

[Home](#) > [Journal](#) > [Earth & Environmental Sciences](#) > [JWARP](#)
[Indexing](#) | [View Papers](#) | [Aims & Scope](#) | [Editorial Board](#) | [Guideline](#) | [Article Processing Charges](#)
[JWARP](#) > Vol.1 No.4, October 2009



Using MODIS Images and TRMM Data to Correlate Rainfall Peaks and Water Discharges from the Lebanese Coastal Rivers

PDF (Size: 783KB) PP. 227-236 DOI : 10.4236/jwarp.2009.14028

Author(s)

Amin SHABAN, Crodula ROBINSON, Farouk EL-BAZ

ABSTRACT

Water flows from rivers into the sea (plumes) is a common phenomenon in many coastal zones. The hydrologic behavior of plumes differs from one river to another depending on rainfall rate and intensity, as well as it is influenced by the hydrologic characteristics of river basin. In order to investigate the precipitation regime in a drainage basin versus the flow into the sea, sequential data must be available. Remotely sensed data can fulfill this scope, thus it can provide climatic and hydrologic data. The scope of this study is to monitor the behavior of water input in the catchments versus the output from rivers in the Lebanese coastal zone using remote sensing data. For this purpose, TRMM (Tropical Rainfall Mapping Mission) data and MODIS satellite images were used. Hence, rainfall data from TRMM was compared with the areal extent of water plumes from rivers. This enables establishing interpolation between water input/output for each river basin. In addition, the lag time and residence time of plumes into the sea can be measured and compared between the issuing rivers. The extracted data from remote sensing was compared with terrain measures and shows its reliability and accordance. The used approach proved to be creditable, non-invasive and cost effective and can be applied to other coastal river basins.

KEYWORDS

Plume, Rainfall, MODIS Image, Coastal Rivers, Lebanon

Cite this paper

A. SHABAN, C. ROBINSON and F. EL-BAZ, "Using MODIS Images and TRMM Data to Correlate Rainfall Peaks and Water Discharges from the Lebanese Coastal Rivers," *Journal of Water Resource and Protection*, Vol. 1 No. 4, 2009, pp. 227-236. doi: 10.4236/jwarp.2009.14028.

References

- [1] R. El-Qareh, " The submarine springs of Chekka: Exploitation of a confined aquifer discharging in the sea," Unpublished M. Sc. Thesis, American University of Beirut, Geology Department, pp. 80, 1967.
- [2] FAO, " Projet de développement hydro-agricole du Sud du Liban: Thermométrie aéroportée par Infra-Rouge," Programme des Nations Unies pour le Développement, HG, 110, pp. 15, 1973.
- [3] S. Gomis, " Evaluating the potential of locating submarine springs in the Gulf of Oman using Landsat Thematic Mapper data," Master's thesis, Boston University, pp. 47, 1996.
- [4] C. Travaglia, and O. Ammar, " Groundwater exploration by satellite remote sensing in the Syrain Arab Republic," Technical Report, FAO. TCP/SYR/6611, pp. 33, 1998.
- [5] K. Brink, R. Arnone, P. Coble, C. Flagg, B. Jones, J. kindle, C. Lee, D. Phinney, M. Wood, C. Yentsch and D. Young, " Monsoons boost biological productivity in Arabian Sea," EOS. Vol. 79, NO. 13, pp. 233– 253. 1998.
- [6] W. Fielding and F. El-Baz, " Linear thermal anomaly offshore from Wadi Dayqah: A probable ground water seep along fracture zones," International Conference on the Geology of Oman, 12-16 January 2001, Sultan Qaboos University, Muscat, Oman, Abstract 1, pp. 33, 2001.
- [7] C. Robinson, A. Buynevich, F. El-Baz and A. Shaban, " Integrative remote sensing techniques to

- [Open Special Issues](#)
- [Published Special Issues](#)
- [Special Issues Guideline](#)

[JWARP Subscription](#)
[Most popular papers in JWARP](#)
[About JWARP News](#)
[Frequently Asked Questions](#)
[Recommend to Peers](#)
[Recommend to Library](#)
[Contact Us](#)

| | |
|------------|---------|
| Downloads: | 402,260 |
|------------|---------|

| | |
|---------|-----------|
| Visits: | 1,010,492 |
|---------|-----------|

[Sponsors, Associates, and Links >>](#)

detect coastal fresh-water seeps," Geological Society of America, Annual Meeting, Salt Lake City, Utah., pp. 16– 19. October, 2005.

- [8] A. Shaban, M. Khawlie, C. Abdallah, and G. Faour, " Geologic controls of submarine groundwater discharge: Application of remote sensing to north Lebanon," *Environmental Geology*, Vol. 47, No. 4, pp. 512– 522, 2005.
- [9] A. Shaban, M. Khawlie, C. Abdallah and M. Awad, Hydrological and watershed characteristics of the El-Kabir River, North Lebanon, *Lakes and Reservoirs: Research and Management*, Vol. 10, No. 2, pp. 93– 101, 2005.
- [10] B. Hakim, " Contribution à la détection des sources sous-marines et littorales de la c?te libanaise par thermogravimétrie infrarouge (secteur Beyrouth-Enfé)," DESS, Faculté des sciences, Montpellier, pp. 30, 1974.
- [11] B. Hakim, " Recherches hydrologiques et hydrochimiques sur quelques karsts méditerranéens: Liban, Syrie et Maroc," Publications de l' Université Libanaise, Section des études géographiques, tome II, pp. 701, 1985.
- [12] NCRS, " TIR survey for freshwater sources in the marine environment," National Center for Remote Sensing, Final Report, LNCSR. NCRS, pp. 103, 1999.
- [13] M. Khawlie, A. Shaban, and C. Abdallah. " Evaluation of potentials of submarine springs: An unconventional groundwater source for the coastal area-Lebanon," Expert Group Meeting on: Groundwater Rehabilitation for Water Resources Protection and Conservation. ESCWA, UNEP/ ROWA, BGR, MOWE, Beirut 14– 17/11/2000.
- [14] LRA-Litan River Authority, Unpublished Technical Report, pp. 29, 2001.
- [15] A. Shaban and C. Robinson, " A systematic approach using MODIS and TRMM data to monitor rainfall peaks versus water flow from rivers," CNRS. Regional Workshop on: Monitoring of coastal zones and legislation for the implementation of a national observatory on environment and development, pp. 24– 25, May 2006.
- [16] C. Scott, C. Thomas and L. Scott, " A comparison of TRMM to other basin-scale estimates of rainfall during the 1999 Hurricane Floyd flood," *Natural Hazards*, Accepted online, 2007.
- [17] Y. Ohsaki, A. Numata, T. Higashinwaatoko, Validation of rain/no-rain discrimination in the standard TRMM data products 1B21 and 1C21, *IEEE* 2, pp. 875– 877, 2000.
- [18] M. Nirala and A. Cracknell, " The determination of the three-dimensional distribution of rain from the Tropical Rainfall Measuring Mission (TRMM) Precipitation Radar," *International Journal of Remote Sensing*, Vol. 23, No. 20, pp. 4263– 4304, 2002.