

Formation of domes on Europa

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On Europa, there are up warded features that are called domes. Since we can see the continuance to the surrounding plains on them, the topography should have been flat once. Many researchers think that convection occurs in the lower part of European ice shell, and most explanation for dome formation have suggested to its convective or diapiric activity. Most of them have 4-5 km radiuses and 1-200 m heights. In this study, we focused on two ~50 km- radius domes which locate at ~0N225W. Classical plate bending theory appears to explain their elevation profiles when plates' thickness are ~1-7km. However, these values of the thickness need further calculation, because we supposed the pressure is on only domes' flank summit in these calculations.

Next, we estimated the effects of mass wasting and viscous relaxation. On Europa, mass wasting is expected to occur when its slope angle exceeds about 10 deg. The model discussed above indicates that some slopes are near 10 deg. The observed high albedo region may be the evidence of the mass wasting.

Viscous relaxation, whose effect on the icy satellite is important, indicates these domes are exceptionally high. Tens of kilometer-scale domes, particularly those focused in this study, are expected to be relaxed in 10^3 - 10^4 years. Domes are thought to be young features ($\sim 10^5$ yr.) among the European surface ($\sim 10^7$ - 10^8 yr.), but these domes seems to be much younger.