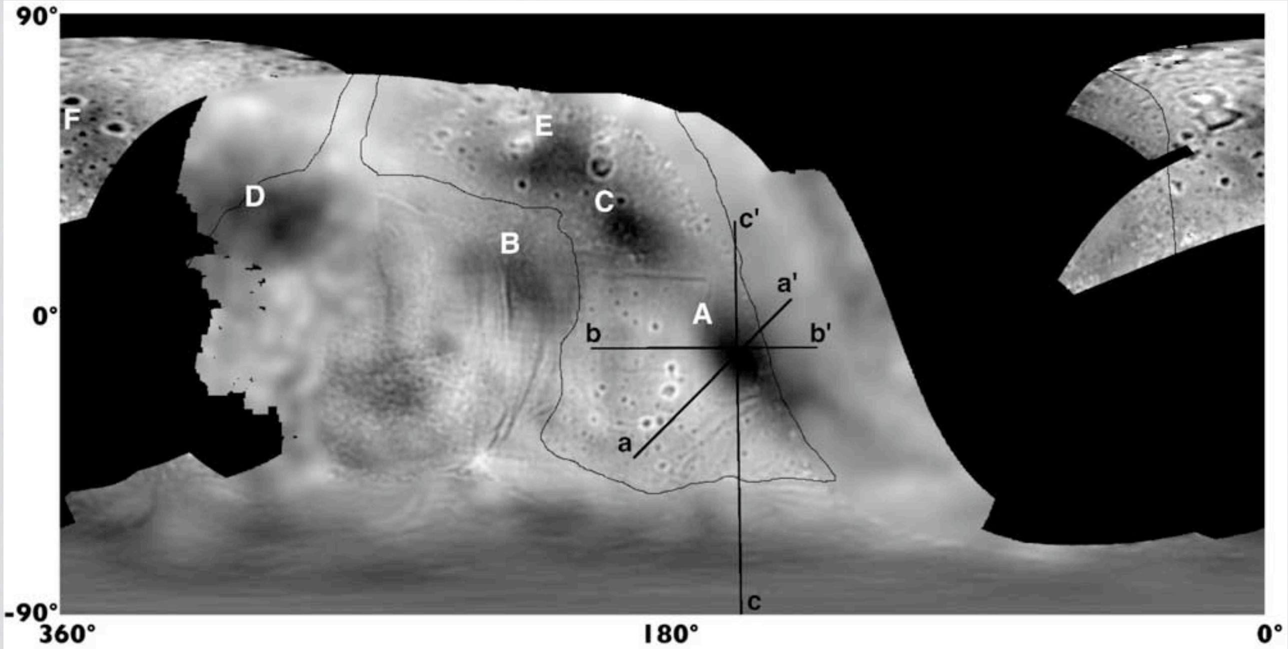

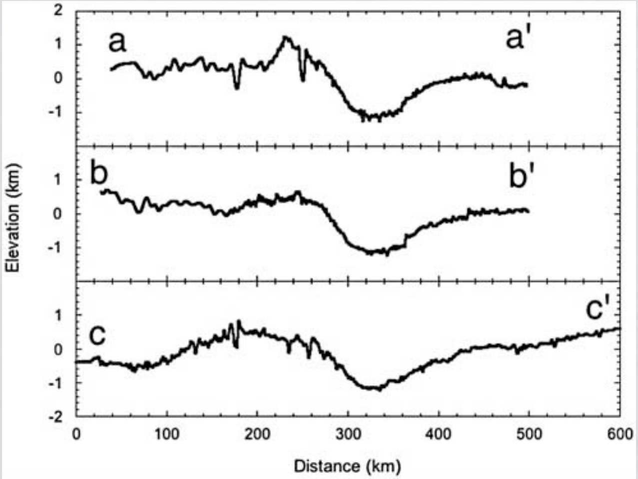

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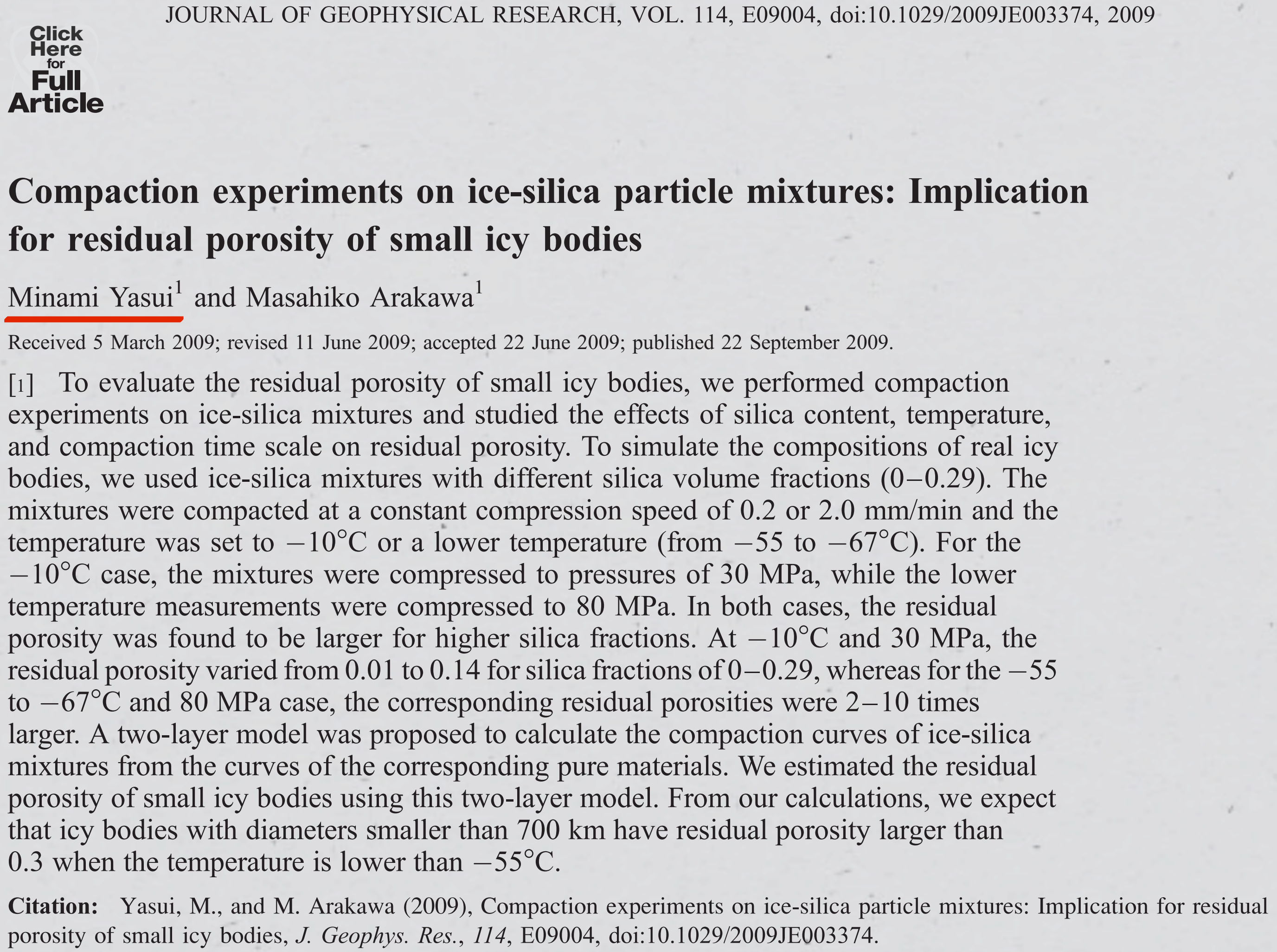

JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 114, E09004, doi:10.1029/2009JE003374, 2009

Compaction experiments on ice-silica particle mixtures: Implication for residual porosity of small icy bodies

Minami Yasui[1] and Masahiko Arakawa[1]

Received 5 March 2009; revised 11 June 2009; accepted 22 June 2009; published 22 September 2009.

[1] To evaluate the residual porosity of small icy bodies, we performed compaction experiments on ice-silica mixtures and studied the effects of silica content, temperature, and compaction time scale on residual porosity. To simulate the compositions of real icy bodies, we used ice-silica mixtures with different silica volume fractions (0–0.29). The mixtures were compacted at a constant compression speed of 0.2 or 2.0 mm/min and the temperature was set to −10°C or a lower temperature (from −55 to −67°C). For the −10°C case, the mixtures were compressed to pressures of 30 MPa, while the lower temperature measurements were compressed to 80 MPa. In both cases, the residual porosity was found to be larger for higher silica fractions. At −10°C and 30 MPa, the residual porosity varied from 0.01 to 0.14 for silica fractions of 0–0.29, whereas for the −55 to −67°C and 80 MPa case, the corresponding residual porosities were 2–10 times larger. A two-layer model was proposed to calculate the compaction curves of ice-silica mixtures from the curves of the corresponding pure materials. We estimated the residual porosity of small icy bodies using this two-layer model. From our calculations, we expect that icy bodies with diameters smaller than 700 km have residual porosity larger than 0.3 when the temperature is lower than −55°C.

