

2

AD-A215 751

MILITARY GEOGRAPHY -- CANVAS OF THE OPERATIONAL PLANNER?

DTIC
ELECTR
DEC 19 1989
S B D

A Monograph
by

Major James W. DeLony
Engineer



School of Advanced Military Studies
United States Army Command and General Staff College
Fort Leavenworth, Kansas

Second Term 88-89

Approved for Public Release; Distribution is Unlimited

89 12 19 079

REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED			1d. RESTRICTIVE MARKINGS		
2a. SECURITY CLASSIFICATION AUTHORITY			3. DISTRIBUTION / AVAILABILITY OF REPORT		
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE			Approved for public release; distribution unlimited.		
4. PERFORMING ORGANIZATION REPORT NUMBER(S)			5. MONITORING ORGANIZATION REPORT NUMBER(S)		
6a. NAME OF PERFORMING ORGANIZATION School of Advanced Military Studies, USACGSC		6b. OFFICE SYMBOL (if applicable) ATZL-SWV	7a. NAME OF MONITORING ORGANIZATION		
6c. ADDRESS (City, State, and ZIP Code) Fort Leavenworth, Kansas 66027-6900			7b. ADDRESS (City, State, and ZIP Code)		
8a. NAME OF FUNDING / SPONSORING ORGANIZATION		8b. OFFICE SYMBOL (if applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER		
8c. ADDRESS (City, State, and ZIP Code)			10. SOURCE OF FUNDING NUMBERS		
			PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.
			WORK UNIT ACCESSION NO.		
11. TITLE (Include Security Classification) Military Geography--Canvas of the Operational Planner? (U)					
12. PERSONAL AUTHOR(S) Major James W. DeLony, USA					
13a. TYPE OF REPORT Monograph		13b. TIME COVERED FROM _____ TO _____		14. DATE OF REPORT (Year, Month, Day) 89/5/12	15. PAGE COUNT 54
16. SUPPLEMENTARY NOTATION					
17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)		
FIELD	GROUP	SUB-GROUP	Operational Art Geography		
			Military Geography Soviet Military Geography		
			Operational Planning, Doctrine--Military Geography		
19. ABSTRACT (Continue on reverse if necessary and identify by block number) <p>— This monograph provides a definition of military geography as it relates to the application of operational art, and a recommended framework for the assessment of the influence of military geography in operational planning. Its focus is the theoretical and doctrinal concepts that define the interaction of the conduct of military operations at the operational level of war and the environment.</p> <p>The study begins with a discussion of the theoretical writings of Sun Tzu, Clausewitz, and Jomini concerning the relationship of the conduct of military operations and military geography. U.S. doctrine describing the influences of military geography on military operations at the operational level is presented. Soviet military geography as defined by its relationship with Soviet military art and science is examined for a comparative view to U.S. doctrine. A definition of military geography and a conceptual framework is presented for an operational assessment of the influence of military geography on military operations at the operational level.</p>					
20. DISTRIBUTION / AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS			21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED		
22a. NAME OF RESPONSIBLE INDIVIDUAL Major James W. DeLony			22b. TELEPHONE (Include Area Code) (913) 684-2138	22c. OFFICE SYMBOL ATZL-SWV	

MILITARY GEOGRAPHY--CANVAS OF THE OPERATIONAL PLANNER?

By

Major James W. DeLony
Engineer

School of Advanced Military Studies
U.S. Army Command and General Staff College
Ft. Leavenworth, Kansas

12 May 1989

Approved for public release; distribution is unlimited.

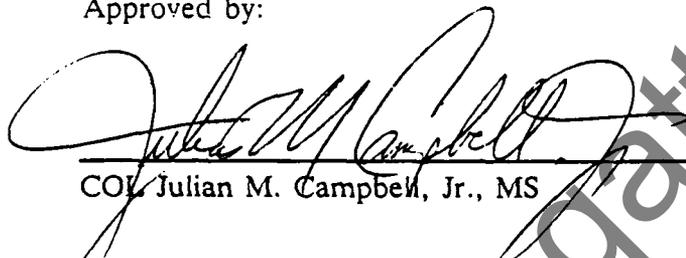
SCHOOL OF ADVANCED MILITARY STUDIES

MONOGRAPH APPROVAL

Name of Student: James W. DeLony, MAJ, Engineer

Title of Monograph: Military Geography -- Canvas of the
Operational Planner?

Approved by:



COL Julian M. Campbell, Jr., MS

Monograph Director



COL L. D. Holder, MA

Director, School of
Advanced Military
Studies



Philip J. Brookes, Ph.D.

Director, Graduate
Degree Program

Accepted this 15th day of May 1989

ABSTRACT

MILITARY GEOGRAPHY--CANVAS OF THE OPERATIONAL PLANNER?
by Major James W. DeLony, USA, 54 pages.

This monograph provides a definition of military geography as it relates to the application of operational art, and a recommended framework for the assessment of the influence of military geography in operational level planning. Its focus is the theoretical and doctrinal concepts that define the interaction of the conduct of military operations at the operational level of war and the environment. Military geography, used effectively by the operational planner, provides the operational canvas for the planning and conduct of military operations at the operational level of war.

