2010/12/9　論文紹介セミナー

# 国際学会参加報告「学会の様子、 街の様子」

高沢 晋 （神戸大M2）

# EPSC 2010

## European Planetary Science Congress

Roma, Italy, 19 – 25 September 2010


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HOTEL CAMELIA
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Roma Termini
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Via Palestro
Via dei Mille
Via Marsala
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San Carlo alle Quattro Fontane o San Carlino
クイリナーレ宮殿
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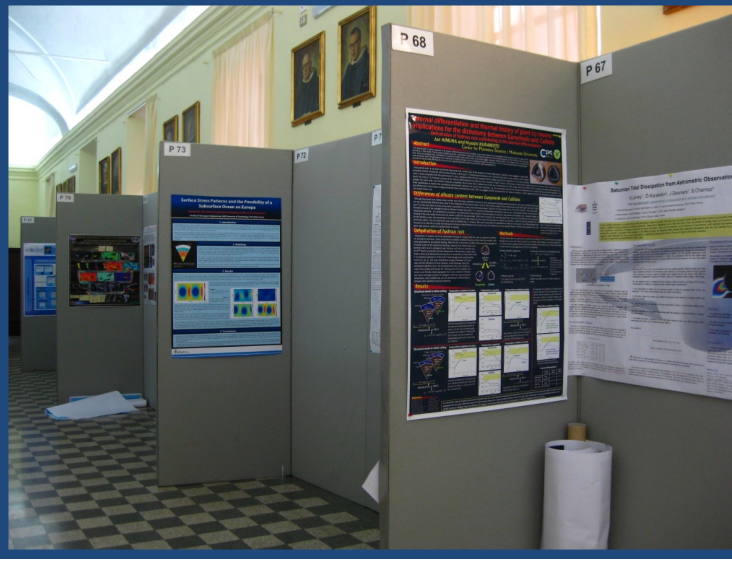
## The church of Sts. Dominic and Sixtus

# Pontifical University of Saint Thomas Aquinas
# Angelicum Centre


# Session

- Terrestrial Planets
- Giant Planet Systems
- Magnetospheres
- Missions and Techniques
- Origins, Exoplanets and Astrobiology
- Outreach and Amateur Astronomy
- Small Bodies and Planetary Moons
- Laboratory and Field Investigations
- Splinter Meetings

→ 7. Impact Processes in the Solar Sy



# Pick up

① **The transition from circular to elliptical impact crater** [Elbeshausen & Wünnemann]

② **Scaling of impact crater formation on planetary surface** [Nowka et al.]

EPSC Abstracts
Vol. 5, EPSC2010-73, 2010
European Planetary Science Congress 2010


# The transition from circular to elliptical impact craters

**D. Elbeshausen** and K. Wünnemann
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クレーターが円形から楕円形へ移行する衝突角度 $\alpha_t$ を計算

衝突エネルギーや標的の物性（内部摩擦、結合力）の影響を調べる

流体解析コード iSALE-3D

・ g = 9.81 m/s$^2$ 、衝突速度U = 8 km/s は固定

・ 衝突角度 α、標的サイズ、標的物性（摩擦係数、結合力）を変化

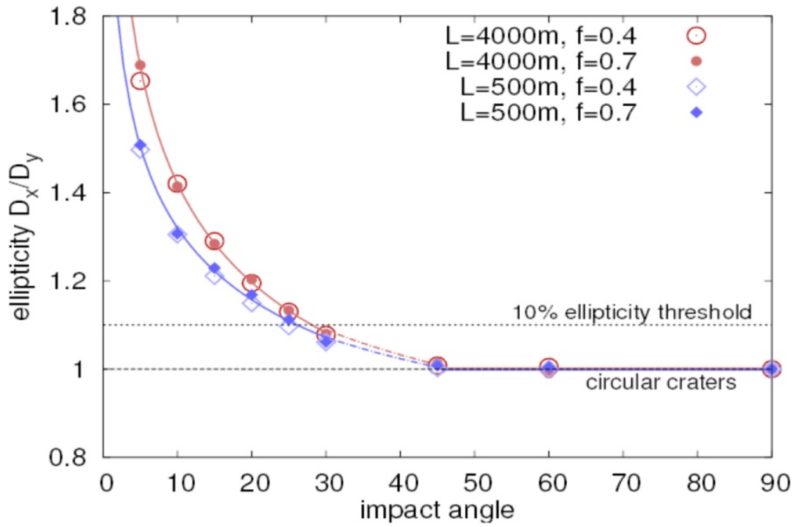


**Figure 1**: Ellipticity vs. impact angle for different impact energies and friction coefficients. Cohesion was kept constant at 5 MPa.

