Groovy Imbrium

Patterns of grooves at Imbrium basin may mark the effects of it's excavation during an oblique collision by a large impacting body on the Moon. Two sets of grooves are identified in images, one radial from the basin center and the other not. While radial grooves and secondary craters are associated with ballistic ejecta and debris from the basin-forming process, Peter Schultz (Brown University) and David Crawford (Sandia National Laboratories) use the non-radial trends to interpret scouring from the earliest stages of collision—at the impactor's first contact point—before the basin's big dig and emplacement of ejecta.

Studying Effects of Oblique Impact at the Imbrium Basin on the Moon

The grooves radial to Imbrium overlap (came after) the non-radial grooves. Schultz and Crawford used impact experiments at the NASA Ames Vertical Gun Range to better understand their observations. Multiple cameras captured the direction and velocities of ejecta throughout the crater-forming process: from an impactor's first contact point and the resulting down-range trajectories of the early debris to the final crater excavation and later emplacement of radially-distributed ejecta. The team also used shock physics codes in order to demonstrate that the experiments actually apply to large scales as well. They estimate the diameter of the Imbrium impactor as a whopping proto-plant size of \( \sim 250 \text{ km} \pm 25 \text{ km} \), its impact point on the Moon, and the survival of impactor fragments. If pieces of the Imbrium impactor survived, Schultz and Crawford suggest these could have been distributed down range and could account for meteoritic compositions identified in Apollo 16 regolith breccias (For example, see PSRD article: Leftovers from Ancient Lunar Impactors.)
See Reference:

See also:

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