The study begins with a discussion of the theoretical writings of Sun Tzu, Clausewitz, and Jomini concerning the relationship of the conduct of military operations and military geography. U.S. doctrine describing the influences of military geography on military operations at the operational level is presented. Soviet military geography as defined by its relationship with Soviet military art and science is examined for a comparative view to U.S. doctrine. A definition of military geography and a conceptual framework is presented for an operational assessment of the influence of military geography on military operations at the operational level.

The paper concludes that the Soviet approach in assessing the influence of military geography on military operations is consistent and holistic, recognizing a conditional significance of the interaction of military geography and the conduct of military operations. The U.S. approach views military geography's influence to be prescriptive due the lack of a doctrinal, analytical framework to fully assess the influence of military geography on military operations. U.S. doctrine for the conduct of military operations at the operational level of war needs to provide an analytical approach in defining the permanent but variable interaction of military geography and the conduct of military operations at the operational level of war.



For	
I	<input checked="" type="checkbox"/>
	<input type="checkbox"/>
	<input type="checkbox"/>

By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	

TABLE OF CONTENTS

Section I.	Introduction.....	1
Section II.	Military Theory and Military Geography.....	3
Section III.	Soviet Military Geography.....	14
Section IV.	Military Geography and U.S. Army Operational Art.....	24
Section V.	Concepts for the Use of Military Geography at the Operational Level.....	31
Section VI.	Conclusions.....	41
Figures:		
	1. Theoretical Framework for the Soviet Study of War.....	44
	2. Parallel Terminology of Soviet Military Art and Military Geography.....	45
	3. Subdivision of Military Geography.....	46
Endnotes.....		47
Bibliography.....		51

SECTION I: INTRODUCTION

If a general desires to be successful in the great drama of war, his first duty is to study carefully the theater of operations so that he may see clearly the relative advantages and disadvantages it presents for himself and his enemies. Jomini¹

But a commander must submit his work to a partner, space, which he can never completely reconnoiter, and because of the constant movement and change to which he is subject he can never really come to know. Clausewitz²

Know the enemy, know thyself; your victory will never be endangered. Know the ground, know the weather; your victory will be total. Sun Tzu³

The purpose of this paper is to define those elements of military geography which are important in the formulation of operational art and application of its principles. Military geography is defined as the study of the interaction of military operations and the total environment in the application of military power. Operational art for the U.S. planner is the employment of military forces to attain strategic goals through the design, organization, and execution of campaigns and major operations.* For the operational planner, these two subjects are primary in the development and execution of military operations. Unquestionably, one of the greatest difficulties in the planning and execution of military operations on any scale is the comprehension of the complex factors of time and space. Military geography, used effectively by the operational planner, provides the

operational canvas for the military operation. Critical to the understanding of the relationship of military geography and operational art is the recognition that operational art places a special set of requirements on the study of the environment. These requirements create a dialectical relationship in the analysis of the interaction of the military force and the environment which are described by military geography, particularly as to the cost and efficiency of military activities.⁷ The operational planner's motivation to pursue the study of military geography is sustained by the reality that a proper understanding of military geography and its influences is crucial to the conduct of effective military action.

The development of military theory, in particular the writings of Clausewitz, Jomini, and Sun Tzu have done much to define the field of applied military geography since the mid-nineteenth century. This paper provides a review of their theoretical writings concerning the relationship of the conduct of military operations and military geography. Additionally, contemporary U.S. views on operational art and military geography are presented. Soviet military geography and its relationship with Soviet military doctrine and science is presented to relate a comparative view. This paper concludes with a proposed concept of the use of military geography by the operational planner.

SECTION II: MILITARY THEORY AND MILITARY GEOGRAPHY

Even though the term 'military geography' did not come into use before the eighteenth century, geography as a military concern can be traced from the accounts of the earliest battle for which there are detailed records. At Megiddo, 1479 B.C., Thutmose III, Pharaoh of Egypt, 'was advised by his staff of the locations and intentions of the enemy and of the terrain to his front'.⁷ Since that time, many military theorists have focused on the interaction of the environment, as determined by military geography, and application of military power, particularly in the conduct of military operations. In this paper, I will discuss three: Sun Tzu, Karl von Clausewitz, and Antoine Henri Jomini.

Critical to an understanding of these three theorists' views of the interaction of the environment and military operations is to define what 'military geography' is. Jomini is the only one of the three theorists who uses the term 'military geography' in his writings. The terms 'terrain', 'weather', and 'ground' are found in the writings of Sun Tzu. Clausewitz uses the terms 'key to the country', 'country and ground', 'terrain', 'space', 'sense of locality', 'weather', and 'geographical'. Jomini uses the terms 'military geography', 'topographical and strategic description', 'country', 'territory', 'weather', 'geographical science', and 'regions'.

However, each theorist agrees on the need for an understanding of the interaction of the total environment and the conduct of military operations--what I define as the study of military geography. The theorist's concern is not to define military geography but to consider how the environment may be used in the conduct of military operations and what influences and constraints environmental conditions may impose on military operations.

