RIFTING AND BREAKUP BETWEEN NEWFOUNDLAND AND IBERIA

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ABSTRACT

The Newfoundland-Iberia conjugate rifted margins are a key example of a major continental rifting system. The present study describes a detailed analysis of the rifting and breakup history using data from the Iberia margin, the eastern North Atlantic, and the western Barents Shelf. The rifting and breakup history is divided into three Early Cretaceous rift episodes, with the breakup unconformity marking the final separation of continental crust and the start of normal seafloor spreading. The rifting and breakup history is characterized by a series of unconformities and faulting events, with the breakup unconformity marking the final separation of continental crust and the start of normal seafloor spreading.

The three Early Cretaceous rift episodes are clearly expressed in reflection profiles over the Iberia margin (Figs. 10 to 14). However, on most of the Newfoundland margin only the Aptian event is clear in the deep basin, where it is represented by the strong U reflection (Figs. 5 to 8). This reflection masks most of the underlying extensional structures, which are only visible in the shallow-water shelf and basin environments.

Maps in Figs. 4 and 15 show profile locations in relation to crustal structure and magnetic anomalies. Reflection profiles are solid yellow lines, and refraction profiles are shown in blue. The three Early Cretaceous rift episodes are expressed in the following ways:

1. **First Rift Episode**
   - Deposition of the initial rift fill in the deep basin, characterized by a strong U reflection.
   - Formation of the first rifting unconformity.
   - Deposition of the first rift fill in the shallow-water shelf and basin environments.

2. **Second Rift Episode**
   - Formation of the second rifting unconformity.
   - Deposition of the second rift fill in the deep basin and the shallow-water shelf.
   - Formation of the second rifting unconformity.

3. **Third Rift Episode**
   - Formation of the third rifting unconformity.
   - Deposition of the third rift fill in the deep basin and the shallow-water shelf.

The final separation of continental crust and the start of normal seafloor spreading is marked by the breakup unconformity, which is characterized by a series of unconformities and faulting events. The breakup unconformity is marked by a strong reflection with unconformable onlap of overlying sediments at its top, by lack of rotation, and by onlap high onto adjacent ridges, which suggests that the ridges were sources of debris. The entire sequence of events is shown in the following ways:

- **First Rift Episode**
  - Deposition of the initial rift fill in the deep basin.
  - Formation of the first rifting unconformity.
  - Deposition of the first rift fill in the shallow-water shelf and basin environments.

- **Second Rift Episode**
  - Formation of the second rifting unconformity.
  - Deposition of the second rift fill in the deep basin and the shallow-water shelf.
  - Formation of the second rifting unconformity.

- **Third Rift Episode**
  - Formation of the third rifting unconformity.
  - Deposition of the third rift fill in the deep basin and the shallow-water shelf.
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