Citation: Yasui, M., and M. Arakawa (2009), Compaction experiments on ice-silica particle mixtures: Implication for residual porosity of small icy bodies, *J. Geophys. Res.*, *114*, E09004, doi:10.1029/2009JE003374.

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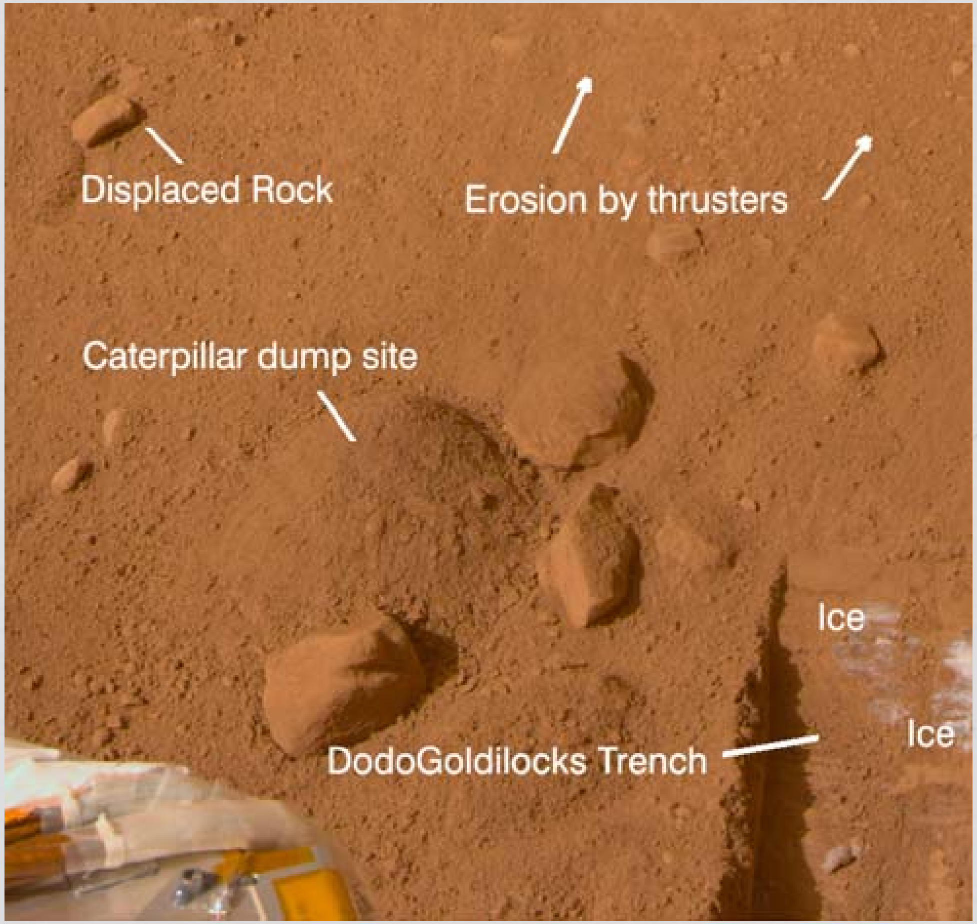