Sun Tzu

Sun Tzu's The Art of War, introduced to the West in the late 18th century, represents the earliest known attempt to formulate a rational basis for the planning and conduct of military operations.⁸ His style and the thinking it represents is not cluttered with elaborate stratagems and techniques; rather, Sun Tzu presents an orderly, straightforward guide for both generals and rulers in the conduct of war. His treatise begins with the advice to view war in terms of five fundamental factors: moral influence, weather, terrain, command, and doctrine.⁹ Sun Tzu further prescribes that an assessment is required for each of these five factors relative to the 'disposition' of friendly and enemy armies according to the elements of the art of war: measurement of space, estimation of quantities, calculations, comparisons, and chances for victory.¹⁰ Essentially, Sun Tzu is describing a methodology of studying the area of military operations, estimating the effect of environment and enemy on planned

operations, and assessing the chances of success. Sun Tzu provides guidance as to the interaction and effect of the environment at the three levels of scale in the conduct of military operations. By distinguishing between six categories of terrain and 'nine varieties of ground', Sun Tzu offers an assessment of how military geography may be used and what influences and constraints it imposes on military operations at the tactical, operational, and the strategic levels of war.¹¹

Sun Tzu's six categories of terrain are: accessible, entrapping, indecisive, constricted, precipitous, and distant.¹² In discussing the characteristics of each, Sun Tzu focuses on the effect of the particular terrain category on the interaction of forces in tactical battle and operations. In this particular section of his writings is also found the often quoted passage:

Know thy enemy, know yourself: your victory will never be endangered. Know the ground, know the weather, your victory will then be total.¹³

The nine varieties of ground as described by Sun Tzu classify ground 'in respect to the employment of troops.'¹⁴ His definitions of ground as dispersive, frontier, key, communicating, focal, serious, difficult, encircled, and death relate to the operational and strategic use of military forces given the influences and constraints of the environment. Not all actions recommended by Sun Tzu prescribe strictly military activity. For example, Sun Tzu states that when in focal ground (ground enclosed by three

other states), the best course of action is to ally with neighboring states or strengthen alliances. Sun Tzu also advises that when in death ground (ground in which the army survives only if it fights with courage) the commander must concentrate his efforts in the moral domain. From an operational perspective, Sun Tzu advises that when in key ground (ground equally advantageous to enemy and friendly forces to occupy) lines of communication or 'rear services' must be a priority concern. Sun Tzu also advises to not fight in your own territory (dispersive ground) or stop operations after gaining only a shallow penetration (frontier ground). Following these broad discussions of what actions are required by each variety of ground, Sun Tzu suggests that a general must 'examine with greatest care' the employment of military forces appropriate to the nine varieties of ground, the advantages of close or extended deployment, and the principles of human nature. By prescribing such a study, Sun Tzu is recognizing a perceptible, but variable interaction between the environment and the two armies that a general can exploit for military advantage. Through an understanding of this interaction and its continual effect on military operations, the general is able to anticipate the maximum advantage the environment can provide to his forces and how use of the environment in his planning will facilitate his prediction and understanding of the enemy's plan. As a result, the general is able to plan his operation 'to

attain one's aim in an artful and ingenious manner."¹⁵

Carl von Clausewitz

The primary contribution of Clausewitz in describing the interaction of the environment with military operations is his delineation of the tactical and the strategic levels of war.¹⁶ By emphasizing the varying significance of terrain (defined as "the territory and inhabitants of the whole theater of war") to the separate concerns of strategy and tactics, the interaction of the environment and military operations becomes a discrete analysis based on the mission, kinds of forces involved, and the particular theater of operations. Clausewitz states that "the relationship between warfare and terrain determines the peculiar nature of military action" through a relationship that is "permanent", "decisive to the highest degree", and is "felt in the very smallest features of the ground, but can also dominate enormous areas."¹⁷

Clausewitz states there are five "elements of strategy": moral, physical, mathematical, geographical, and statistical.¹⁸ He warns of the pitfalls in developing a strategy that would analyze these elements in isolation "since they are usually interconnected in each military action in manifold and intricate ways". The geographical element "comprises the influence of terrain". The mathematical element, though not considered a geographical topic by Clausewitz, prescribes the concept of a three-dimensional, geometrical relationship between the size,

shape, location, 'angle of lines of operations', and routes of movement of military forces. This geometrical relationship, essentially what is now recognized as the concept of 'space', indeed is a concern of military geography.¹⁹ An understanding of the interaction of the environment and military operations first requires a concern of place or location; 'the where of things'. Following the establishment of the 'where of things', military geography then defines the site (internal resources) and position (relation with other places).²⁰ From the establishment of the physical geometry of 'space', the study of military geography is then focused on how to utilize the environment of this 'space' in the conduct of military operations and what influences and constraints it imposes. However, Clausewitz does not view space as an abstraction but as terrain that possesses an intrinsic political and military value.²¹ Clausewitz recognizes that space has only a conditional significance to the success of a military operation. The significance of space also varies with the scale of the operation; in tactics, the principle of space and time are 'rapidly reduced to their absolute minimum.' However, at the operational and strategic levels, 'armies do not burst from one theater of war to another'.²²

Clausewitz provides a warning in the use of natural terrain in developing strategy for a particular military operation. The physical or natural environment of military

operations contains no 'key to the country', a popular 18th century belief that occupation of a particular geographical point or topographic feature provides the possession of a country (theater of operations). Clausewitz states that terrain should be judged for its proper value in defining areas within a country (theater of operations) that must be held 'before one can risk an advance'.²³ He further discounts the belief of an automatic commanding nature of 'high ground'.

