Basin analysis is a process that requires the integration of various methods and data sets with the purpose of understanding the origin and evolution of sedimentary basins.
Basin Analysis in the context of interdisciplinary research

Data sets

- Outcrop data
- Core data
- Well-log data
- Seismic data
Sedimentary basins

Large areas of positive accommodation in which sediments can accumulate to considerable thickness over geological time scales

- Eustasy
  \[ \pm 200 \text{ m} \]
- Tectonics
  \[ 10^3 \text{ m} \]

Sea floor

Basin classification – *plate tectonics*

1. Type of crust on which the basin rests
2. The position of the basin relative to plate margins
3. Where the basin lies close to a plate margin, the type of plate interaction occurring during sedimentation
Types of plate margins:

1. Convergent (*subduction*)
2. Divergent (*rifts, mid-oceanic ridges*)
3. Transform (*offset mid-oceanic ridges*)

Basin classification

I. Intraplate basins (pre-rift)
II. Divergent-margin basins (syn-rift)
III. Intraplate basins (post-rift)
IV. Convergent-margin basins
V. Collision and post-collision basins
VI. Strike-slip basins
### Basin classification (modified from Einsele, 1992 and Miall, 2000)

<table>
<thead>
<tr>
<th>Basin type</th>
<th>Underlying crust</th>
<th>Tectonics</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. Intraplate basins (pre-rift)</strong></td>
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<tr>
<td>1. Intracrateric basins</td>
<td>continental</td>
<td>divergence</td>
<td>large areas, slow subsidence</td>
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<tr>
<td>(interior sag basins)</td>
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<tr>
<td>2. Graben structures</td>
<td>continental</td>
<td>divergence</td>
<td>relatively narrow, fault-bounded, rapid subsidence</td>
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<tr>
<td>(interior fracture basins)</td>
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<tr>
<td><strong>II. Divergent-margin basins (syn-rift)</strong></td>
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<tr>
<td>3. Rift basins</td>
<td>transitional/oceanic</td>
<td>divergence</td>
<td>relatively narrow, fault-bounded, early rapid subsidence</td>
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<tr>
<td><strong>III. Intraplate basins (post-rift)</strong></td>
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<tr>
<td>4. Divergent continental margins</td>
<td>transitional</td>
<td>divergence</td>
<td>asymmetric, moderate to low subsidence</td>
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<tr>
<td>5. Oceanic sag basins</td>
<td>oceanic</td>
<td>divergence</td>
<td>large, asymmetric, slow subsidence</td>
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</tbody>
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**Figure (a):** Interior Sag Basin
- **CONTINENTAL AND SHALLOW MARINE SEDIMENTS**
- **THINNING OR HIGHER DENSITY**

**Figure (b):** Graben
- **ONGOING SPREADING**
- **FAILED RIFT (AULACOGEN)**

**Figure (c):** Rift Zone, Aulacogen
- **CONTINENTAL CRUST**
- **OCEANIC CRUST**
Subduction:
1. No terrain accretion: forearc-backarc systems
2. Terrain accretion: orogenesis, and foreland systems

IV. Convergent-margin basins

| 6. Subduction zones (trenches) | oceanic          | convergence               | asymmetric, varying depth and subsidence |
| 7. Forearc, interarc, intra-arc backarc basins | transitional/oceanic | divergence                 | ± symmetric, varying depth and subsidence |
| 8. Retroarc foreland systems (overriding plate) | continental      | flexural                   | asymmetric, varying depth and subsidence |
| 9. Proarc foreland systems (underiding plate) | oceanic          | flexural                   | asymmetric, varying depth and subsidence |
| 10. Piggyback basins (thrust-fold belts) | continental      | convergence                | asymmetric, varying depth and subsidence |
V. Collision and post-collision basins

11. Remnant basins (paleo-trenches)  oceanic  convergence  moderate to low subsidence driven by sediment loading
12. Intramontane basins (thrust-fold belts)  continental  divergence  the equivalent of gneiss in thrust-fold belts
13. Foreland systems (pro/retro)  continental  flexural  asymmetric, varying depth and subsidence
VI. Transform- and transcurrent-fault (strike-slip) basins

14. Pull-apart basins

continental/oceanic transension relatively small, elongate, rapid subsidence