弾丸サイズ（L）、摩擦係数（f）を変化

↓

$\alpha_t$ は衝突エネルギーにより少し変化

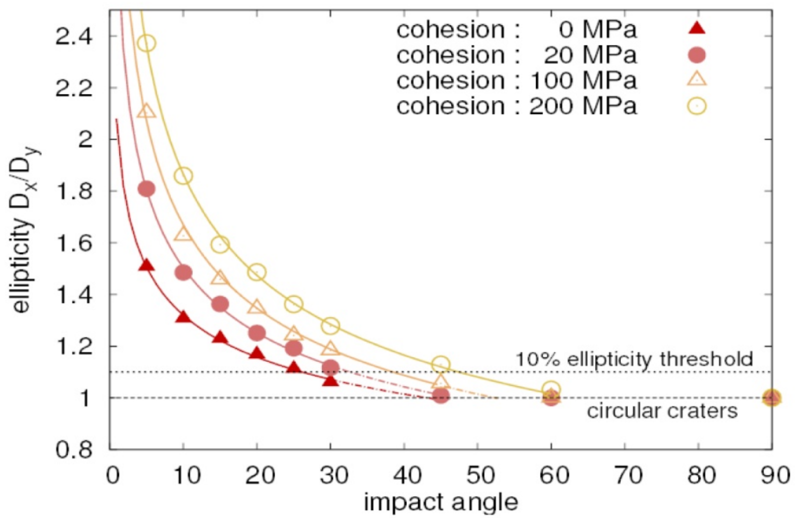


**Figure 2**: Ellipticity vs. impact angle for L=500 m, f=0.7 and a varied cohesive strength.

結合力（cohesive strength）を変化

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$\alpha_t$ は結合力により大きく変化

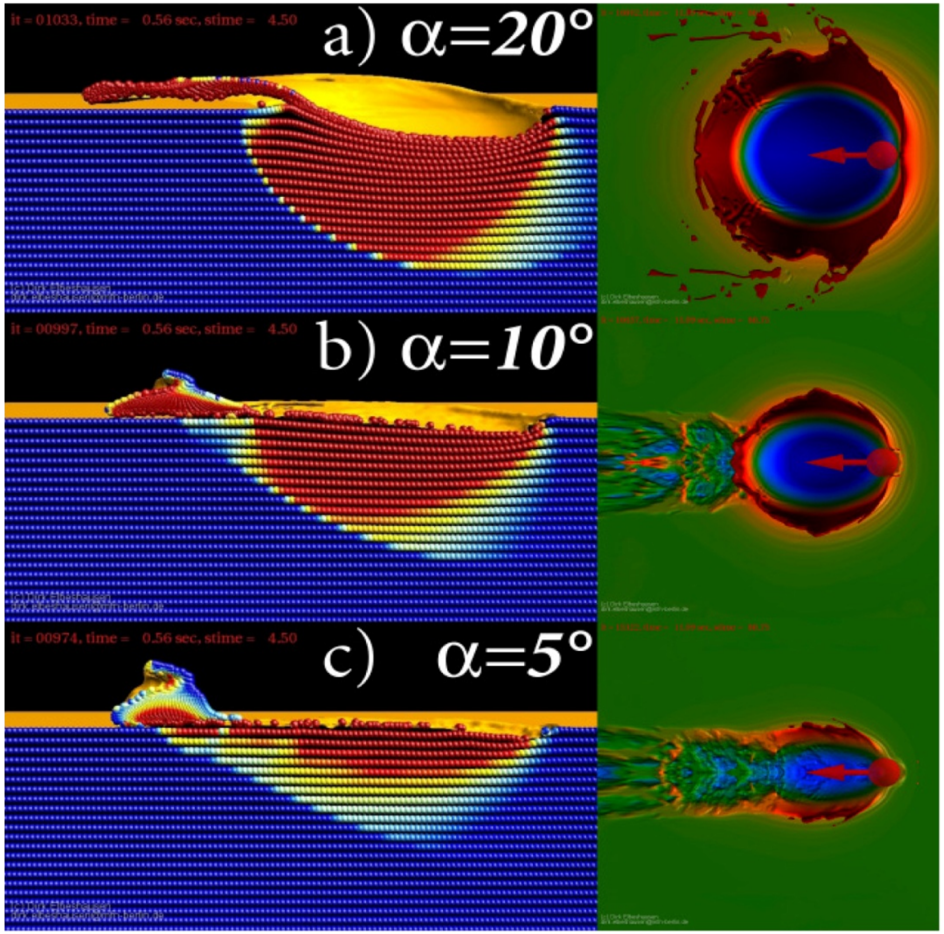


**Figure 3**: Snapshots of crater formation ($L=1\ km$) in a weak target ($Y_{coh}=5\ MPa, f=0.3$) for selected impact angles. Left: Early stage, front face shows tracers colored by pressure in a range from 0 (blue) to 3 GPa (red) which is close to the Hugoniot elastic limit for most granites and similar materials. Right: Corresponding craters at late stage crater modification (plane view); color denotes elevation above impact surface. Projectile material has been removed from the visualization (see depressed features in downrange direction) to enable an undisturbed view into the crater.