Antoine Henri Jomini

The writings of Jomini mark the beginning of the view that military geography is synonymous with intelligence.²⁴

Jomini defines military geography as:

the topographical and strategic description of the theater of war, with all the obstacles, natural or artificial, to be encountered, and the examination of permanent decisive points which may be presented in the whole extent of the frontier or throughout the whole extent of the country.²⁵

This definition limits military geography to a 'science' of the description of a particular region, i.e. theater of war, theater of military operations. This concept of military geography as a concern of regional descriptions is apparent in Jomini's mainly geographical definitions of strategy, tactics, and logistics:

Strategy is the art of making war upon a map, and comprehends the whole theater of operations. Grand Tactics is the art of posting troops upon the battlefield according to the accidents of the ground, in contradistinction to planning upon a map... Logistics comprises the means and arrangements which work out the plans of strategy and tactics. Strategy decides where to act; logistics brings the troops to this point; grand tactics decides the manner

of the execution and employment of the troops.²⁶

Jomini believed that the practice of warfare could be reduced to a set of general rules which could be learned and applied to all situations. Every campaign takes place within a definite theater of operations. Conceptually, each theater of operations consists of four sides, of which two are dominated by the opposing forces. The central problem of warfare is the choice of the correct line of operation that allows for the domination of the theater of operations. Selection of the correct line of operation leaves the enemy only two choices; fight under unfavorable conditions or withdraw from the theater of operations.²⁷ Critical to selection of the line of operation is an assessment of the interaction of the planned military operation and the military geography of the theater of operations.

Lines of operation trace essentially two patterns; permanent geographical decisive points or strategic points of maneuver. Geographical decisive points are defined as those points which control the chief lines of communication in a theater of operations by their permanence, position, and "consequence of the configuration of the country". Strategic points of maneuver are points which have "a value from the relations they bear to the positions of the masses of the hostile troops and the enterprises likely to be directed against them".²⁸

The objective point of the line of operation, later

defined as the object of the campaign whose strategy is dominance of the theater of operations, is also a decisive point. An objective point is classified as either a geographic objective point, an objective point of maneuver, or a political objective point. Jomini provides the examples of an important fortress, a riverline, or an area which provides a favorable position for subsequent operations as a geographical objective point. Objective points of maneuver, similar to strategic points of maneuver, are dependent on their position relative the hostile forces. The selection of objective points of maneuver depend on the political "character" of the aim of the war and the "military facilities" of the two armies. Political objective points are those objectives of a line of operation designed to achieve a strictly "political end" which may or may not be linked to the strategic aim of dominance of the theater of operations.²⁹

Jomini very carefully chooses to separate those lines of operations, decisive points, and objective points which are exclusively a result of the influences and constraints of military geography from those that are strictly a matter of strategic choice.³⁰ Clearly Jomini acknowledges the utility and necessity of planning military operations based on an effective use of military geography. However, his theory of war is prescriptive in assessing the influence and constraints of military geography and does not recognize an interactive and variable relationship between

the environment and military operations.

Summary

The theoretical writings of Sun Tzu, Clausewitz, and Jomini are quite different in their description of the interaction of the environment and military operations. In general, the theory of Sun Tzu describes the relationship of terrain and ground with military operations as situational; the site and location of the military forces dictate the proper actions to be taken to gain advantage from the interaction of military operations and the environment. Sun Tzu also recognizes the impact of cultural and political environmental factors on the conduct of military operations.

The writings of Jomini prescribe a permanence in the relationship of military operations and the environment. This relationship is primarily physical and is dictated by a strategy of selecting the correct geographical points that have a value for the military dominance of a theater of operations. There is limited discussion in his theory of the political and cultural factors of the environment, however Jomini provides no guidelines in evaluating their variable qualities. Rather, much like a formula, the interaction of military operations and the environment are predictable and constant.

Clausewitz's theory of the interaction of the environment and military operations reflects a synthesis of Sun Tzu and Jomini. He recognizes the permanence of the

interaction of the environment and military operations but insists that influences and constraints of the environment have a conditional significance that is dependent on the political, cultural, and natural conditions of the theater of operations and, that the effect of these influences and constraints are relative to the scale of the operation.

Where both Jomini and Sun Tzu were predictive of the interaction of the environment and the conduct of military operations, Clausewitz presents various possibilities that the commanding general might face in conduct of military operations in different regions. His emphasis is on development of an ability to evaluate the environment and the conduct of military operations as an interactive and dynamic process that is permanent but variable in nature and consequence.