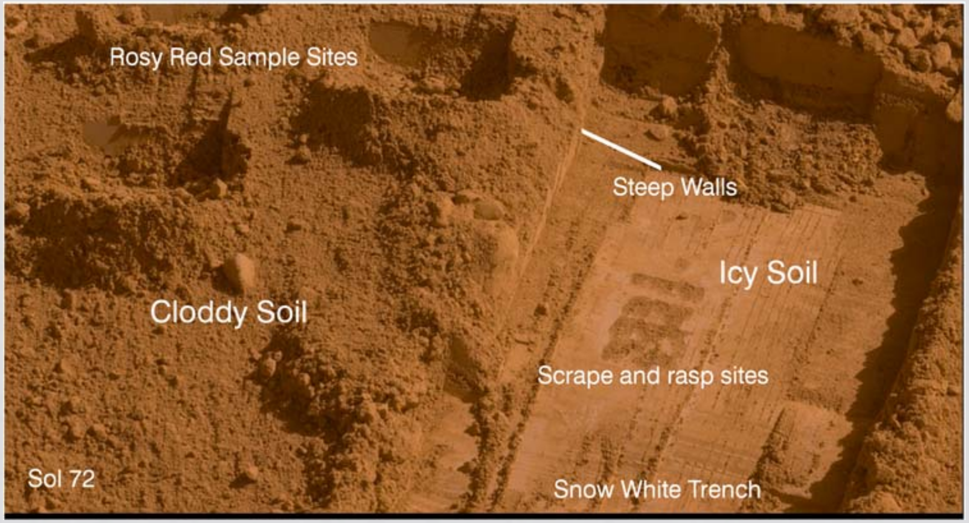

“Data’s shameful neglect”, **Nature**

nature

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Vol 461 | Issue no. 7261 | 10 September 2009

Data's shameful neglect

Research cannot flourish if data are not preserved and made accessible. All concerned must act accordingly.

More and more often these days, a research project’s success is measured not just by the publications it produces, but also by the data it makes available to the wider community. Pioneering archives such as GenBank have demonstrated just how powerful such legacy data sets can be for generating new discoveries — especially when data are combined from many laboratories and analysed in ways that the original researchers could not have anticipated.

All but a handful of disciplines still lack the technical, institutional and cultural frameworks required to support such open data access (see pages 168 and 171) — leading to a scandalous shortfall in the sharing of data by researchers (see page 160). This deficiency urgently needs to be addressed by funders, universities and the researchers themselves.

Research funding agencies need to recognize that preservation of and access to digital data are central to their mission, and need to be supported accordingly. Organizations in the United Kingdom, also the software that will help investigators to do this. One important facet is metadata management software: tools that streamline the tedious process of annotating data with a description of what the bits mean, which instrument collected them, which algorithms have been used to process them and so on — information that is essential if other scientists are to reuse the data effectively.

Also necessary, especially in an era when data can be mixed and combined in unanticipated ways, is software that can keep track of which pieces of data came from whom. Such systems are essential if tenure and promotion committees are ever to give credit — as they should — to candidates’ track-record of data contribution.

Who should host these data? Agencies and the research community together need to create the digital equivalent of libraries: institutions that can take

“Data management should be woven into every course in science.”

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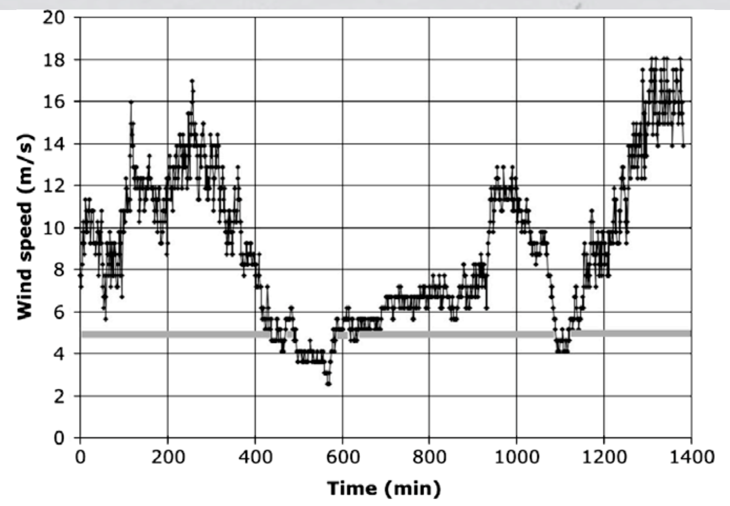

