

AVANTIX

Avancement Simulateur IQ

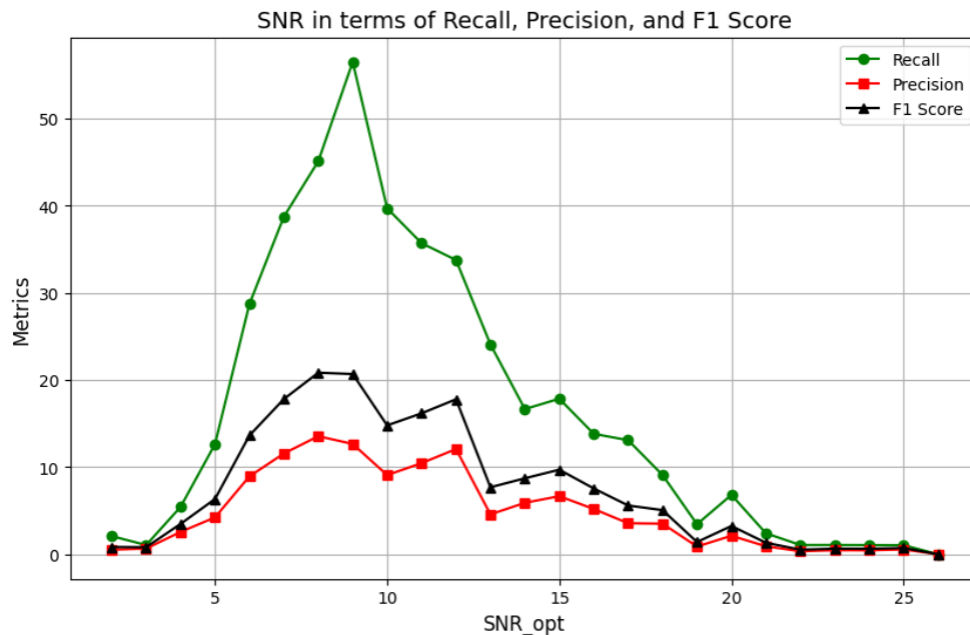
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WOLA

Rappel

Base 200 :

- Regular FFT
- Target SNR de 9dB (-5 et 16dB) pour chaque impulsion
- 81 train / 14 val / 19 test
- Seuil création du masque : 0 dB effectif

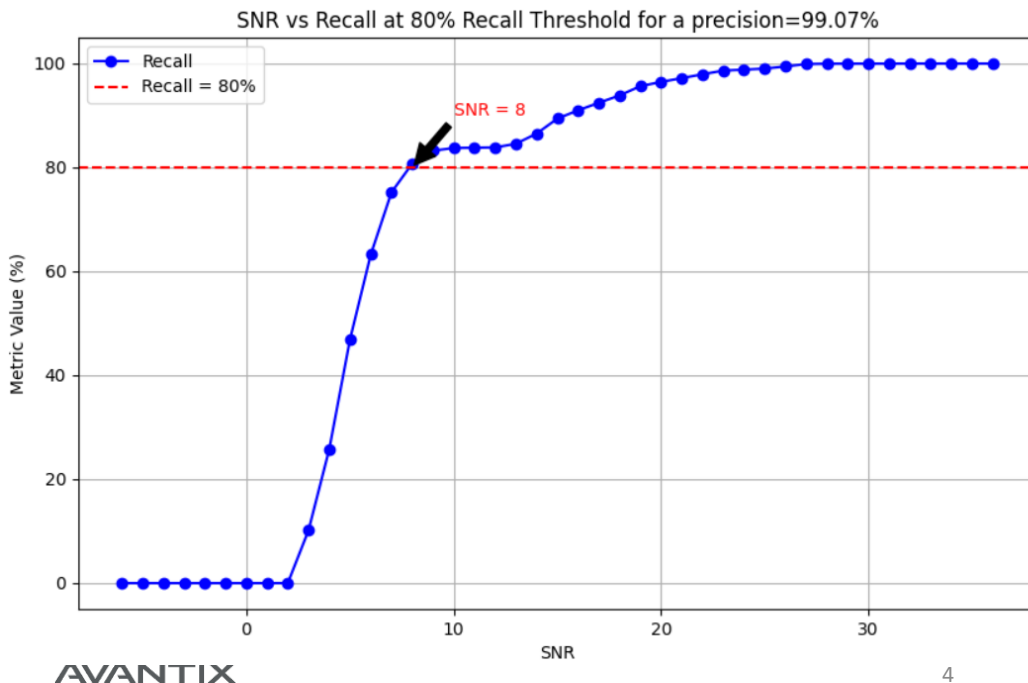


WOLA + IA : Résultat segmentation

Nouvelle base :

- WOLA FFT
- Target SNR de 9, 17 ou 25dB pour chaque impulsion
- 256 train / 50 val / 50 test
- Seuil création du masque : 3dB effectif
- Best HP : Adam + lr = 0,001 + no act + with bias + no pos_weight
- NPERSEGS : [64, 128, 256, 512, 1024, 4096, 16384, 131072]

run_2025-01-24_12-15-02

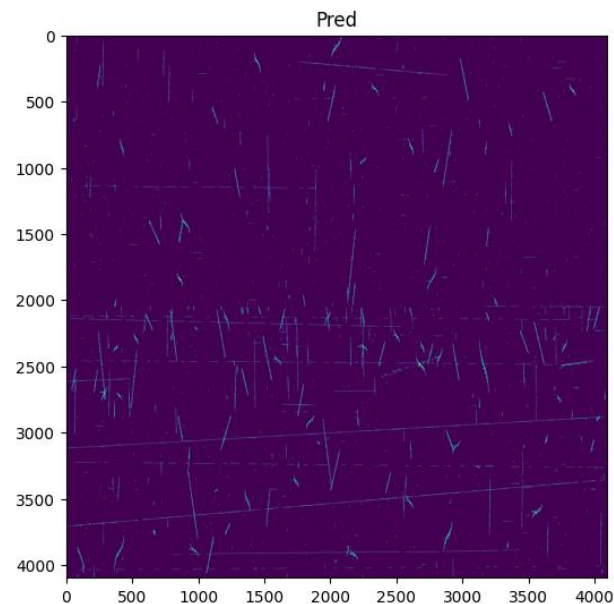
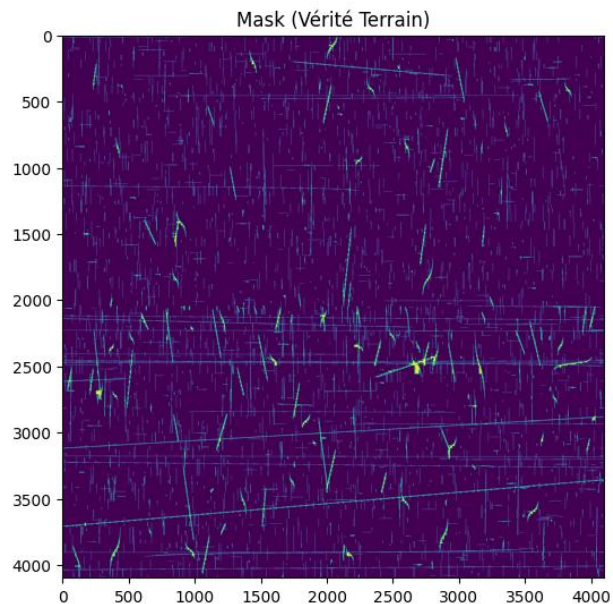
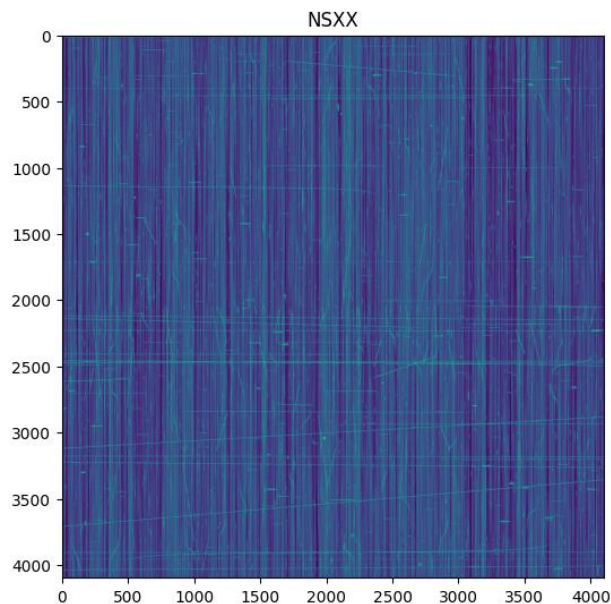


WOLA + IA : Résultat segmentation

run_2025-01-24_12-15-02

Target snr = 9 dB

mask_96.pt

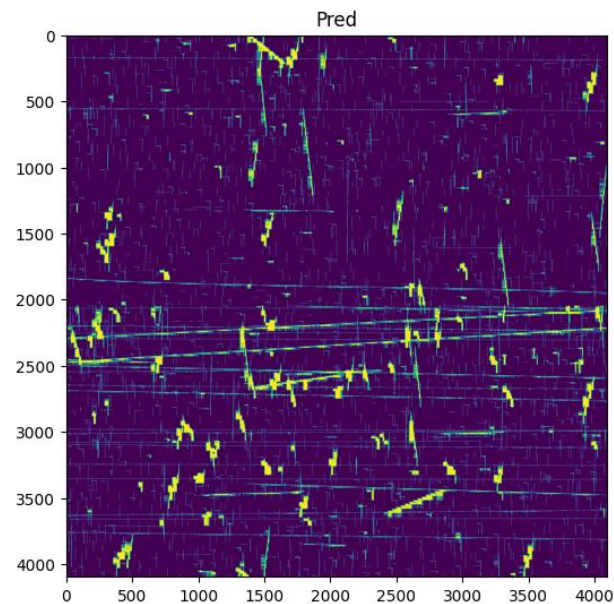
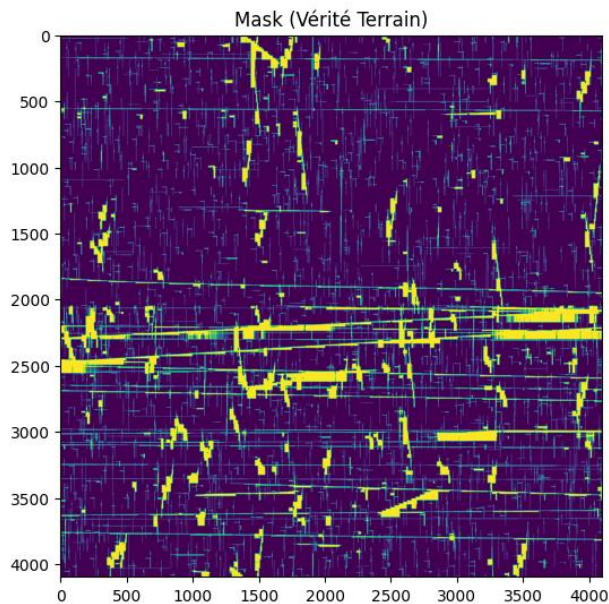
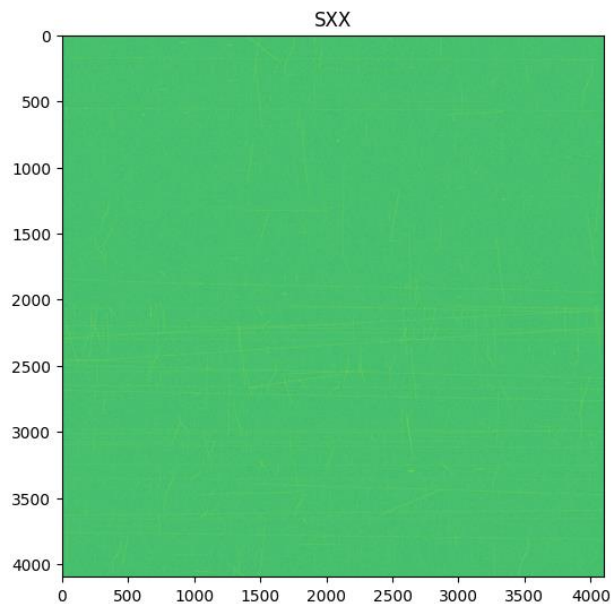