SECTION III: SOVIET MILITARY GEOGRAPHY

Soviet military doctrine consists of a highly developed, sophisticated framework for the employment of military power and development of the armed forces. It provides the vision of future war, guidelines for preparation of forces for war, and methods for waging war. Military doctrine constitutes two broad areas of concern; military-technical (the practice of war) and socio-political (the theory of war). Figure 1 is a representation of the theoretical framework of the Soviet study of war.³¹ Note that military geography is considered within the military-technical aspects of war and is a component of military science and military art.

Within the military-technical aspects of Soviet military doctrine, military science is defined as the study of warfare in all its elements with the purpose of developing recommendations for the conduct of war. Through a Marxist-Leninist approach that defines warfare and all military affairs by scientific analysis and a framework of "natural laws", the Soviets derive a "general theory of military science". This "general theory of military science" seeks to define the laws of warfare, to identify and to categorize the elements of military science, and to establish these elements within the Soviet armed forces.³²

The categorization of the elements of Soviet military science, as depicted by Figure 1, includes military art. Military art, considered the most important element of

military science, is defined as that accepted body of thinking on the actual employment of forces at three levels of scale: strategy, operational art, and tactics. Once the war begins, military doctrine, the structured framework which has identified the Soviet vision of wars it may have to fight and how to prepare for them, is implemented by Soviet military art. The theory of Soviet military art further provides an analytical framework for the study of military history to gain from the past 'in a constant search for a better military organization'.³³ By constantly examining, reexamining, and incorporating military historical experiences, drawn heavily from World War II and local wars, and considering current and projected technological developments, Soviet military art is structured to produce decisions concerning the employment of military forces with a perspective based primarily on military considerations and operational continuity.

Military Geography and Military Doctrine

Given the above descriptions of Soviet military doctrine and military art, military geography has several roles in Soviet military thinking. As an element of Soviet military doctrine, it is recognized that military-geographic factors exert influences on the nature of future war, particularly the geographical location of the country and the national characteristics of its population. However, the influence of geography cannot be examined

without taking into consideration other factors of an economic and political nature, to include the position and interrelations of the neighboring states.³⁴ Accordingly, military geography provides research into the military-political, military-economic, and natural resources of an individual country, strategic region, or land-sea theater of strategic military activity, and their influence on the preparation for and conduct of war and military operations. Military geography also includes an analysis of the level of operational preparation for war of a country, strategic region, or land-sea theater of strategic military activity. Military geography, as a scientific discipline, is divided into the study of general geographical principles, military regional geography, and the study of theaters of strategic military activity. General principles of military geography provide the conceptual framework and methodology for research and study of the influence of military-geographical factors on the conduct of armed conflict. Specifically, the spatial relationship of the country or region to other countries, natural conditions to include weather, resources, and topography, cultural conditions to include social and governmental structure, economic development (location, nature, capabilities, energy sources, agricultural development, etc.), and transportation capabilities to support economic and military demands. The study of population distribution, composition, and location is also an important element in

the general methodology and principles of Soviet military geography.³⁵

Military regional geography is concerned with assessing the war potential of a particular country or region and the military-geographical factors of the region which have an affect on ground, sea, and air operations. For example, the physical location and measurable capacities and capabilities of military bases, airports, and seaports, the status of civil defense preparation, and in-place obstacles or defensive fortifications are elements of military regional geography. Additionally, an assessment of the vulnerability of the country's economy and its degree of preparation for the conduct of war is a concern of military regional geography. Using the military-geographical analysis from the general methodology, an assessment is made of the effect of relief, soil, hydrology, vegetation, climate, and other physical environmental features found in the region on the conduct of military mobilization, movement, and combat for both Soviet military forces and those defending the region.

Military Geography and Military Art.

The conceptual framework of the application of Soviet military art is based on an appreciation that all military activities take place in a defined space and time. Given a defined command perspective for the application of military art (strategy, operational art, and tactics), Soviet military geography closely parallels Soviet military art in

defining the geographic areas of operation and interest for strategy, operational art, and tactics. Strategy is further divided into general military strategy, preparation and conduct of war in general, and partial military strategy, military action in specific regions of the world.³⁶

The broadest concept of military geography is the theater of war (TV), large areas of land, sea, and air over which the war is conducted. Within the theater of war are the continental and oceanic theaters of strategic military activity (TVD), bounded geographical regions within which the military activities associated with partial military strategy, operational art, and tactics are executed. Figure 2 outlines the parallel terminology of Soviet military art and military geography.³⁷

The terms strategic, operational, and tactical direction are defined as areas, sectors, or zones of terrain, water, or airspace for military operations. The following is a description of the strategic directions of the Western TVD taken from lecture notes of the Voroshilov Military Academy:

Strategic Directions of the Western TVD

- North-German direction: Characterized by large cities, industrial areas, and ports (Berlin, Hamburg, Amsterdam, Brussels, Antwerp, Paris, London, the Ruhr, and northern French industrial regions, and the Birmingham and Cardiff industrial areas in England), and the Vistula, Oder, Elbe, Oker, Seine, and Loire Rivers.
- South German direction: Characterized by large

cities and industrial areas (Salzburg, Munich, Stuttgart, Marsaille, Madrid, Geneva, Zurich, and Lisbon); natural obstacles to include the Carpathian, northern Alps, and Pyrenees mountains, and rivers (Danube and Rhine).

