The subtle distribution of Plover and Flamingo reservoirs (Jurassic to Early Cretaceous) within the Money Shoal Basin is believed to be controlled by a tectonic phase of inversion. Sequence stratigraphic analysis has enabled the characterization of the main phases of inversion and enhanced the prediction of reservoir facies distribution.

The Money Shoal Basin, in continuation with the Bonaparte Basin is of Mesozoic to Cenozoic age and overlies the intracratonic Arafura Basin of Neoproterozoic to Paleozoic age. A phase of regional compression during the Trias is represented by an angular unconformity between Paleozoic and Mesozoic series above which Plover and Flamingo clastic formations are deposited. The Plover Formation is known as a prolific reservoir within the neighbouring Bonaparte Basin (Abadi field, etc.)

This study is based on the interpretation of well data and available 2D seismic within the area. Above the transgressive surface at the top of the Plover Formation, an initial phase of subsidence resulted in the creation of a small basin subsequently filled by shallow marine deposits (Money-Shoal-1 well). The final phase of the basin infill is characterized by deltaic deposits derived towards the NW. The overall downward shift of deltaic facies onlapping the sequence boundary suggests an uplift of the small basin. The magnitude of uplift can be estimate in the order of 500 m. Due to the influence of inversion on the Flamingo Formation, limited reservoir continuity is expected.

The Abadi Field, 50 km west of the Money Shoal Basin, encountered hydrocarbon bearing sandstones of the Plover Formation. Sandy facies of the younger Flamingo Formation are absent represented by an argillaceous condensed section. Tectonic activity contemporaneous with deposition of the Flamingo Formation resulted in the creation of a paleohigh on which deltaic sands were not deposited.
Sequence stratigraphy evolution of the Plover and Flamingo Formations as a response to a tectonic inversion in the Money Shoal basin, North Australia

C. Dumont, P. Dattilo, J.M. Gaulier
Petroleum geology of the Arafura and Money Shoal basins
Modified after GEOSCIENCES AUSTRALIA, 2006
Geodynamic evolution

Cambrian 500 Ma

Trias 200 Ma

Jurassic 150 Ma

Cretaceous 65 Ma

Reconstructions after Scotese, 2006

Paper IPTC-17885 • Sequence stratigraphy evolution of the Plover and Flamingo Formations as a response to a tectonic inversion in the Money Shoal basin, North Australia • Cyrielle Dumont
Miocene unconformity: Local uplift and erosion due to collision between Australia-India and Eurasia plates in the Banda Arc region

Albian unconformity: Local uplift, tilt of the basin

- Carnavon break-up
- Upper Flamingo Formation deposition
- Bonaparte break-up
- Lower Flamingo Formation deposition
- Browse break-up
- Plover Formation deposition

Fitzroy event: Regional N-S compression, inversion, transpression, uplift and erosion during Late Triassic

Reactivation of NW rifting: Late Carboniferous to Early Permian NNW-SSE elongated extension created grabens (Malika, etc.)

Carboniferous unconformity: Local uplift and erosion

Arafura Group deposition

Devonian unconformity: Local uplift and erosion

Goulburn Group deposition

Stratigraphy of Arafura and Money Shoal basins
After Geosciences Australia, 2012 – [website]
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Devonian unconformity: Local uplift and erosion

Goulburn Group deposition
Available data
Abadi Field

**Country name:** Indonesia

**HC Type:** Gas

**Status:** Developing

**Discovery date:** 2000

**Current operator:** Inpex (65%)

**Nb of wells:** 12

**Water depth max.:** 457m

**Total depth max.:** 4236m

**Reservoir interval:** Mid. Jur. Plover

**Gross interval:** 20m

**Gas in place:** 4 835 MMBoe

**Gas recoverable:** 3 143 MMBoe

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Paper IPTC-17885 • Sequence stratigraphy evolution of the Plover and Flamingo Formations as a response to a tectonic inversion in the Money Shoal basin, North Australia • Cyrielle Dumont
Sequence stratigraphy study

Abadi-1 Tuatara-1 Cobra-1A Kulka-1 Money-Shoal-1 Torres-1 Arafura-1 Goulburn-1

NW SE

TD: Ordovicien
1000m
2000m
3000m

TD: Jurassique

Top Plover

Top inverted basin

TD: Dévonien

TD: Précambrien

Albian unc.
Fitzroy unc.

