**Supplementary material**

# Quantification and characterization of naphthenic acids in soil of oil exploring area in China by GC/MS

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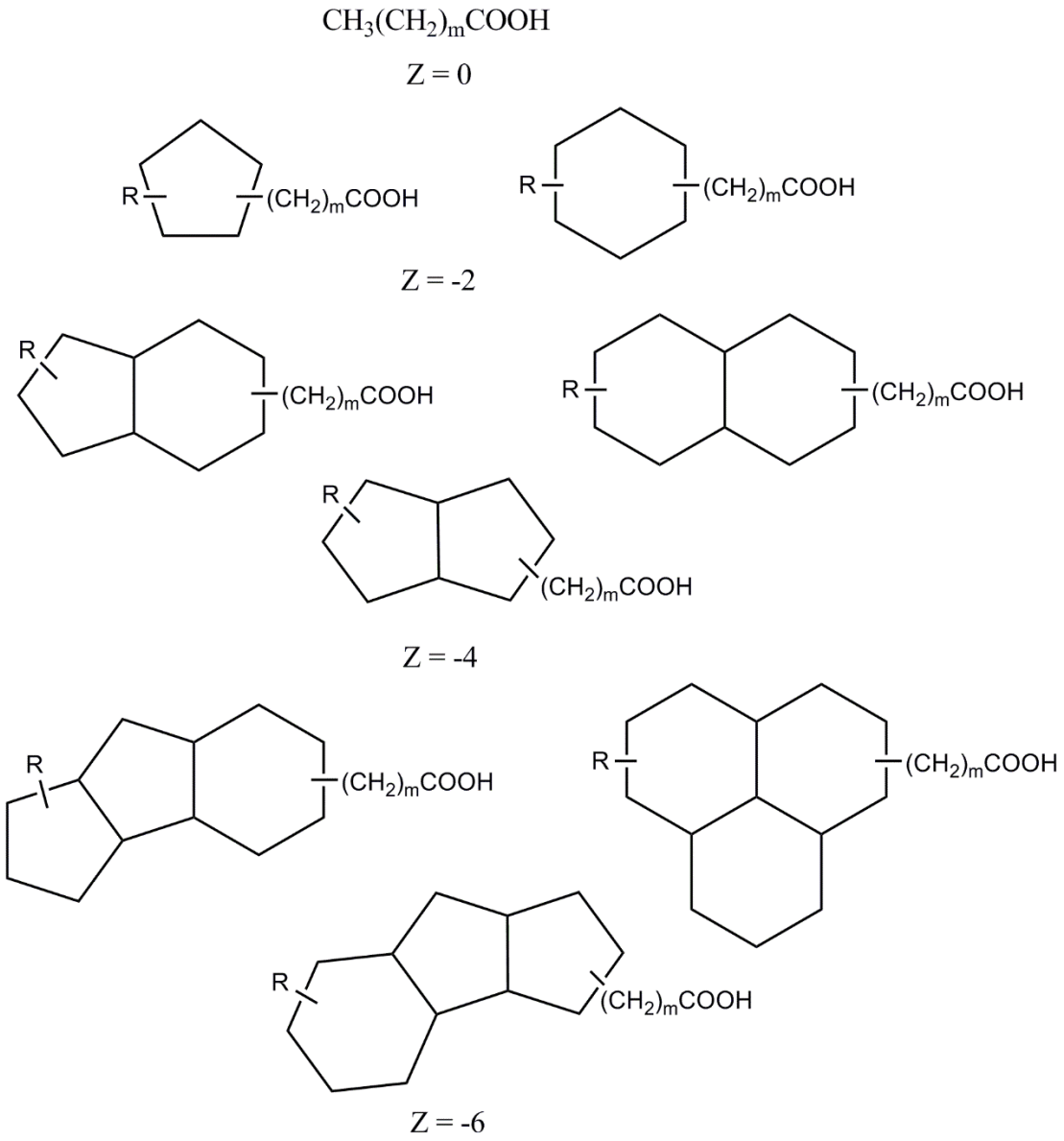


**Fig. S1** Sample naphthenic acid structure where R is an alkyl chain, Z describes the hydrogen deficiency, and *m* is the number of $CH_2$ units.