WOLA + IA : Résultat segmentation

run_2025-01-24_12-15-02

Target snr = 17 dB

mask_9005.pt

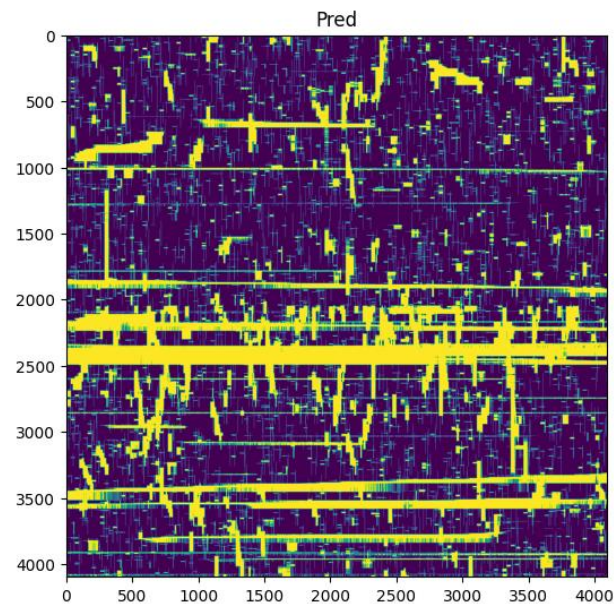
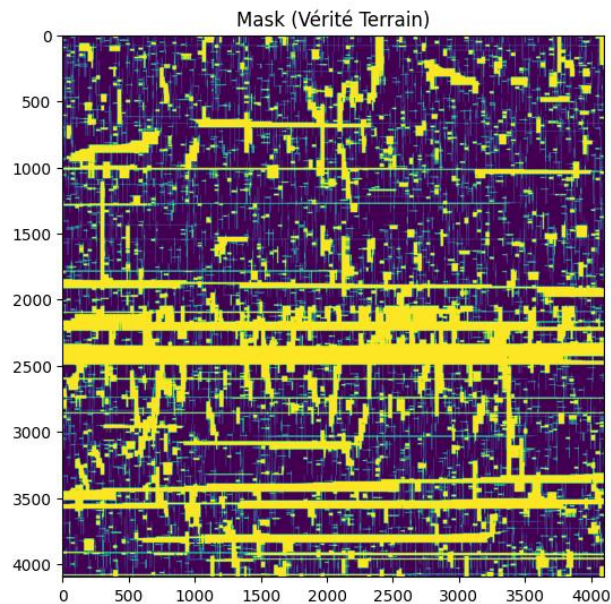
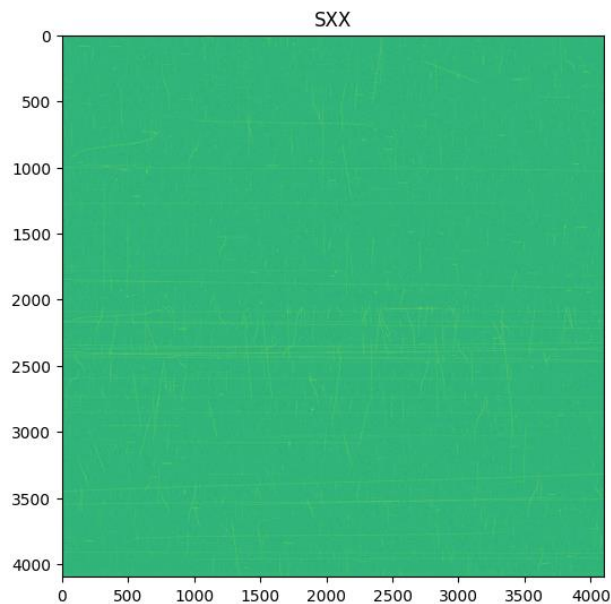


WOLA + IA : Résultat segmentation

run_2025-01-24_12-15-02

Target snr = 25 dB

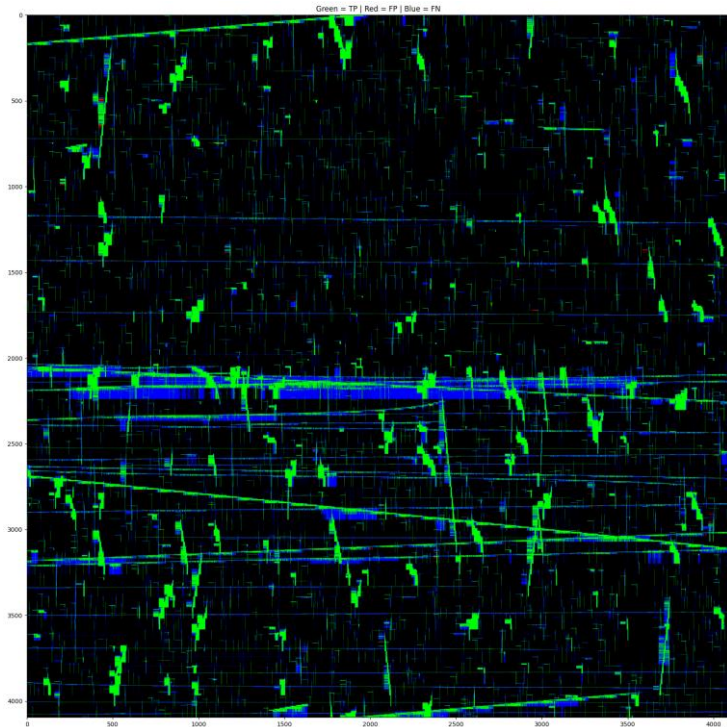
mask_902.pt



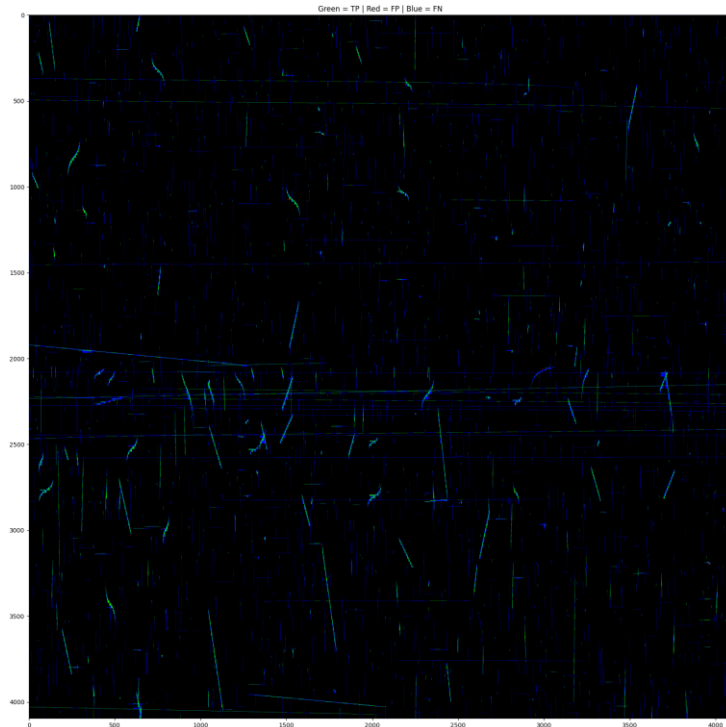
WOLA + IA : Résultat segmentation

run_2025-01-24_12-15-02

Quasi aucun FP et les FN sont localisés autour des pixels des impulsions déjà détectées



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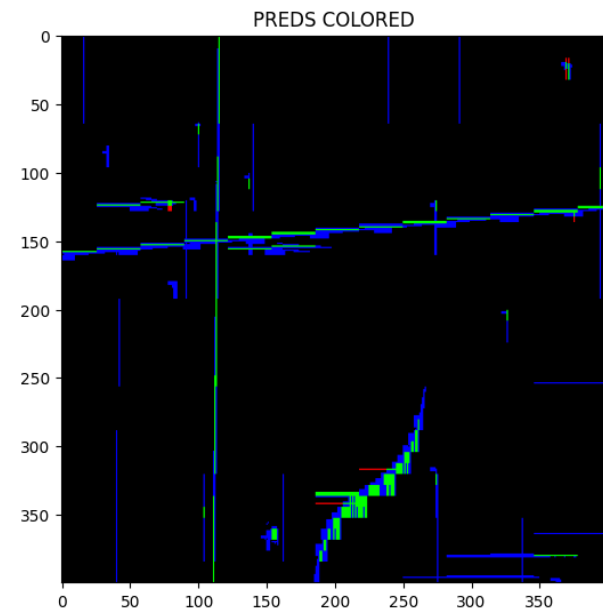
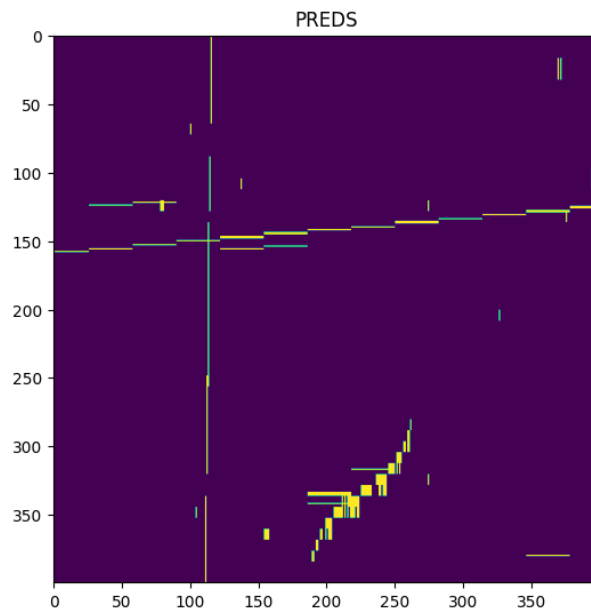
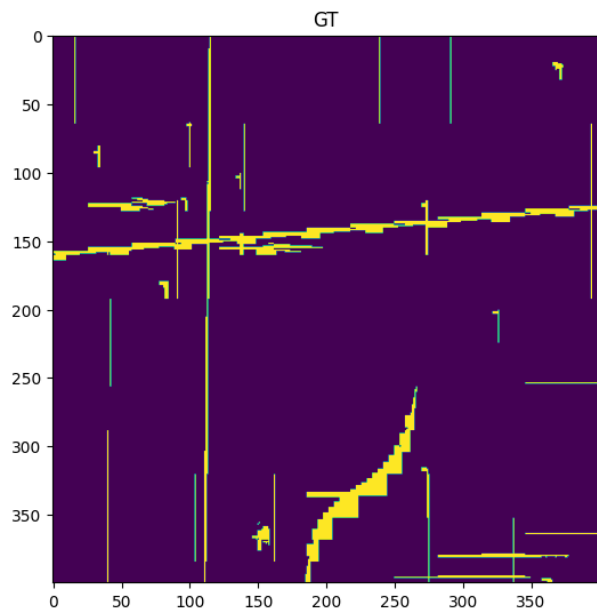
WOLA + IA : Résultat segmentation