The approximate boundary lines between the north-German and south-German strategic directions run approximately through Kiev, Wroclaw, Frankfurt, the southern border of Luxembourg, and Borge.

The operational capacity of each direction is sufficient for the deployment and military operations of two fronts.³⁹

Given this geographical framework for defining the space of military operations at the three levels of military art, the general principles of military geography and military science are applied to develop an accepted body of thinking on the actual employment of armed forces in combat.³⁹ From the collection and assessment of political, economic, natural, and military conditions relative to a specific TVD, the planning of military operations, early preparation of the TVD for future operations, and the overall preparation of the armed forces in relation to the characteristics of the TVD is accomplished.

Soviet Military Geography and Operational Art

One of the most significant differences in the development of Soviet and U.S. military thinking since the end of World War II is the concept of operational art. The development of Soviet operational art can be traced as a consequence of the environmental conditions of historical Soviet military experience.⁴⁰ From a military point of view, the two most significant military topographical

features of the eastern region of the Soviet Union are its great size and flatness. These conditions, as well as significant political and economic developments, dictated that most of the Soviet operational experiences since 1917 were large scale battles fought on nearly level terrain. The lack of definable terrain objectives, the absence of obstacles, and limited effect of tactical operations required forces that were large, mobile, and able to concentrate rapidly over large distances. The operational orientation was required to be offensive as the relatively featureless terrain provided no opportunity for an effective defense unless in great depth. The development of the Soviet concept of maskirovka relates in part to the scarcity of significant terrain features which forced the Soviet planner to seek other means to protect his force from enemy observation and fire.⁴¹

Effect of the environment on the execution of Soviet operational art is a significant influence in the design of forces and operational plans. Drawing data derived from the general principles of the science of military geography and military regional geography, the Soviet operational planner collects and assesses the effect of geographic, economic, and political factors within the operational direction(s) of the strategic direction(s) of the TVD. Geographic factors include the natural conditions of relief, hydrologic conditions, soils, vegetation, and climate. Soviet military science and regional geography

categorize weather and terrain under six specific conditions: normal or usual, which applies to Central Europe as a whole, and five special conditions defined as mountain, desert, coastal, arctic, and cities.⁴² The nature and scale of probable destruction to the natural environment by combat operations, the delineation of areas that favor mobility and countermobility of combat operations, climatic conditions to include the season, wind, rainfall, and cloudiness, and the demands of the physical environment on logistical operations constitute the majority of the assessment of the effect of geographic factors. The operational direction's soil, hydrology, and geology conditions are evaluated to predict induced radiation, nature and parameters of shock waves, and potential areas of radioactive fallout from the use of nuclear weapons.⁴³

Economic factors include the capacities, geographic locations, resources, distribution networks, and assessed relative importance of the operational sector's economic and industrial areas. Areas and points of vulnerability for targeting by nuclear and non-nuclear weapons are determined as well as the enemy potential to regenerate and defend. The assessment of the effect of economic factors of the operational direction is closely aligned with the strategic assessment of the economic factors of the TVD. Within consideration of the economic factors of the operational direction is a calculation on the availability

of local resources to support combat operations, such as fuel, food, manpower, and transportation.⁴⁴

Political factors include an assessment of the strengths and weaknesses of the resident government structure of the strategic and operational direction to resist or defend. Targets for exploitation and protection, specifically for deep operations and protection of the rear areas, are determined. Civil defense potential of the resident government is an important political factor in the determination of the effects of the use of conventional and nuclear weapons. An assessment of the measures required to support party-political work in the operational sector is made based on the class, cultural, and religious characteristics of the local inhabitants. Important in this analysis is the determination of the power of the various political and social organizations and their leaders.⁴⁵

Summary

The Soviets have an unified, scientific approach to assess how military geography can be used in the conduct of military operations and the influences and constraints it imposes. By a focus which is regionally oriented at the strategic and operational levels, the affects and costs of the interaction of the environment and military operations are determinate for war and preparation for war. The separation of military strategy into strategy and partial strategy provides the operational planner clear strategic

goals and a framework for the research and study of military geography at the correct scale. The Soviet operational focus in the use of military geography is twofold: one, to develop the correct armed forces and military art to fight in a particular region; secondly, how to prepare those armed forces and the political, economic, military, and natural factors of a particular region to effectively achieve the Soviet strategic requirements for that region. This concept of regional preparation is an essential element of Soviet military science and insures an appropriate understanding of the interaction of environment and military operations both in planning and executing Soviet operational art.

SECTION IV: MILITARY GEOGRAPHY AND U.S. ARMY
OPERATIONAL ART

Together with aims, resources, and limiting factors, the threat and the geography of the area of operations define the parameters within which military operations are conducted.

