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我国大陆下地壳的再循环研究取得重大进展

物质的再循环是地球动力学的主要过程之一。大陆下地壳是否能够再循环返回地幔是地球动力学和地球化学一个长期未解决的难题，这一问题对于认识大陆地壳的形成和演化以及壳幔交换作用至关重要。

在国家自然科学基金面上项目、重点项目和国家杰出青年科学基金的持续资助下，西北大学高山教授及其合作者从1992年以来先后提出了华北克拉通和秦岭—大别造山带下地壳拆沉作用的地质、地球化学和岩石物理学证据，并建立了下地壳拆沉作用的化学地球动力学模型。近年来他们通过对辽西晚侏罗世高镁中酸性火山岩的研究，发现这些火山岩不仅具有高镁-铬-镍-锶和低钪含量，还含有铬铁矿，斜方辉石斑晶，具有核部低镁与幔部高镁的反环带，含有大量2.5 Ga华北克拉通前寒武纪岩石特征的继承锆石，锶-钕同位素组成与来自华北克拉通下地壳榴辉岩包体部分熔融产生的熔体与地幔橄榄岩反应后的产物一致。上述特征排除了这些火山岩是下地壳部分熔融、含水上地幔部分熔融或俯冲洋壳部分熔融产物的可能性，揭示了它们是华北克拉通原岩为太古宙的岩石，后经相变形成的榴辉岩下地壳与岩石圈地幔一同拆沉再循环进入软流圈，随后榴辉岩部分熔融产生的熔体与地幔橄榄岩相互作用的结果。这一研究不仅为拆沉作用导致的下地壳再循环这一重要的地球动力学过程提供了更直接的新证据，而且为中国东部中生代强烈岩浆活动和壳幔交换与大规模成矿作用的动力学背景提供了新认识，为国际关注的中国东部岩石圈地幔减薄作用提供了时间制约。该项成果发表在 *Nature*(2004, 12: 892—897)杂志上。

(供稿：郭进义)