run_2025-01-24_12-15-02

Quasi aucun FP et jamais isolé des impulsions

Beaucoup de FN à target_snr = 9dB

Green = TP | Red = FP | Blue = FN



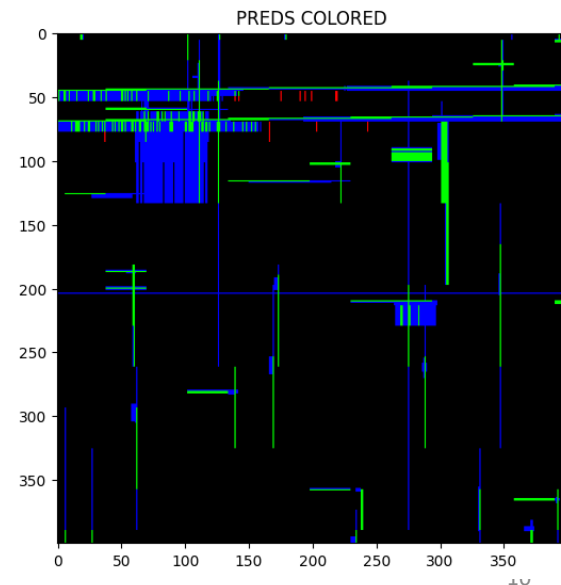
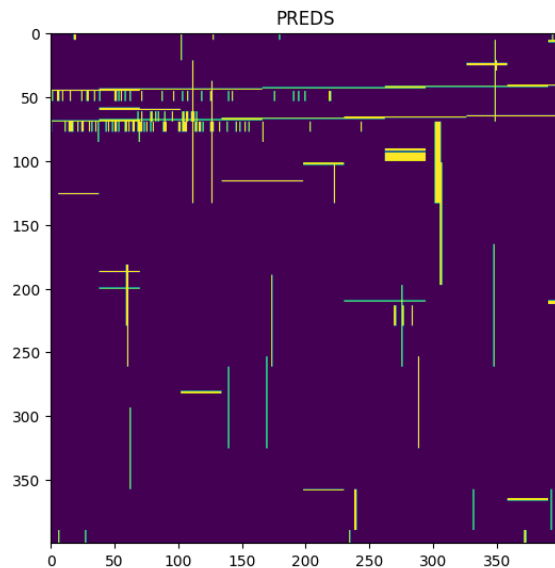
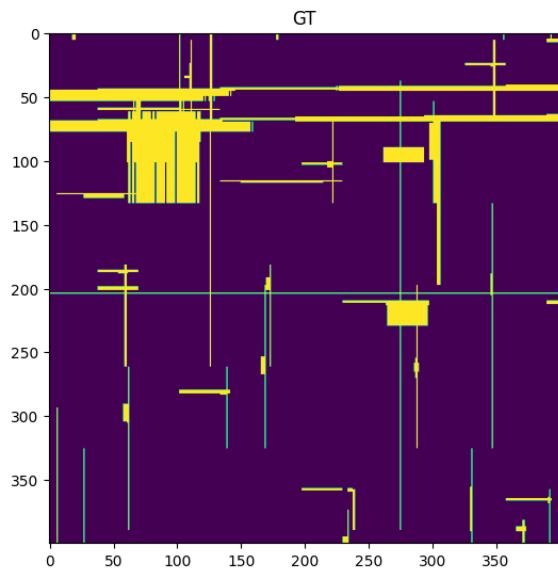
WOLA + IA : Résultat segmentation

run_2025-01-24_12-15-02

Quasi aucun FP et jamais isolés des impulsions

Beaucoup de FN à target_snr = 17dB mais jamais isolés des impulsions

Green = TP | Red = FP | Blue = FN



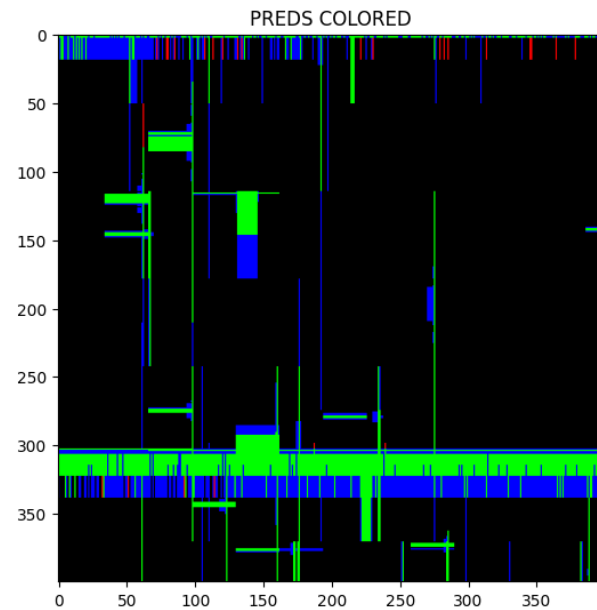
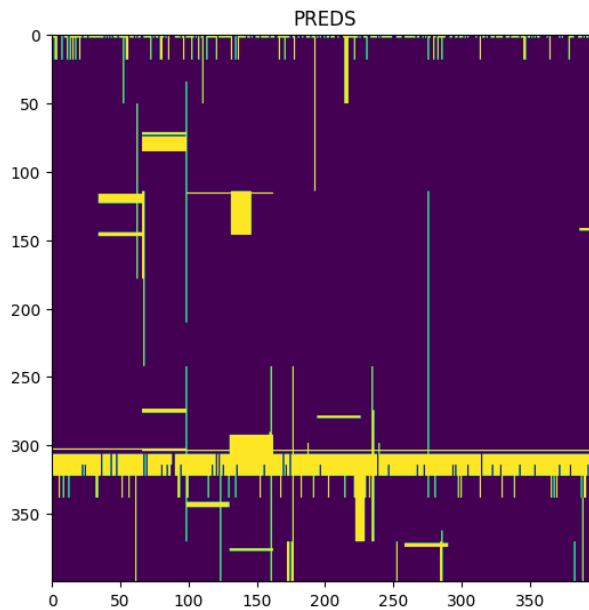
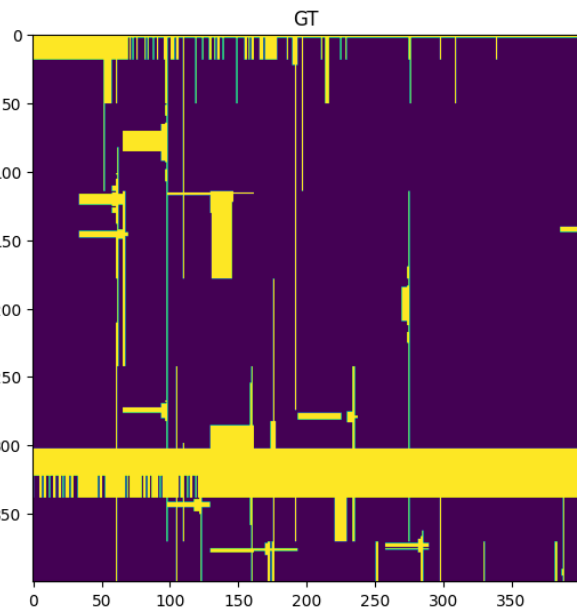
WOLA + IA : Résultat segmentation

run_2025-01-24_12-15-02

Quasi aucun FP et jamais isolés des impulsions

Beaucoup de FN à target_snr = 25dB mais jamais isolés des impulsions

Green = TP | Red = FP | Blue = FN



WOLA + IA : end-2-end

Base lego :

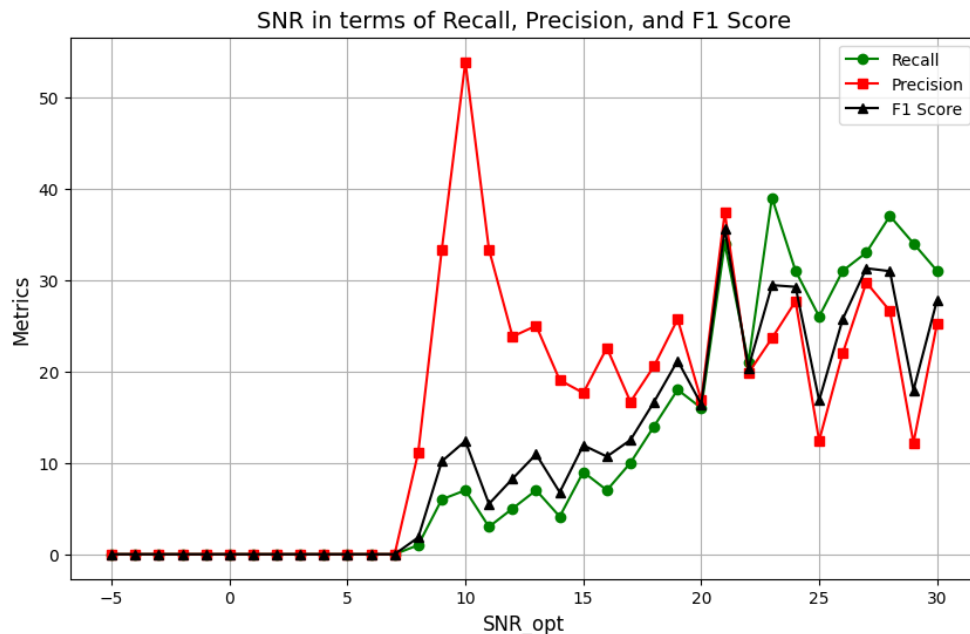
- -5 dB à 30 dB

WOLA + IA : end-2-end

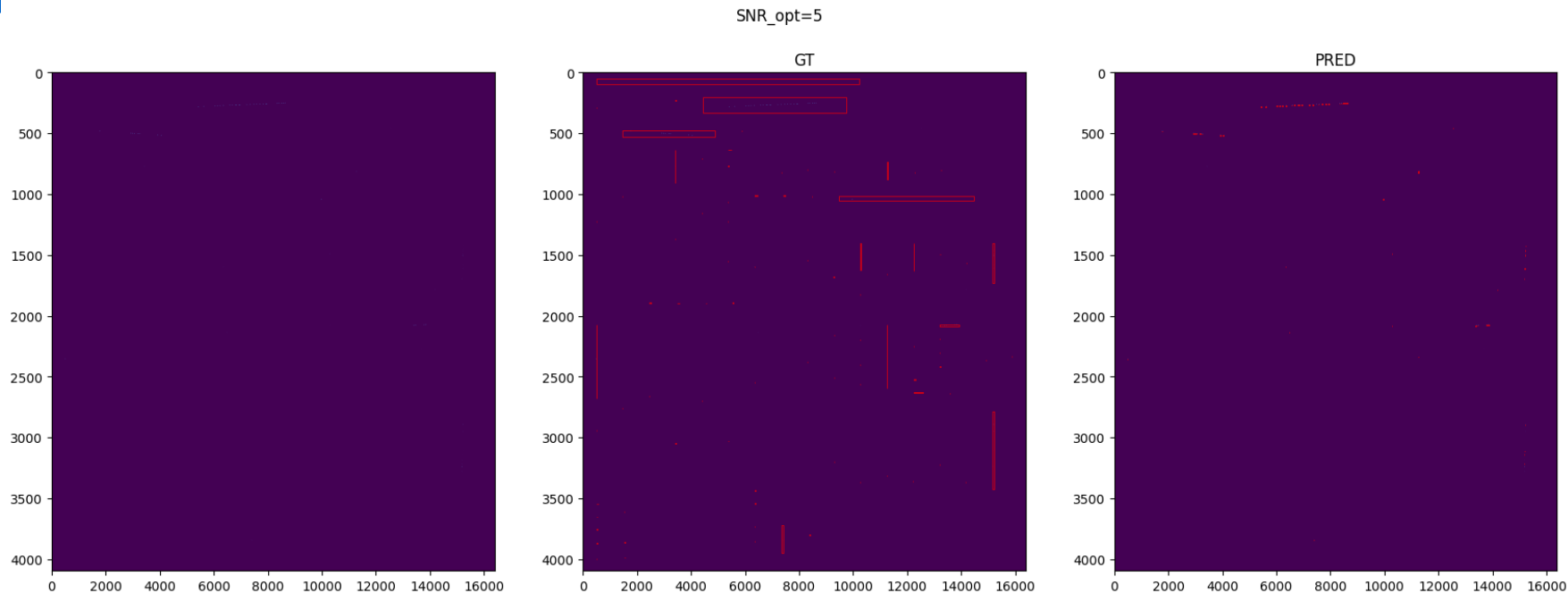
Nouvelle base :

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- Target SNR de 9, 17 ou 25dB pour chaque impulsion
- 256 train / 50 val / 50 test
- Seuil création du masque : 3dB effectif
- Best HP : Adam + lr = 0,001 + no act + with bias + no pos_weight
- NPERSEGS : [64, 128, 256, 512, 1024, 4096, 16384, 131072]