$\alpha_t$ は どうやら 20°くらい

α < 20°でのクレーター形状を三段階に分類

***a) Transition regime***

***b) Ricohet regime***

***c) Grazing regime***

EPSC Abstracts
Vol. 5, EPSC2010-87, 2010
European Planetary Science Congress 2010


# Scaling of impact crater formation on planetary surfaces

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(2) Impacts and Astromaterials Research Centre, Dept. of Earth Science and Engineering, Imperial College London, UK
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標的物性（内部摩擦、空隙率など）が一時クレーターサイズへ及ぼす影響を調べる

Pi スケーリング

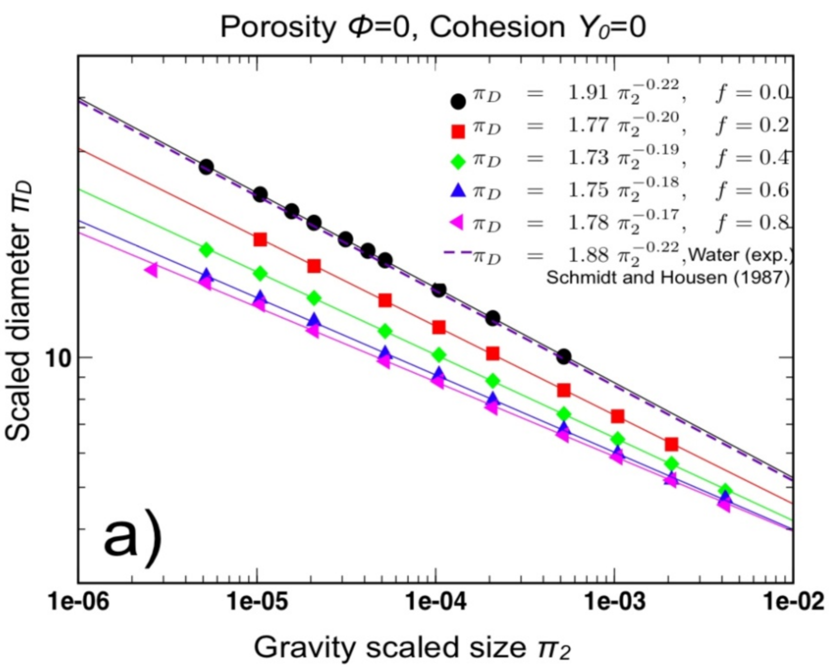
$$\pi_2 = 1.61\, g\, L / U^2$$

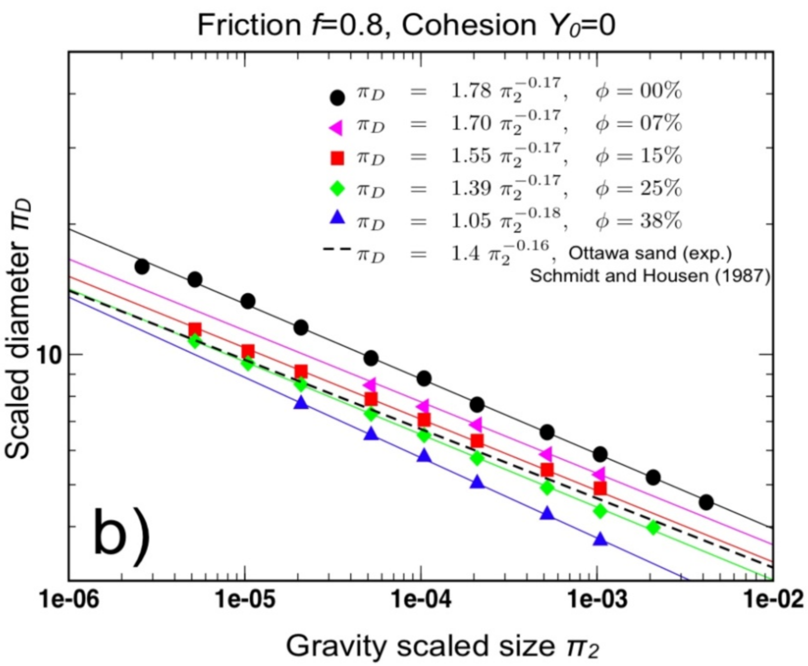
$$\pi_D = D\, (\rho/M)^{1/3} \propto D/L$$