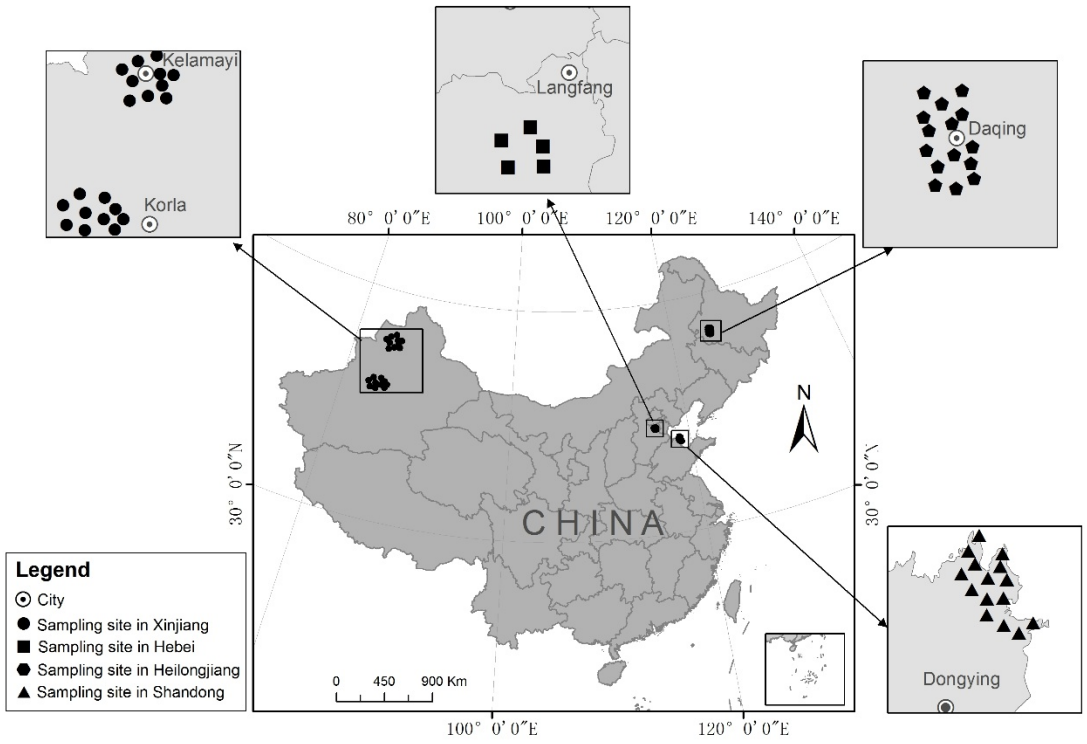


**Fig. S2** Location of sampling sites in this study

**Table S1** Expected carbon number (n) and Z families, based on nominal mass observed by MS of tert-butyldimethylsilyl derivatives, given the formula $C_nH_{2n+Z}O_2$

| Carbon number | Z family | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0 | -2 | -4 | -6 | -8 | -10 | -12 |
| 5 | 159[a] | -[b] | - | - | - | - | - |
| 6 | 173 | - | - | - | - | - | - |
| 7 | 187 | 185 | - | - | - | - | - |
| 8 | 201 | 199 | - | - | - | - | - |
| 9 | 215 | 213 | - | - | - | - | - |
| 10 | 229 | 227 | 225 | - | - | - | - |
| 11 | 243 | 241 | 239 | - | - | - | - |
| 12 | 257 | 255 | 253 | 251 | - | - | - |
| 13 | 271 | 269 | 267 | 265 | - | - | - |
| 14 | 285 | 283 | 281 | 279 | 277 | - | - |
| 15 | 299 | 297 | 295 | 293 | 291 | - | - |
| 16 | 313 | 311 | 309 | 307 | 305 | 303 | - |
| 17 | 327 | 325 | 323 | 321 | 319 | 317 | - |
| 18 | 341 | 339 | 337 | 335 | 333 | 331 | 329 |
| 19 | 355 | 353 | 351 | 349 | 347 | 345 | 343 |
| 20 | 369 | 367 | 365 | 363 | 361 | 359 | 357 |
| 21 | 383 | 381 | 379 | 377 | 375 | 373 | 371 |
| 22 | 397 | 395 | 393 | 391 | 389 | 387 | 385 |
| 23 | 411 | 409 | 407 | 405 | 403 | 401 | 399 |
| 24 | 425 | 423 | 421 | 419 | 417 | 415 | 413 |
| 25 | 439 | 437 | 435 | 433 | 431 | 429 | 427 |
| 26 | 453 | 451 | 449 | 447 | 445 | 443 | 441 |
| 27 | 467 | 465 | 463 | 461 | 459 | 457 | 455 |
| 28 | 481 | 479 | 477 | 475 | 473 | 471 | 469 |
| 29 | 495 | 493 | 491 | 489 | 487 | 485 | 483 |
| 30 | 509 | 507 | 505 | 503 | 501 | 499 | 497 |
| 31 | 523 | 521 | 519 | 517 | 515 | 513 | 511 |
| 32 | 537 | 535 | 533 | 531 | 529 | 527 | 525 |
| 33 | 551 | 549 | 547 | 545 | 543 | 541 | 539 |

[a] Calculated masses allowed by the formula $C_nH_{2n+Z}O_2$ for given carbon (n) and the possible Z families.

[b] The combination of carbon and Z numbers are deficient in carbon or hydrogen atoms to satisfy the formula $C_nH_{2n+Z}O_2$ and criteria outlined in the text.