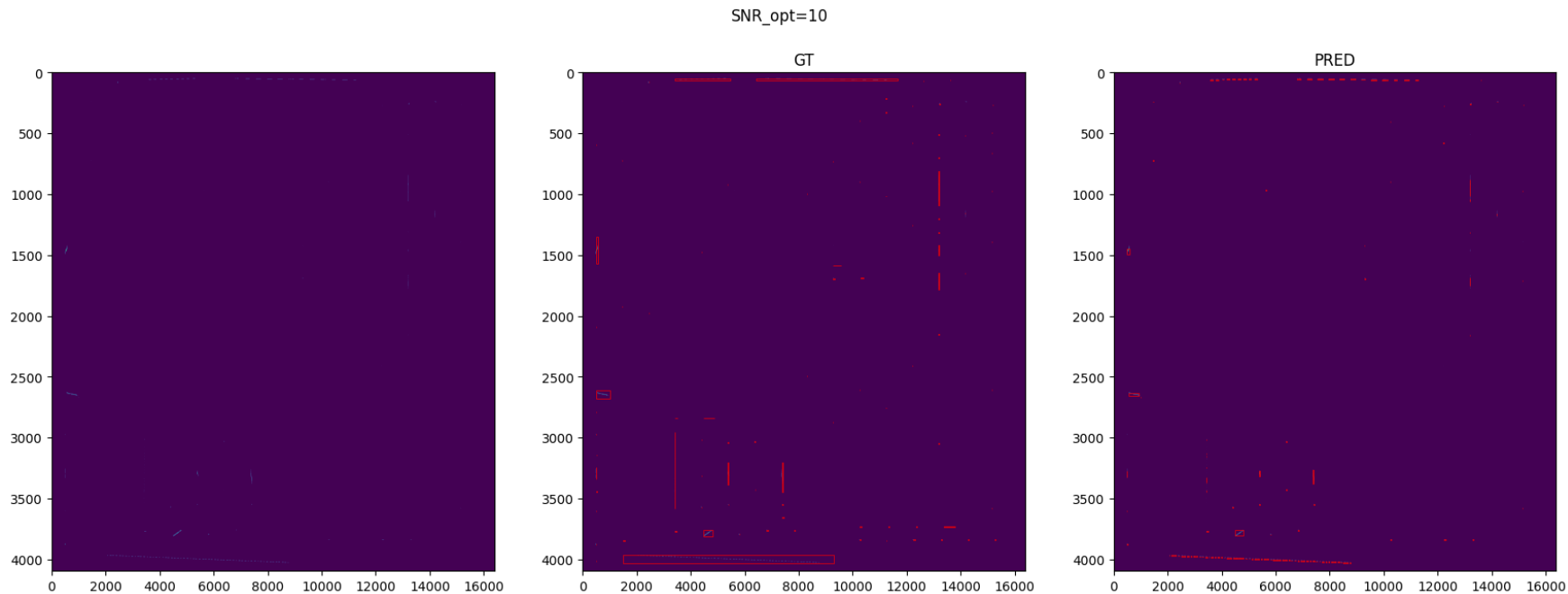
run_2025-01-24_12-15-02



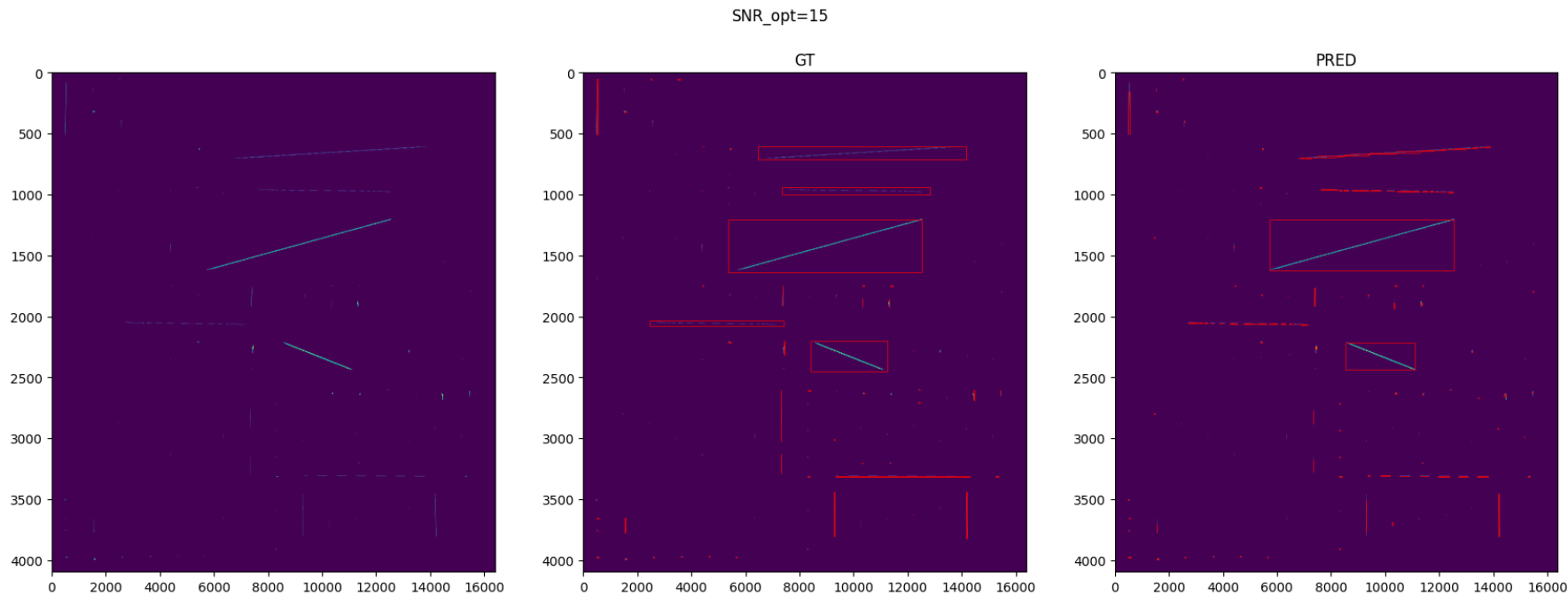
Résultats SNR_{opt} = 5 dB



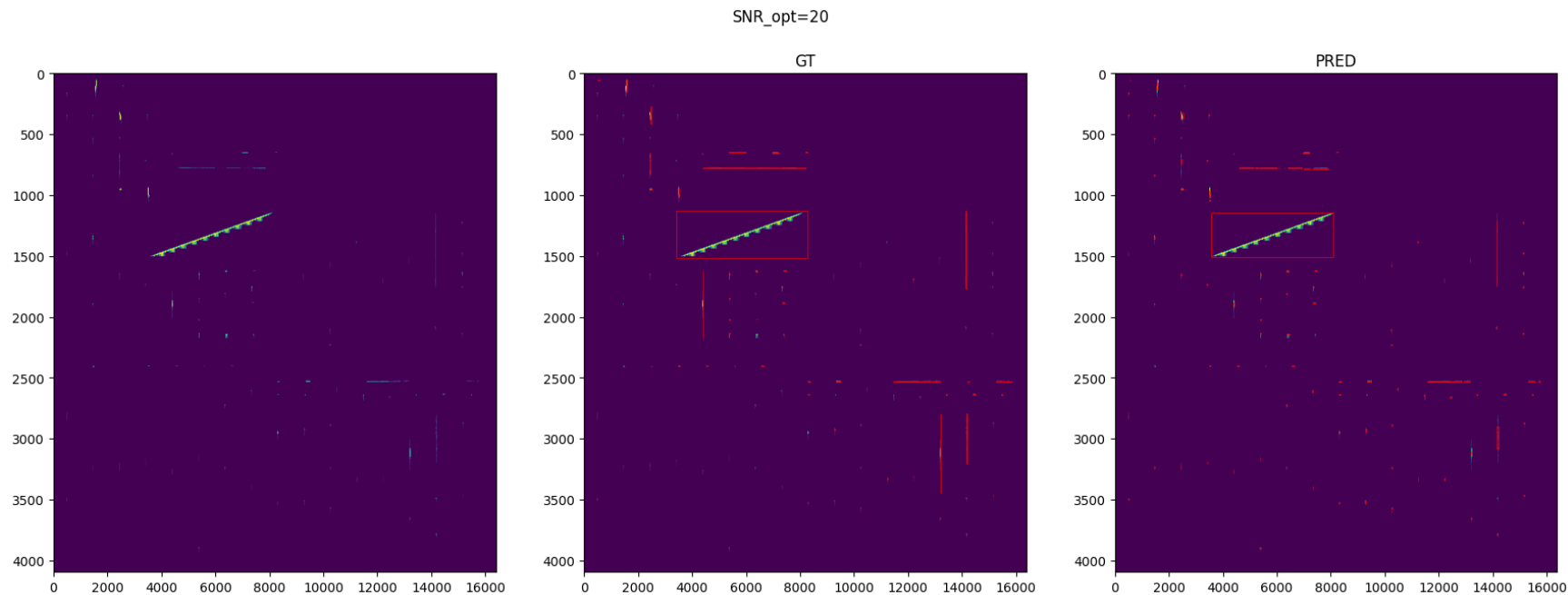
Résultats SNR_{opt} = 10 dB



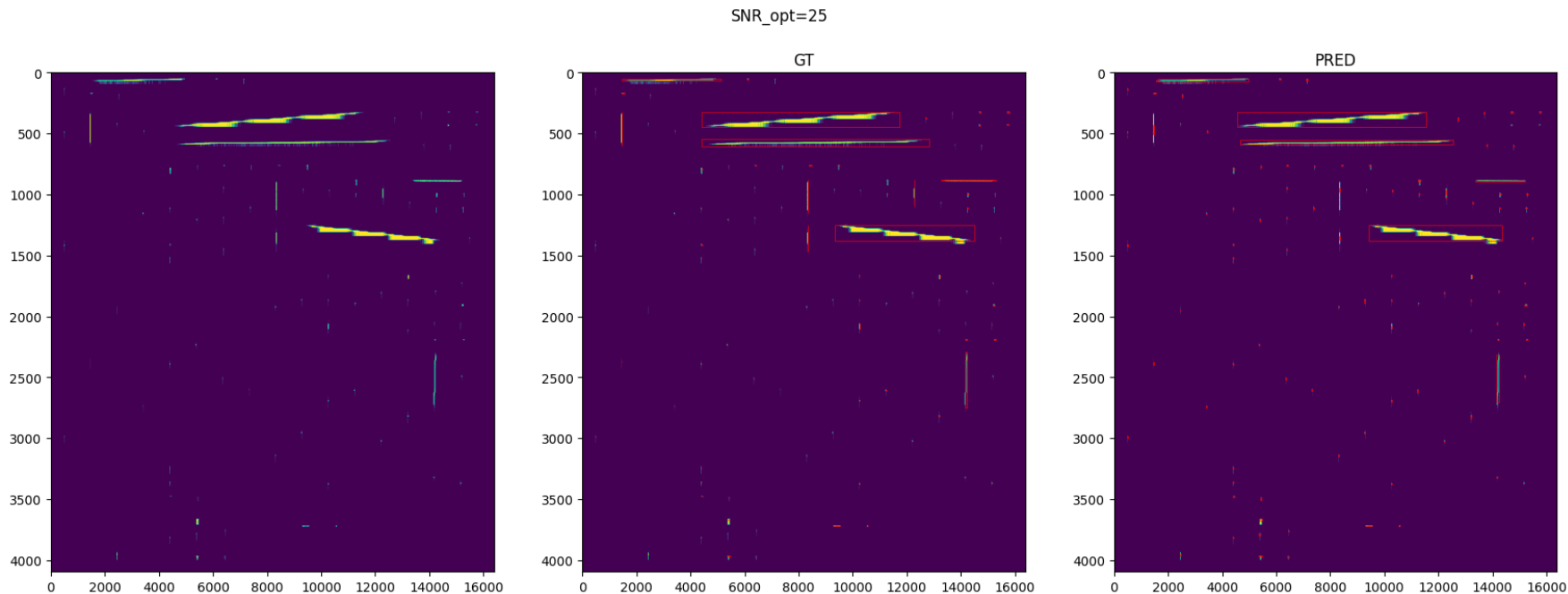
Résultats SNR_{opt} = 15 dB



Résultats $\text{SNR}_{\text{opt}} = 20 \text{ dB}$

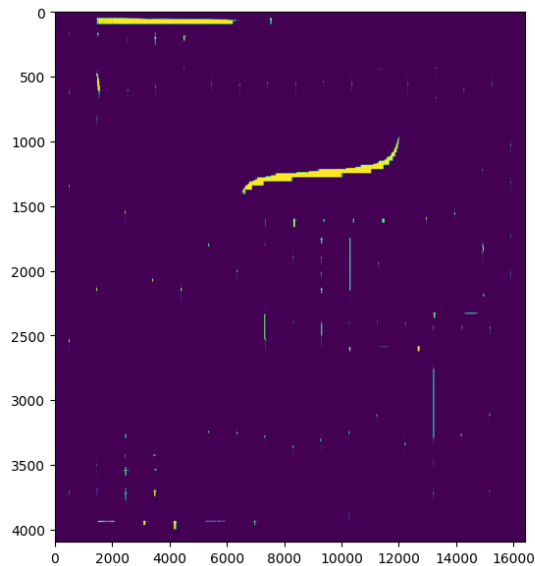


Résultats SNR_{opt} = 25 dB

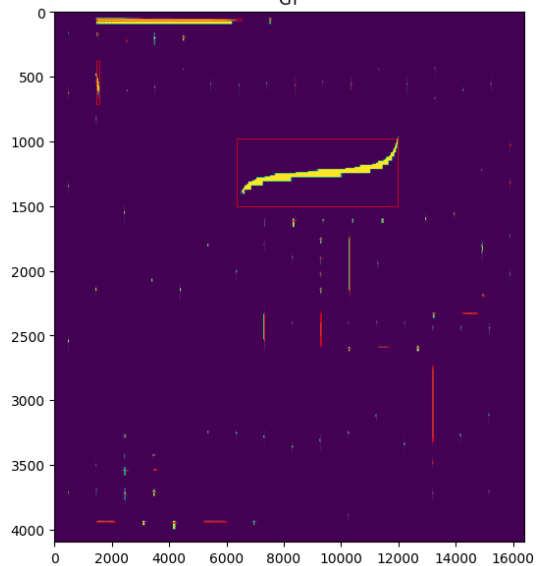


Résultats SNR_{opt} = 30 dB

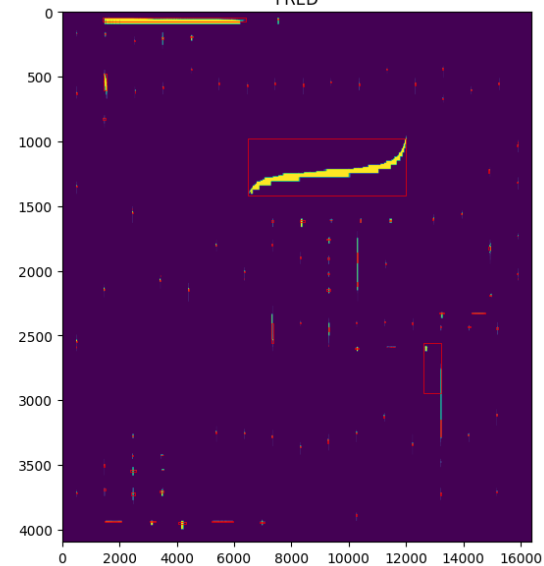
SNR_{opt}=30



GT



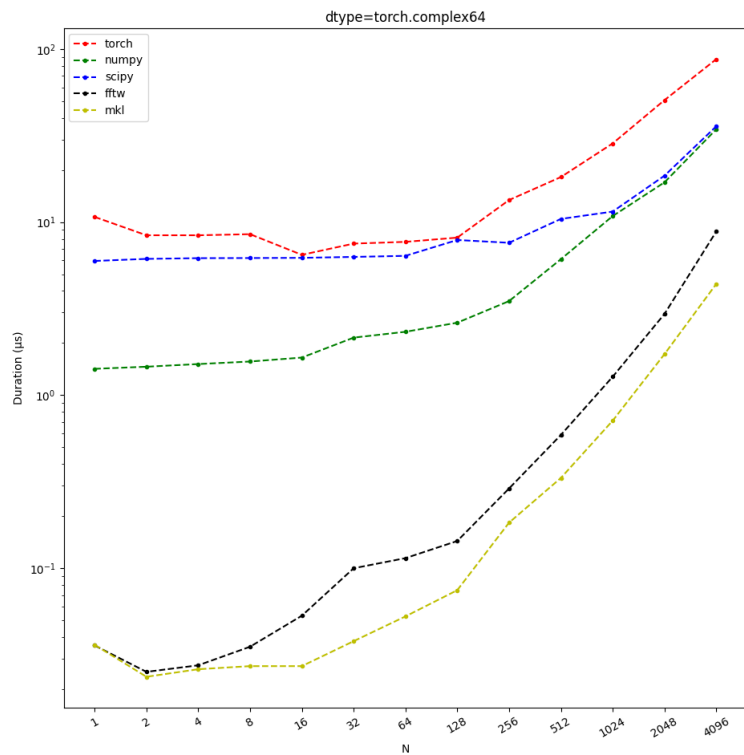
PRED



AVANTIX

Iq2pdw CPU

FFT



Setup

CPU i7-8665U (1,90GHz) – 3 cœurs utilisés

fs = 100 MSps