TD: Carbonifère

TD: Ordovicien

TD: Précambrien

Paper IPTC-17885 • Sequence stratigraphy evolution of the Plover and Flamingo Formations as a response to a tectonic inversion in the Money Shoal basin, North Australia • Cyrielle Dumont
Plover: a transgressive system, continuous sand body

Abadi-1 Tuatara-1 Cobra-1A Kulka-1 Money-Shoal-1 Torres-1 Arafura-1 Goulburn-1

NW SE

TD: Ordovicien 1000m 2000m TD: Jurassique

TD: Précambrien

TD: Dévonien 3000m

TD: Carbonifère

TD: Précambrien

TD: Ordovicien

TD: Précambrien

Top Plover

Top inverted basin

Albian unc.

Fitzroy unc.

TD: Jurassique

TD: Carbonifère

INDONESIA
AUSTRALIA

Arafura Basin

Money Shoal Basin

Goulburn boundary

Paper IPTC-17885 • Sequence stratigraphy evolution of the Plover and Flamingo Formations as a response to a tectonic inversion in the Money Shoal basin, North Australia • Cyrielle Dumont
Plover: a transgressive system, continuous sand body
Local basin generation and inversion

Abadi-1 Tuatara-1 Cobra-1A Kulka-1 Money-Shoal-1 Torres-1 Arafura-1 Goulburn-1

TD: Ordovicien
1000m
2000m

TD: Jurassique

TD: Précambrien

TD: Dévonien

Top Plover

Top inverted basin

Abadi

Indonesia

Australie

Goulburn boundary

Money Shoal Basin

Bunyip Basin

TD: Jurassique

TD: Précambrien

TD: Carbonifère

TD: Ordovicien

TD: Précambrien

Paper IPTC-17885 • Sequence stratigraphy evolution of the Plover and Flamingo Formations as a response to a tectonic inversion in the Money Shoal basin, North Australia • Cyrielle Dumont
Local basin generation and inversion

Control of the approximate geometry with the topset of progradation

Paper IPTC-17885 • Sequence stratigraphy evolution of the Plover and Flamingo Formations as a response to a tectonic inversion in the Money Shoal basin, North Australia • Cyrielle Dumont
Flamingo: restart the sedimentation with a regressive system

Top Plover

Top inverted basin

Abadi-1
Tuatara-1
Cobra-1A
Kulka-1
Money-Shoal-1
Torres-1
Arafura-1
Goulburn-1

NW
SE

1000m
2000m
3000m

TD: Ordovicien
TD: Jurassique
TD: Précambrien
TD: Dévonien
TD: Carbonifère

Albian unc.
Fitzroy unc.

INDONESIA
AUSTRALIA

Abadi-1
Bentapate Basin
Money Shoal Basin
Goulburn boundary

Paper IPTC-17885 • Sequence stratigraphy evolution of the Plover and Flamingo Formations as a response to a tectonic inversion in the Money Shoal basin, North Australia • Cyrielle Dumont
Flamingo: restart the sedimentation with a regressive system

Torres-1

Tuatara-1

Cobra-1A

Kulka-1

Money-Shoal-1

1000m

2000m

3000m

Albian unc.

Top Plover

Fitzroy unc.

Top inverted basin

Paper IPTC-17885 • Sequence stratigraphy evolution of the Plover and Flamingo Formations as a response to a tectonic inversion in the Money Shoal basin, North Australia • Cyrielle Dumont
Conclusions

- **Trap:**
  Magnitude of uplift estimated in the order of 500 m at the Money Shoal-1 well → potentially other inversion features elsewhere in the basin

- **Plover reservoir:**
  Transgressive sandstones: very continuous sand body

- **Flamingo reservoir:**
  Regressive sandstones (forced regression with progradations from East to West): intercalated shales between sandstones reservoirs
Thank you for your attention