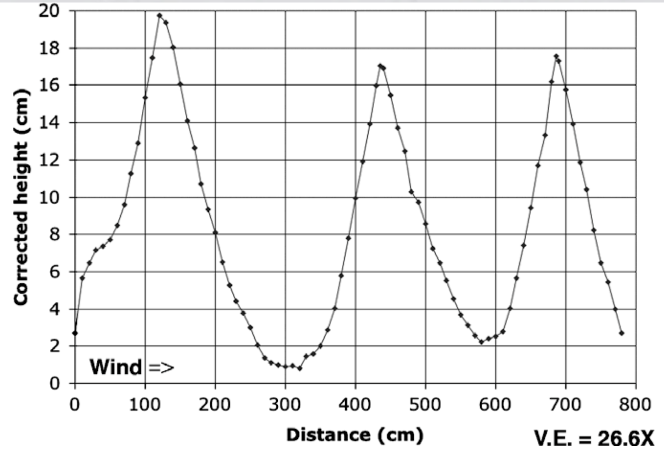

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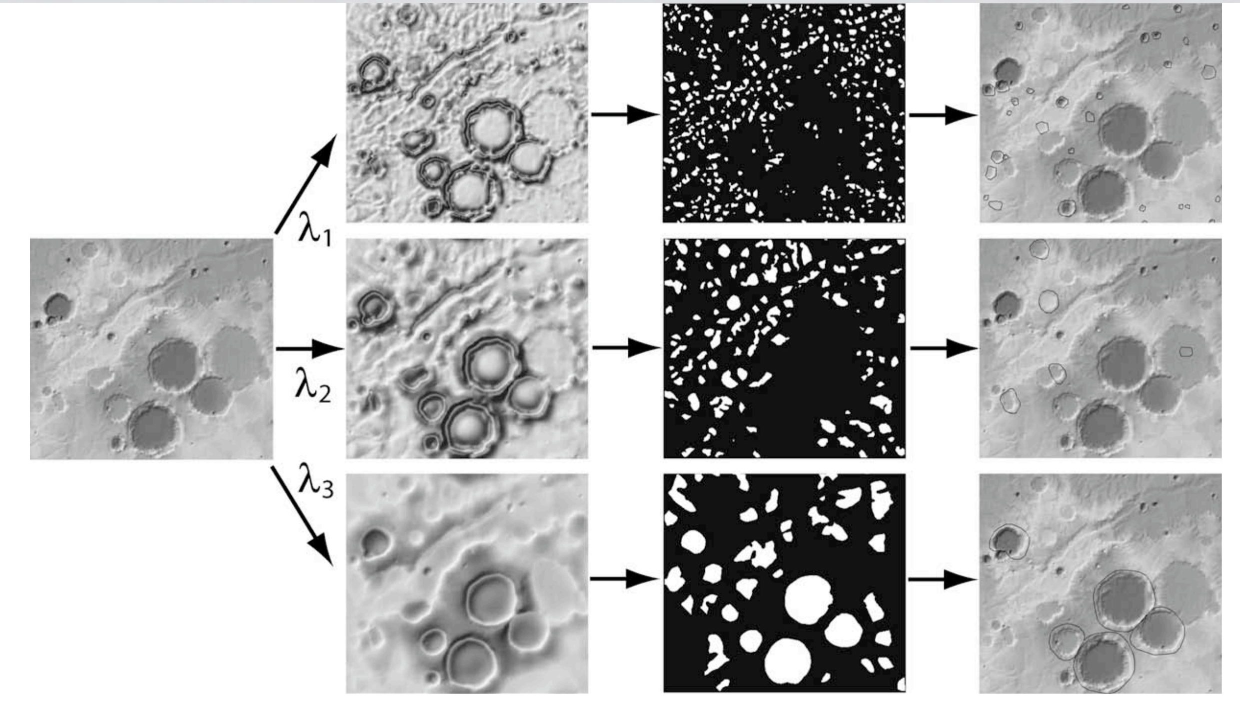