FM 100-6⁴⁶

The above quotation, taken from the U.S. Army doctrinal manual FM 100-6, Large Unit Operations, that 'addresses the activity of military operational direction', categorizes geography as one of several parameters of the 'operational environment'.⁴⁷ FM 100-5, Operations, states that the 'environment of combat' consists of the elements of the physical environment which have a physical and moral effect on combat operations in 'the stressful, resistant environment of battle'.⁴⁸ For the purpose of this paper, I will focus on the 'operational environment'; however, I consider 'the environment of combat' and the 'environment of battle' to be subsets of the 'operational environment' despite the deficiency of U.S. doctrine to define a relationship between these three concepts of 'environment'.

U.S. operational doctrine prescribes an 'operational environment' that consists of a set of parameters that define military operations at the operational level. This doctrinal 'operational environment' is confusing given this paper's previous discussions of military geography as the study of the interaction of military operations and the total environment. In the context of this paper, the environment is 'the sum of all of the factors and forces

which operate at a place and can have an effect upon the performance of any function there."⁴⁹

In the context of U.S. Army doctrine, the "operational environment" is the total set of factors and forces (aims, resources, threat, and "geography") that an operational planner must consider in the practice of operational art. Operational art is the employment of military forces to attain strategic goals through the design, organization, and execution of campaigns and major operations. These two uses of "environment" are confusing if the context of their use is not understood. From an operational planning context, the determination of the parameters that define the conduct of military operations is an essential activity if "the design of operational plans is . . . to be effective and achievable".⁵⁰ In defining an "operational environment" for the planning and conduct of operational art, the interaction of these parameters is established in a conceptual framework to optimize the application of operational art in the attainment of strategic goals. This concept of a set of parameters for the application of operational art is quite similar to the theoretical approach of the three theorists discussed in this paper.

Use of the geographical parameter of operational design begins with the division of the world into five unified commands or theaters of war. A theater of war includes the geographic area within which land, sea, and air operations are directed toward a common strategic aim.

The delineation of theaters of war is linked to the strategic aim and not necessarily the spatial relationship of the world topography. Within each theater of war, there are theaters of operations which are bounded geographic areas based on 'political and military agreements, geography [undefined, but I assume configuration of the natural environment], the threat, and the nature of the planned operations'.⁵¹

At the operational level, the military commander focuses his efforts to create the military conditions to achieve the strategic aim. U.S. doctrine states this requires 'the destruction, surrender, or evacuation of enemy forces and control of geography--land, sea, and air' for mid- to high-intensity war.⁵² This purposely limited use of the term geography ignores the importance of the influences of the cultural, political, and economic geography in creating the conditions for operational military success. Throughout FM 100-6 there is very little appreciation of the influence of the environment (my definition) on the conduct of military operations except for the effects of the physical and natural environment that are largely the concerns of topography and climate.

Neither FM 100-6 nor FM 100-5 recognize the concept of military geography. Rather, the undefined term 'geography' is used. This imprecise use of the term geography is linked to a poor doctrinal appreciation of what constitutes military geography as well as a failure to

recognize the scope of the interaction of military operations and the total environment.

The one area where U.S. operational doctrine approaches an appreciation of military geography is in the application of operational functions. Operational functions are applied through the conduct of military operations in a theater of operations through a planned sequence of operations. These functions are: operational intelligence, maneuver, fires, sustainment, and deception.³³ As per FM 100-6 and TC 34-130, Intelligence Preparation of the Battlefield, operational intelligence is the function which forms a limited assessment of the military geography (my definition) of the theater of operations. This assessment (termed 'situation development' in FM 100-6) is a product of a process defined as the operational-level of war Intelligence Preparation of the Battlefield (IPB). The IPB process involves four assessments: theater area evaluation, analysis of the characteristics of the theater area of war, threat evaluation, and threat integration.³⁴ The assessments of the theater area and characteristics of the theater area of war are a broad analysis of the terrain and weather to include topography, hydrology, and climatology. Other areas considered in this analysis include the dispositions of the transportation and telecommunications networks: economic, political, and social systems; scientific and technological bases; the extent of urbanization, the state

of national morale, impact of neutral nations on military operations, and the popular support for U.S. strategic goals.⁵⁵ The IPB process continues beyond these largely military geographic concerns to an assessment of the threat (opposing forces) capabilities, dispositions, deployment patterns, and centers of gravity. The determination of the threat centers of gravity represents the primary concern of the threat integration assessment of the IPB process "as defeat of these sources of strength is the sine qua non of success and victory at the operational level of war".⁵⁶

The IPB process yields an analysis focused primarily on the interaction of the enemy forces and the physical and natural geography of the theater of operations. The effect of military geography on friendly operations, a part of the analysis of the theater of operations assessment, is generated as a secondary effort. There is not an analysis of the effect of sustained military operations on the military geography of the theater of operations; such as, the effect of nuclear weapons on the natural, political, and economic environment, or the assessed degradation of the economic infrastructure due to military operations in the theater of operations.