$$\pi_D = C_D\, \pi_2^{-\beta}$$

U: 衝突速度　M: 弾丸質量
L: 弾丸直径　δ : 弾丸密度
g: 重力　ρ: 標的密度

→ $C_D$ 、β が標的物性に影響




# 流体解析コード iSALE-3D を使用

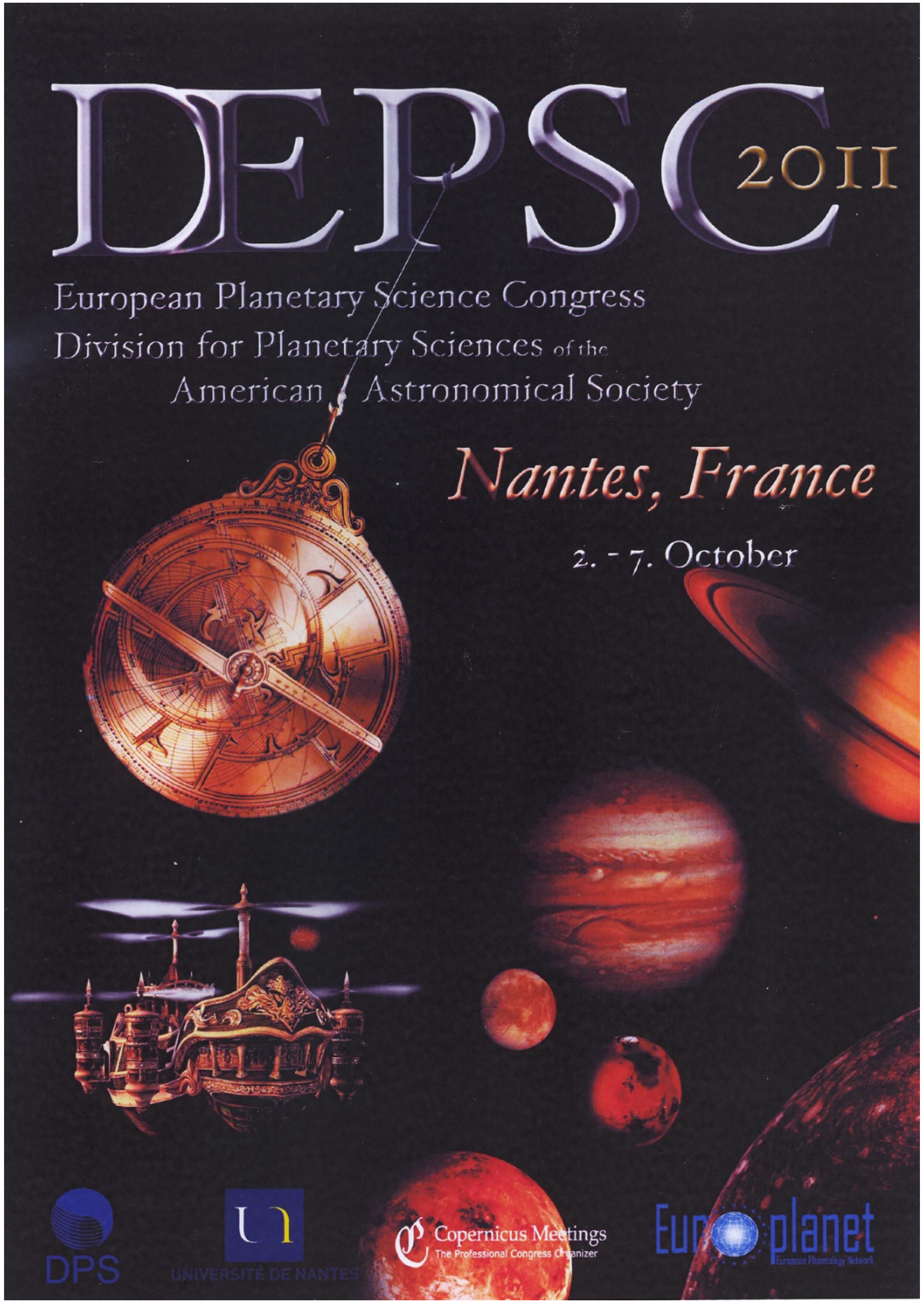
$g = 1.62\ m/s^2$ 、U = 5 km/s で固定

グラフは摩擦係数 f や空隙率 Φ によって変化

↓

実際の実験データとも一致

Figure 1: Gravity scaled size $\pi_2$ versus scaled crater diameter $\pi_D$. (a) Scaling lines for nonporous material and different coefficient of friction f. The dashed line corresponds to an experimentally derived scaling line for water. (b) Scaling lines for a friction coefficient of f=0.8 and porosities 0-38%. The dashed line corresponds to an experimentally derived scaling line for Ottawa sand (f≈0.6-0.8, porosity≈20-30%).




# EPSC 2011

2 – 7 October 2011

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おわり