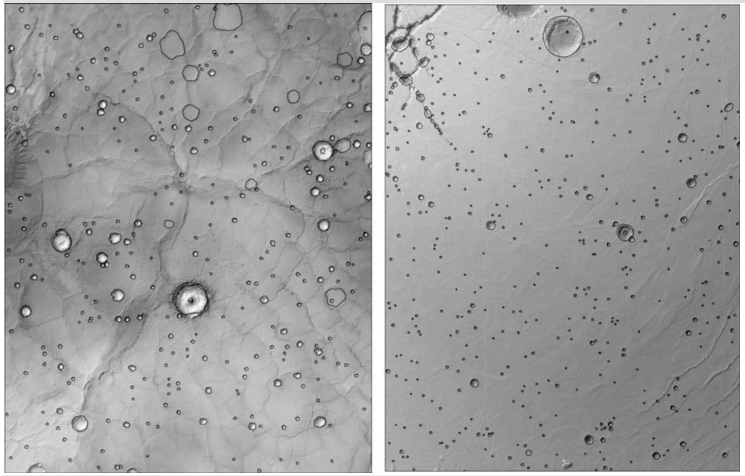

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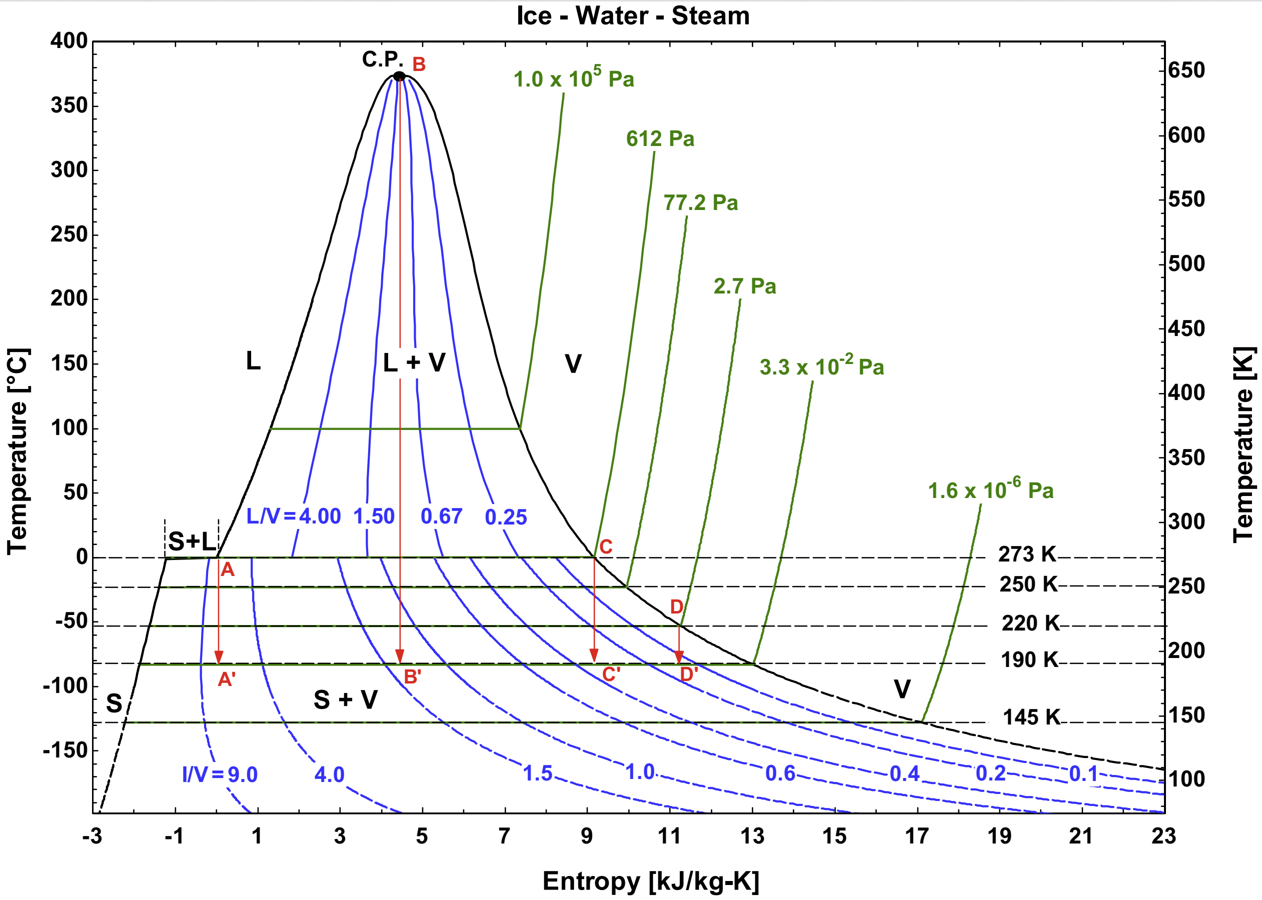

Fig. 1. Temperature–entropy diagram for H_2O. S = solid (ice), L = liquid and V = vapor. Combinations of these indicate the L + V, S + V and S + L two-phase fields. CP is the critical point. Green lines are lines of constant pressure, and blue lines are lines of constant mass ratio: I/V denotes the ice/vapor ratio; L/V denotes the liquid/vapor ratio. Data below −100 °C are extrapolated (dashed lines) from the lowest temperature measurements available. The thermodynamic paths A–A′, B–B′, C–C′ and D–D′ are discussed in the text.