NPERSEGS = [32, 128, 512, 2048]

76 train / 20 val / 20 test

Fp64 vs fp32 ?

Docker :

- Base Ubuntu 22.04
- Taille de l'image : 2,01Go
- **Durée SXXs + IA @ dt_iq = 5,24ms :**

Computing spectrograms nperseg=32 took 35.17 ms.

Computing spectrograms nperseg=128 took 53.01 ms.

Computing spectrograms nperseg=512 took 38.06 ms.

Computing spectrograms nperseg=2048 took 65.78 ms.

Computing spectrograms took 192.79 ms.

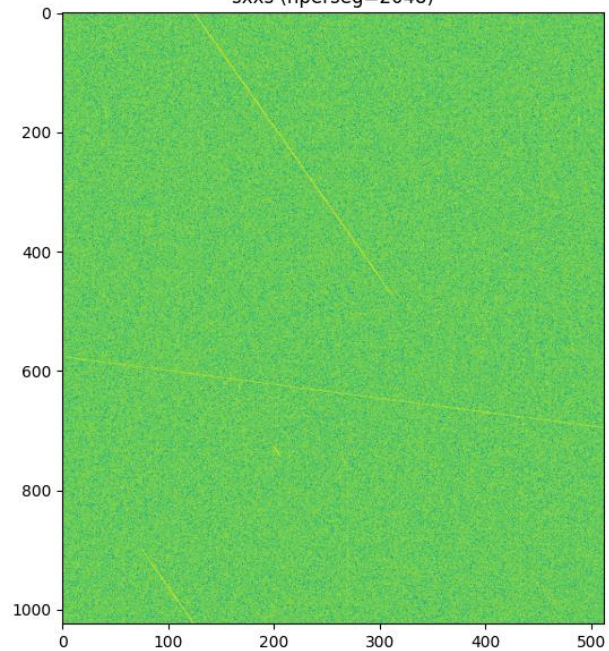
Computing the mask (AI) took 51.24 ms.

Getting the bboxes took 10.58 ms.

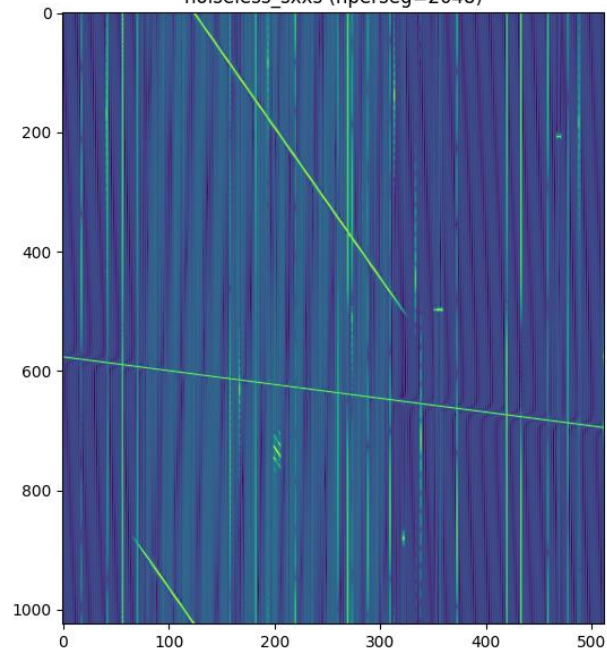
In total it took 254.84 ms.

BT 100 MSps

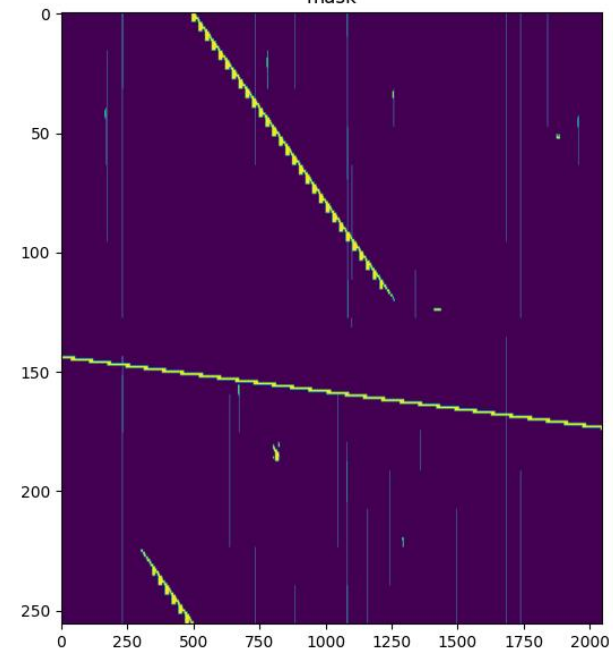
sxxs (nperseg=2048)



noiseless_sxxs (nperseg=2048)

