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Miocene Incised-Valleys System (IVS) Related to Western Alps Foreland Basin Evolution (Southeast France Basin)

The restitution of the paleo incised-valley drainage let to quantify and decipher local movement (thrust-fault) to long wave influence (flexural response) that is subsidence or uplift links to the forebulge migration. In a sequential framework, the mapping of all the IVS shows that the geometry of the Miocene transgression throughout the foreland basin had to be reconsidered.

The Lower Miocene present a compound IVS recognized on 150 km long in Southward direction. This drainage system cut most of the East-West Middle Eocene Provençal structures, flattened during the Oligocene but reactivated during the Miocene. The Pre-Burdigalian and Upper Burdigalian incision stages eroded underlying series or widened the first valley. The Langhian incision was less important and in many case the deposit start to shift in syncline topography formation. This first drainage network was affected by local fold thrust activation which enhanced the incision on top of the growing structure and create a bypass zone compare to both side of the structure with high accumulation more than 100 m of bioclastics sediments.

Another younger valleys are developed when shortening rate increases as shown by folds growing and major uplifting of all the external part of the basin (long wave deformation). Most of the Lower Miocene deposit were also inverted and the previous compound IVS was scantily re-incised during the Middle Miocene. This younger incision stage occurs at right angle from the first and is linked to sea level drops enhanced by this regional uplift (more than 300 m).