AVIS DE SOUTENANCE DE THÈSE EN COTUTELLE

Tamer HAFEZ ABDELAZIZ

CANDIDAT(E) au DOCTORAT PHYSIO BIOLOGIE,
à L'UNIVERSITÉ DE PAU ET DES PAYS DE L'ADOUR
EN COTUTELLE AVEC L'UNIVERSITÉ DU PAYS BASQUE (ESPAGNE)
SOUTIENDRA PUBLIQUEMENT sa THÈSE

le 14 octobre 2021 à 10h30
à L'UNIVERSITÉ DE PAU ET DES PAYS DE L'ADOUR
UPV/EHU - BILBAO (Plenzia) - ESPAGNE

SUR LE SUJET SUIVANT :

"Effets écotoxicologiques du pétrole fractions adaptées à l'eau et fractions adaptées à l'eau du pétrole + dispersant sur les environnements froids : essais biologiques basés sur Acarita tonsa et dynamique de la communuauté microbienne comme outils de surveillance"

JURY :

Christine CAGNON, Maître de Conférences, HDR, UNIVERSITÉ DE PAU ET DES PAYS DE L'ADOUR
Cristiana CRAVO-LAUREAU, Maître de Conférences, HDR, UNIVERSITÉ DE PAU ET DES PAYS DE L'ADOUR
Bjorn MUNRO JENSSEN, Professeur, UNIVERSITÉ DES SCIENCES & TECHNOLOGIE (NORVEGE)
Jasmine NAHRGANG, Professeur, UNIVERSITÉ DE TROMSO (NORVEGE)
Fernando VILLATE, Professeur, UNIVERSITÉ DU PAYS BASQUE (ESPAGNE)
Benat ZALDIBAR ARAMBURU, Professeur, UNIVERSITÉ DU PAYS BASQUE (ESPAGNE)

Pau, le 11 octobre 2021

Le Président et,
Par délégation, la Vice-Présidente de la Commission de la Recherche

p.o. Isabelle BARAILLE

S. Mercier
Directrice ED 211

Directeurs de la thèse

en cotutelle avec l'Université du Pays-Basque UPV EHU (ESPAGNE) :

Robert DURAN (IPREM)

Maren ORTIZ ZARRAGOITA (UPV / EHU)

Résumé :

Oil pollution is a concerning problem in the world seas, especially in cold environments or polar regions where remediation procedures are difficult and the ecosystems are highly vulnerable. After an oil spill, wave dynamics and other weathering factors introduce soluble oil hydrocarbons, mainly, polycyclic aromatic hydrocarbons (PAHs) in the water column, creating oil Water Accommodated Fractions (WAFs). As a form of remediation, chemical dispersants, among others, are added to assist in oil biodegradation processes. However, chemical dispersants may have adverse effects on marine organisms. The objective of this thesis is to estimate the effects to marine organisms of oil WAF, with or without the addition of a chemical dispersant, in cold or sub-polar conditions, using copepod based bioassays and changes in native microbial communities. Bioassays using the model organism Acartia tonsa, showed that naphthenic North Atlantic (NNA) oil WAF was less toxic than the WAFs prepared from distilled oils (IFO 180 and Marine gas oil), which exhibited toxicity toward the copepods considering endpoints such as the mortality, reproduction and transcription levels of genes involved in the antioxidative and xenobiotic metabolism pathways. The addition of the chemical dispersant Finasol OSR52 to NNA oil WAF increased the toxicity toward copepods. Acartia tonsa exposed to NNA WAF with dispersant showed low fecundity, high mortality and altered gene transcription patterns, further highlighting the toxicity effects of the chemical dispersant. Upon examining the effects of NNA WAF and NNA WAF with dispersant on microbial communities, using microcosm experimental scenarios, Finasol OSR52 dispersant did not improve bacterial PAHs biodegradation rates. However, NNA WAF with dispersant contributed to changes in the microbial community dynamics by selecting certain bacterial taxa in samples of water and sediments from sub-Arctic regions artificially spiked with the WAF. Results showed that microbial communities with initial hydrocarbon degrading bacteria due to history of chronic hydrocarbon exposure (legacy effects), were the main drivers of the degradation rate of PAHs in water and in sediment. In conclusion, integrating both copepod based in vivo toxicity bioassays and studying microbial communities dynamics offers a holistic picture of the effects and responses that may cause an oil spill scenario and the addition of chemical dispersants in sensitive environments.