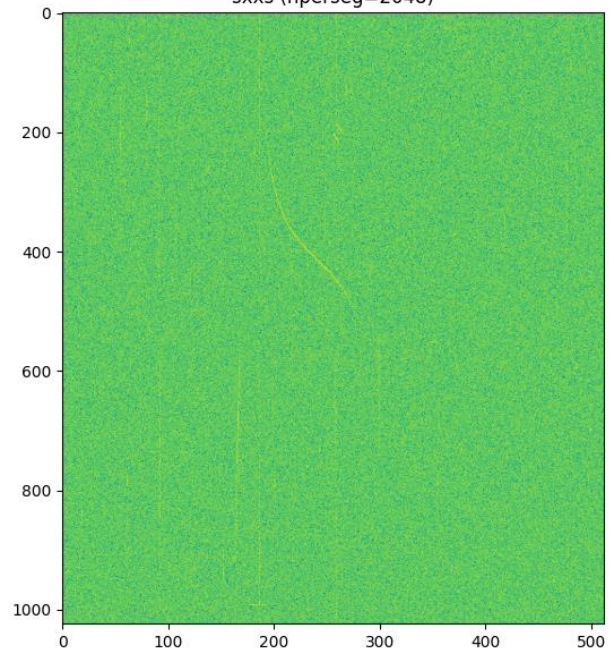


mask

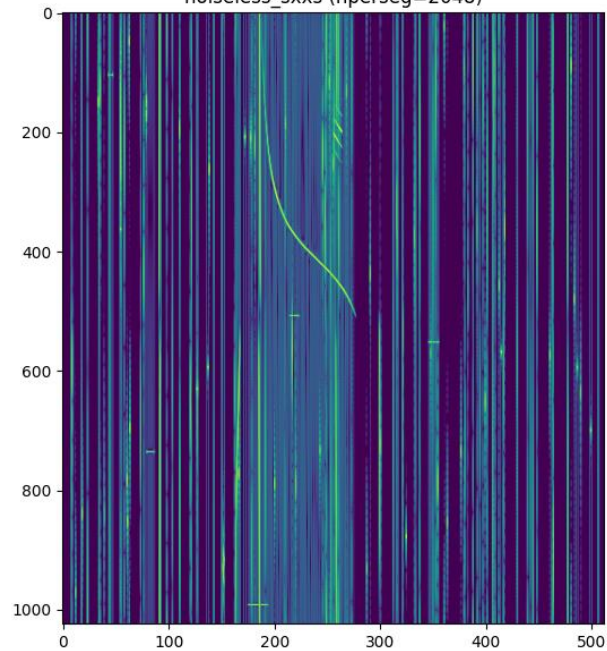


BT 100 MSps

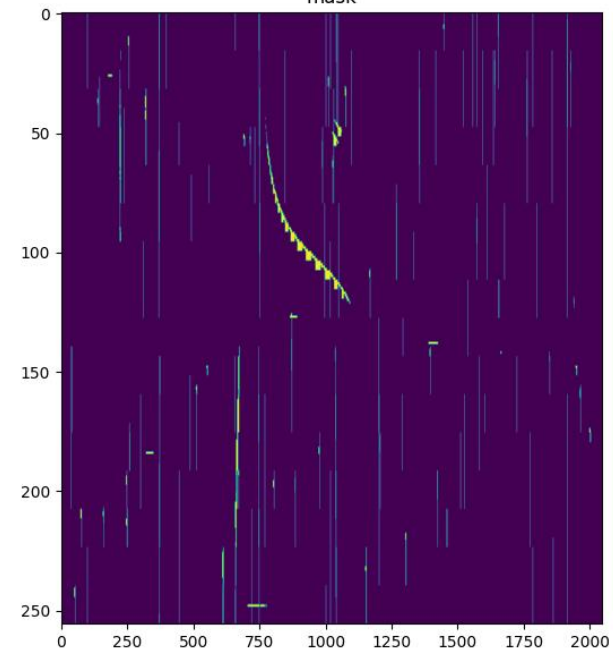
sxxs (nperseg=2048)



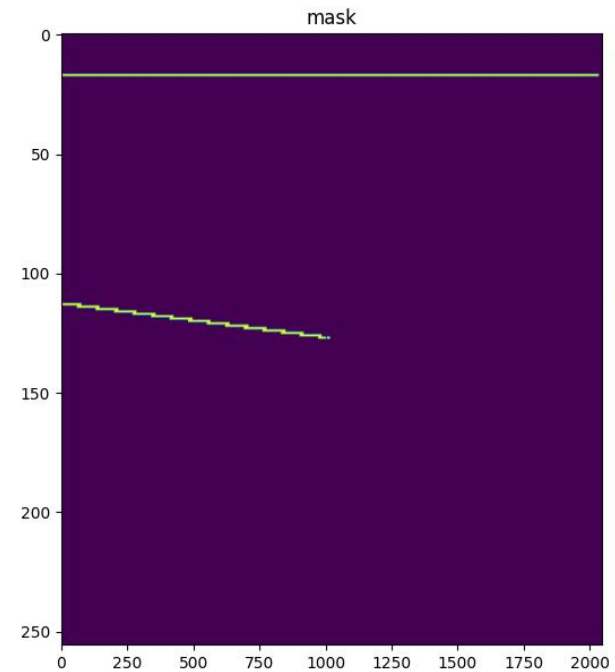
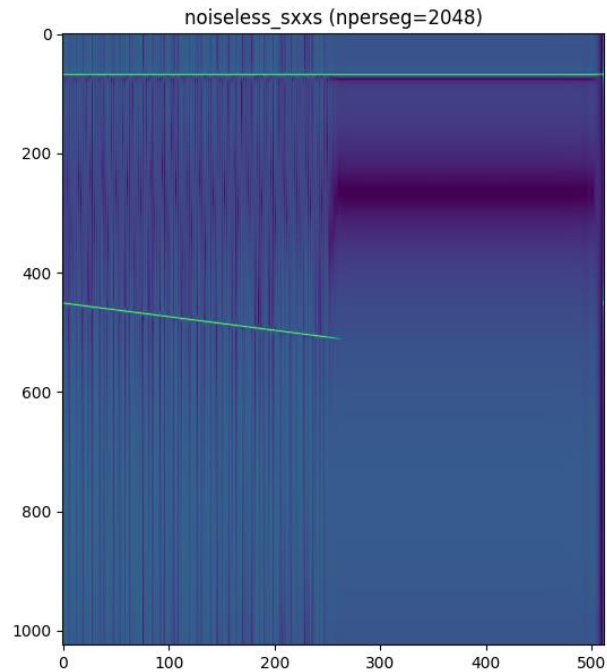
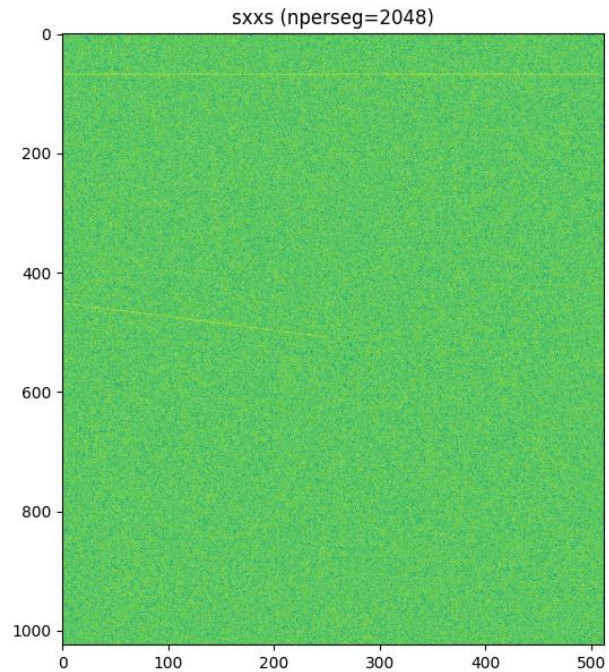
noiseless_sxxs (nperseg=2048)



mask

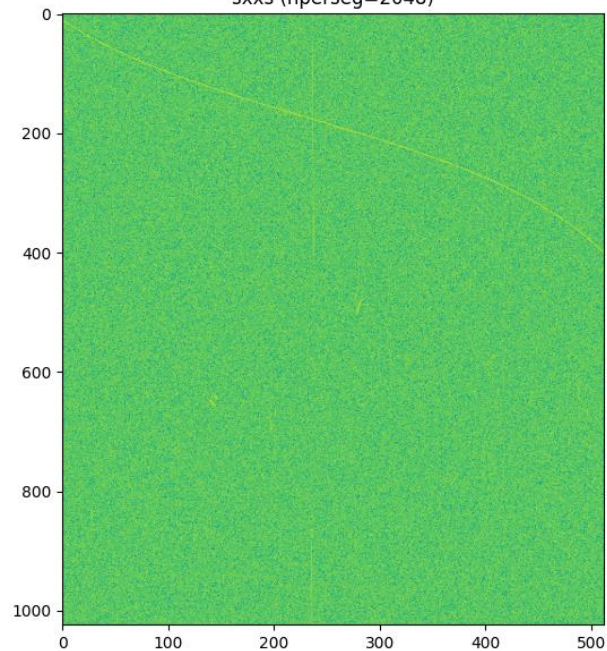


BT 100 MSps

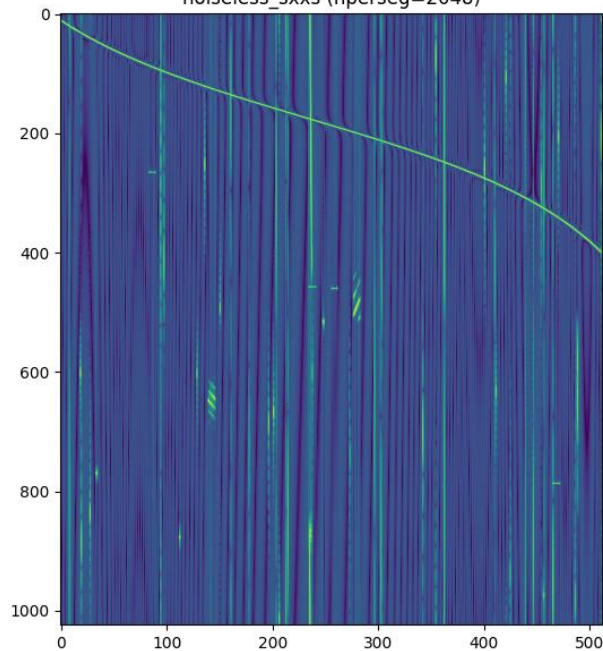


BT 122,88 ? MSps demander à bernard

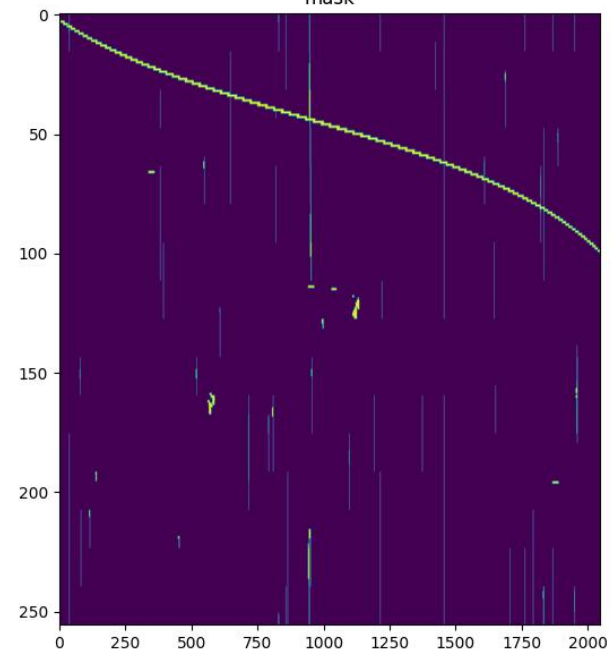
sxxs (nperseg=2048)



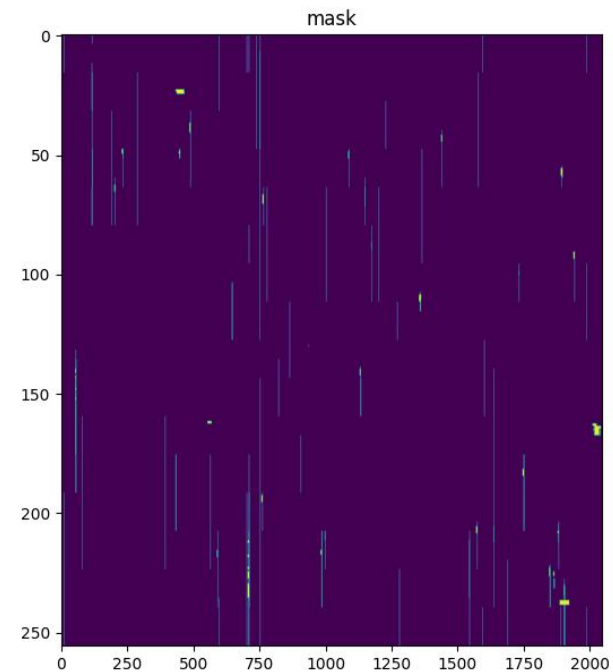
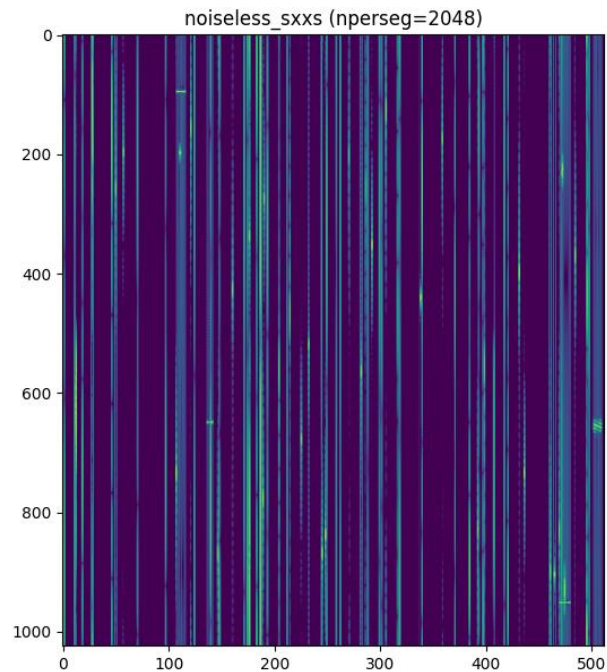
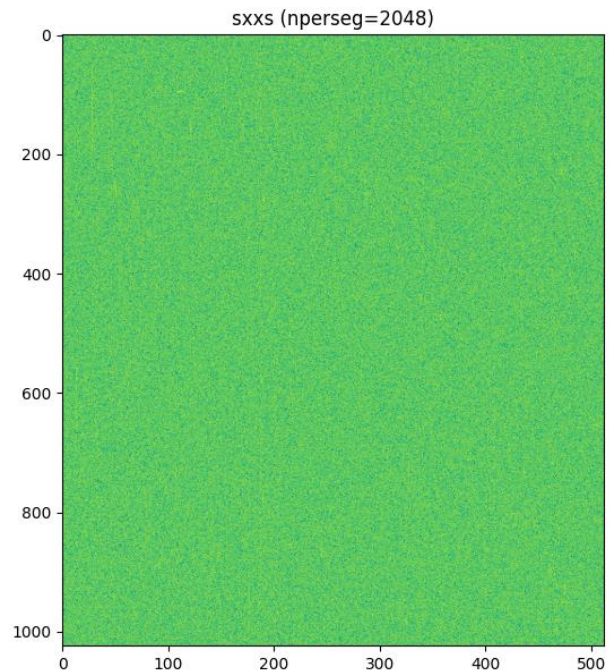
noiseless_sxxs (nperseg=2048)



mask



BT 100 MSps

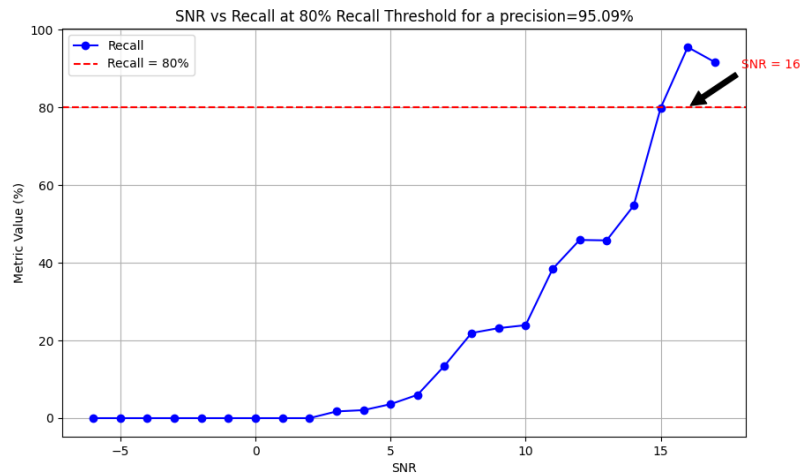


Apprentissage

InterMergerModel à 4 branches

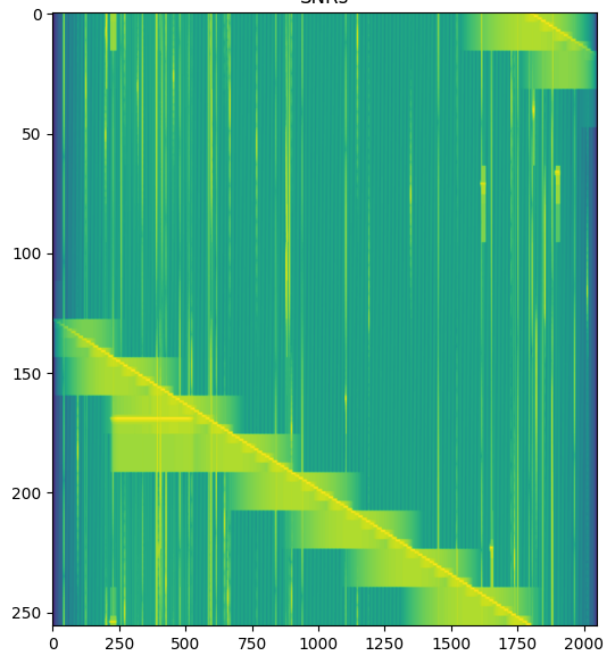
Act = False, bias = True

run_2025-01-20_10-38-22

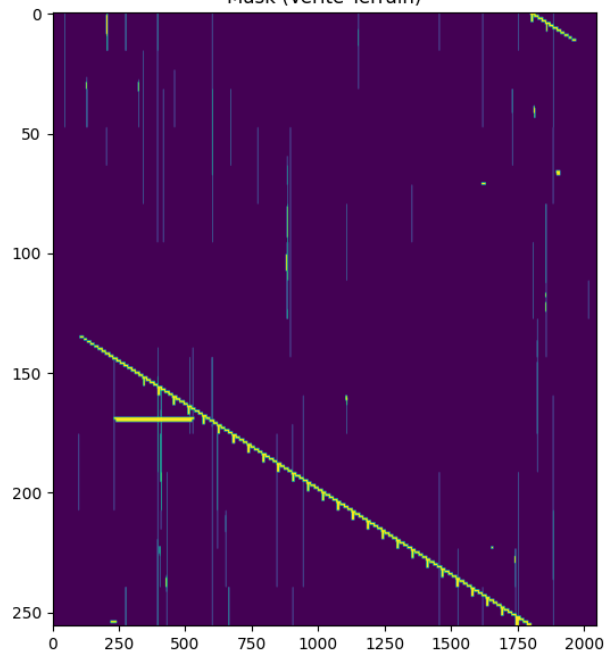


Résultats

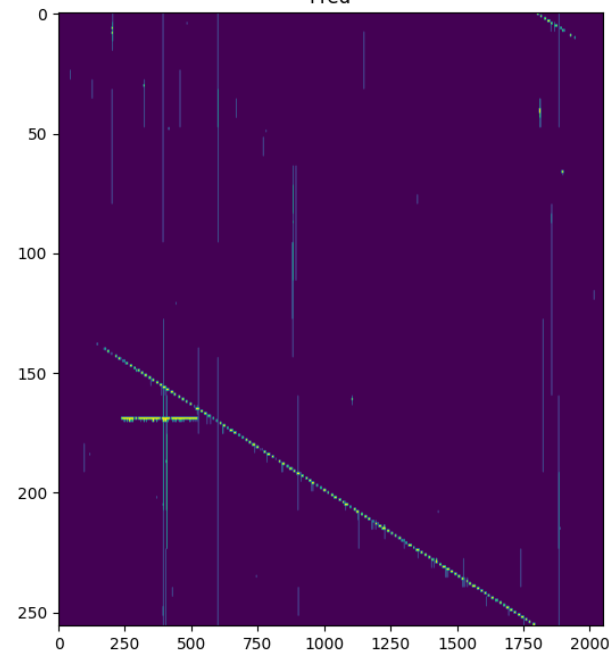
SNRs



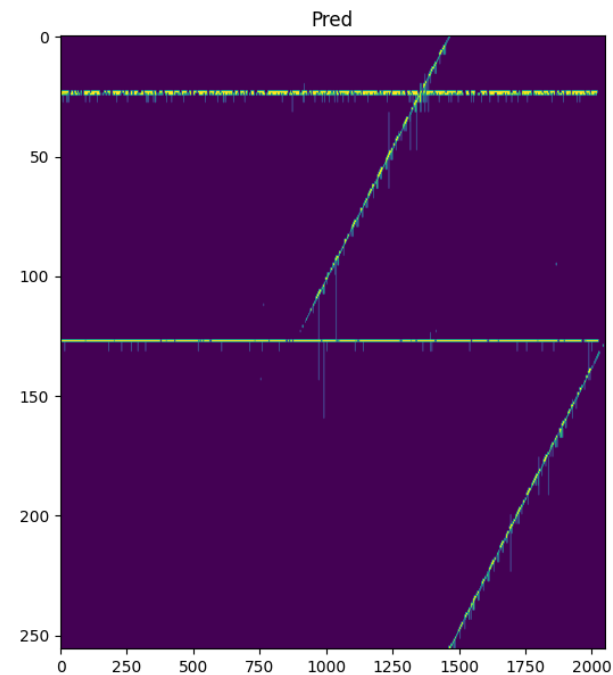
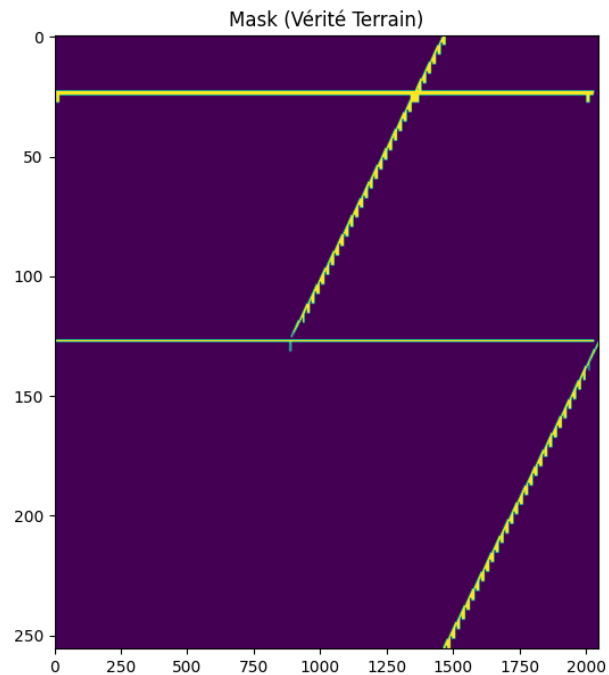
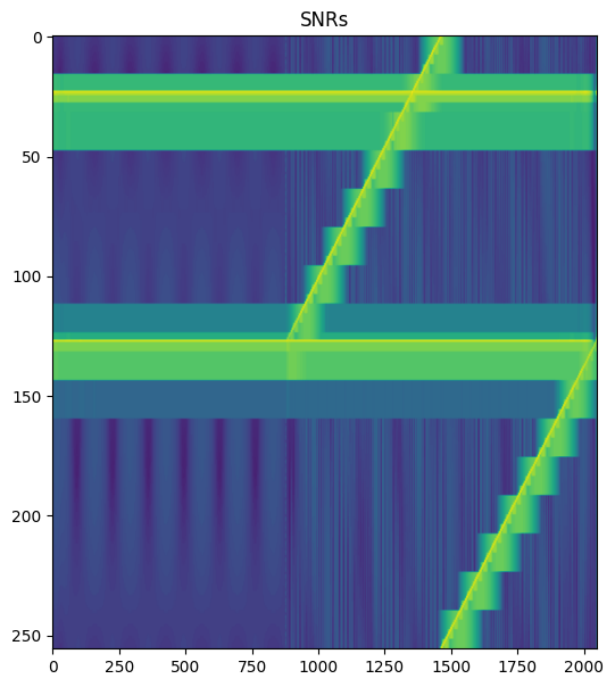
Mask (Vérité Terrain)



Pred

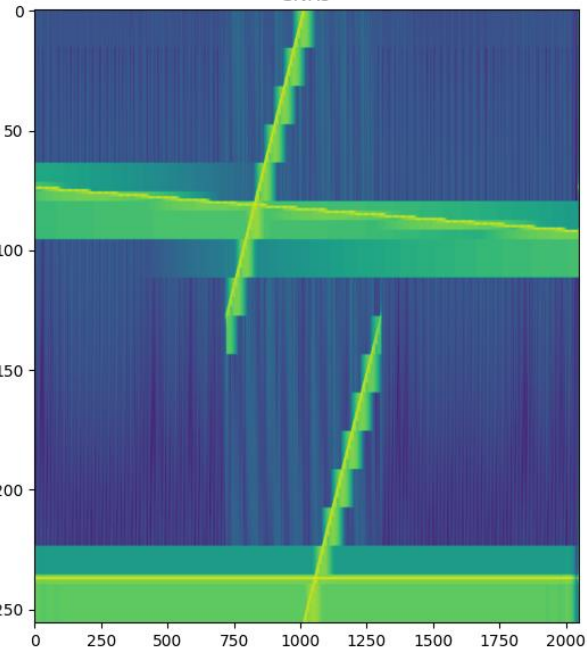


Résultats

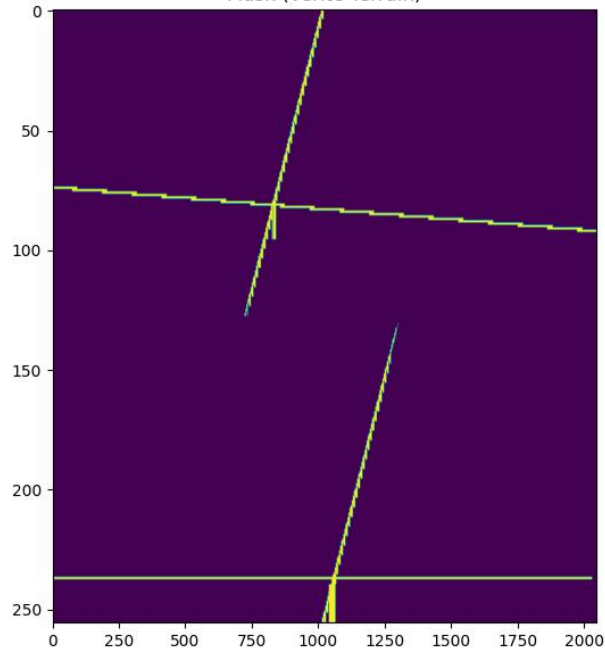


Résultats

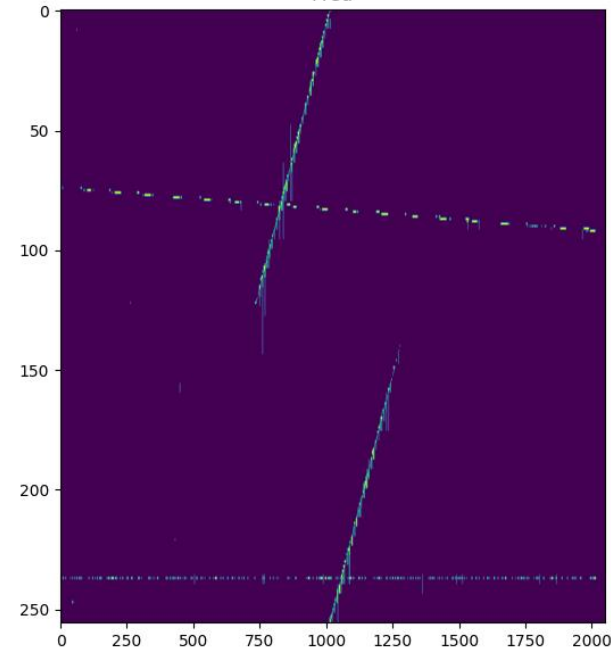
SNRs



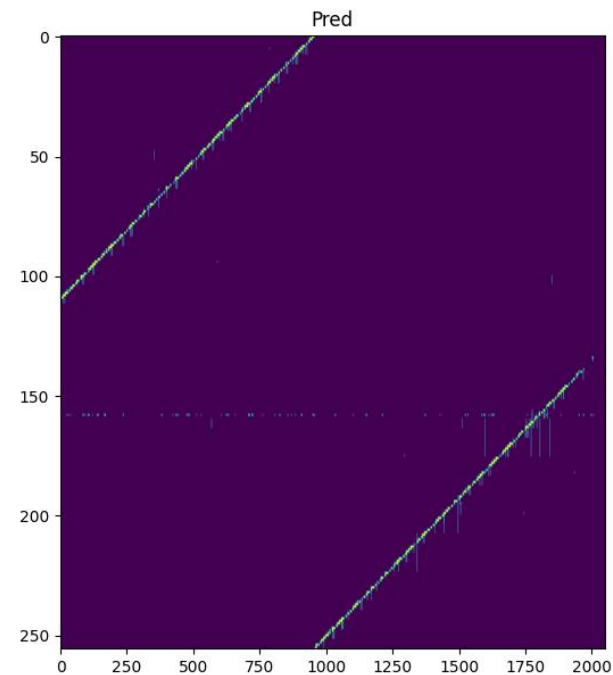
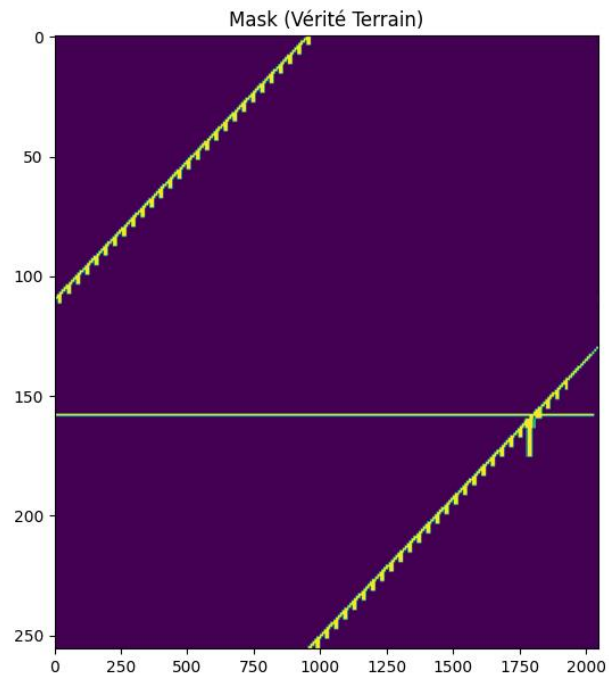
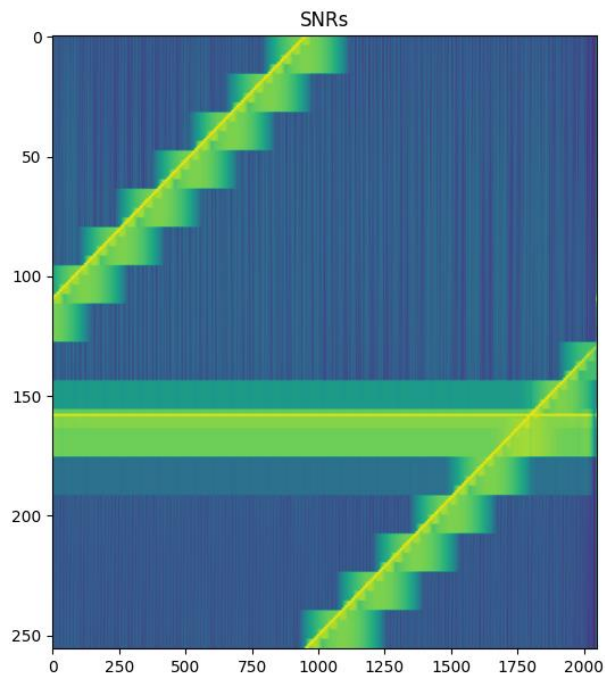
Mask (Vérité Terrain)



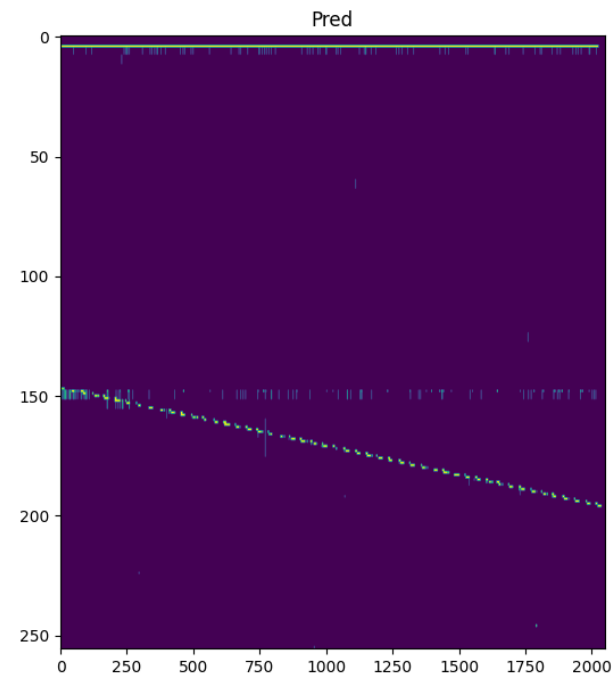
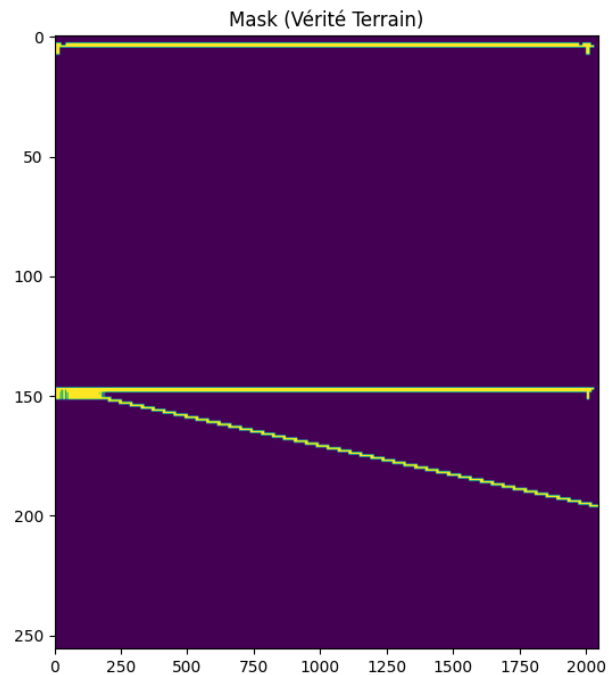
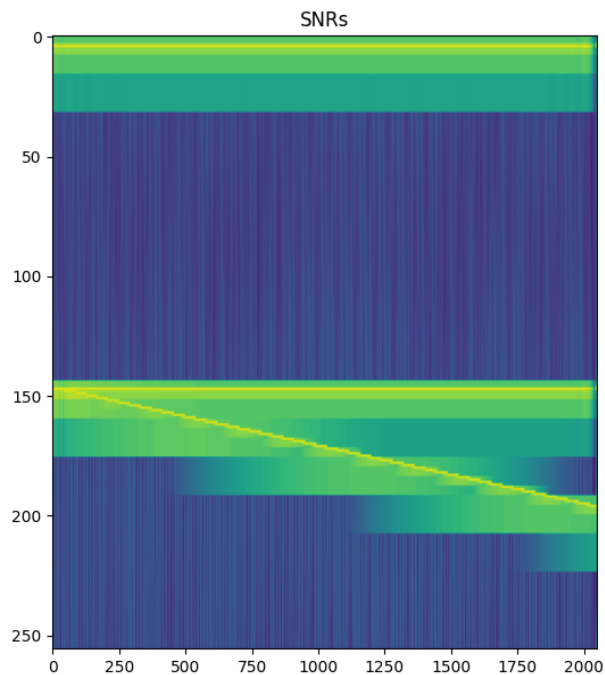
Pred



Résultats



Résultats





Inférence type de modulation

Solution actuelle

Attribution d'une impulsion au 4 FO suivantes :

- Chirp lin
- Chirp S
- No mod
- Pmod

Solution actuelle

If SNR OK :

Interpolation de la phase unwrappée à 50 échantillons

Centrage de la phase

Produit scalaire sur 4 phases de références

Else:

Interpolation du tridge à 50 échantillons

Centrage du tridge

Produit scalaire sur 4 tridge de références

It took 22 μ s per bboxes (nb_bboxes=16384).

Solution 1A

Mesure durée de l'architecture suivante :



It took 24 μ s per bboxes (nb_bboxes=16384).

AVANTIX

MERCI