Operational sustainment provides the means to execute the operational plan. In the analysis of the capabilities of the support structure to provide resources for military operations, the effect of military geography (my

definition) is a critical factor but receives little doctrinal definition in the interaction of sustainment operations and military geography. FM 100-6 provides a concept of a 'sustainment environment' in which the six key sustainment functions are executed: manning, arming, fueling, fixing, transporting, and protecting the force.⁵⁷ Use of 'environment' is an attempt to define an organizational framework versus an evaluation of the sustainment function operating in the military geography of the theater of operations. By implication rather than a clear expression that recognizes the variable interaction of sustainment operations and military geography, the U.S. doctrine only provides for creation of an organizational 'sustainment environment' based on size of the theater, location of the sustainment base, number and direction of lines of communication, enemy capabilities to interdict sustainment operations, geography (undefined but I assume the configuration of the natural environment), and political boundaries.

The operational functions of maneuver, fires, and deception have no specific references to the military geography which encompasses their application. FM 100-6 abstractly describes these functions without specifying how the interaction of these functions and military geography of the theater of operations would effect conduct of military operations.

Summary

U.S. operational art has a limited concept of the role of military geography in the conduct of military operations. The effort to assess the effect of the environment on military operations at the operational level is not holistic; rather, the attempt is to provide for separate situation developments for the application of each operational function. There is not an overall doctrinal concept of the military geographical information requirements required to conduct joint operational level planning in a specific theater of operations. The confusion caused by prescribing various 'environments' is an impairment to understanding a conceptual framework of an 'operational environment' which defines the 'canvas' for the optimal use of operational art.

SECTION V: CONCEPTS FOR THE USE OF MILITARY GEOGRAPHY AT
THE OPERATIONAL LEVEL

One cannot choose a theater of operations
by trying it out as if it were merchandise.
Clausewitz^{3a}

Definition of Military Geography

The task of the operational planner is to use theoretical concepts and doctrine in analyzing the aims, resources, limiting factors, threat, and military geography of the area of operations for the conduct of a specific campaign or major operation. This requires a skilled concept of what is important and what is not to produce an effective plan for a campaign or major operation. One problem for the operational planner in assessing the significance of the interaction of the environment and military operations is the confusion related to a definition of the term "military geography".

In the introduction to this paper, I stated that military geography had been variously defined as the study of the interaction of man and the total environment in the application of military power. This definition was selected primarily for its simplicity and universal applicability to the entire spectrum of conflict. However, as with most generalizations, this definition is difficult to apply in practice. First, operational planners do not study; rather their concern is analytical, calculating, and predictive. Secondly, operational planners are concerned

only with the environment of a specific theater of operations. Thirdly, the application of military power at the operational level is employment of military forces through the design, organization, and execution of campaigns and major operations. Therefore, from an operational perspective, military geography is defined as follows:

1. Military geography, as a subset of the larger field of geography, is that part of the operational planning process that is concerned with the accurate, orderly, and rational description and evaluation of the earth's surface in the theater of operations.²⁹

2. Military geography is concerned with the development of specific campaign plans and plans for major operations. Therefore, military geography is mission oriented and predictive; there is no military geography without a military mission. Analysis of the military geography of the theater of operations is focused on the effects of the environment on both friendly and enemy courses of action. From a theoretical view, this is assessing the sum of all factors and forces which operate within the theater of operations and their effect upon the performance of any military function.³⁰

3. Military geography is relative as to its effect on military operations. As Clausewitz describes in his theory of the interaction of the environment and military operations, the relationship is permanent, but the

constraints and influences are conditional in their influence on military operations. Taken from a strictly geographic view, no two places on the earth's surface are the same. Site factors, the inventory of things within a given area, can indeed be similar. Position factors, the connections and movements between one area and another, are never the same as no two places can share the same factors of position.⁶¹ From a military standpoint, no two operational plans are exactly alike. Aims, resources, limiting factors, and threat are also variable in their composition, assumptions, and understanding which also cause a relative and variable effect of military geography on operational planning.

4. Military geography can be subdivided in terms of the size of the area of operations and the command perspective:⁶²

(1). Military topography--the study of small areas in which the individual features of the landscape are mapped on large scale maps. The emphasis is primarily on the physical factors of the area. This subdivision of military geography supports tactical operations.

(2). Military chorography--the study of large regions on large scale maps. The emphasis is on physical, cultural, and economic factors of the region. This subdivision supports operational campaigns and major operations in a theater of operations.

(3). Military geography--the study of the world as a whole or the major theaters of war. This subdivision supports military strategy. Military geography can be regional (theater of war) in its orientation or topical, such as the study of a single factor throughout the whole world.

Figure 3 is a graphical representation of this subdivision

of military geography. Note that the figure represents a continuum of the levels of war and military geography and not a binding construct of neat "boxes" to be applied without a sense of the relative nature of military geography to military operations.

Framework for the Evaluation of Military Geography

The IPB process is the formal, doctrinal methodology for the intelligence officer to assess the military geography of the theater of operations for both friendly and enemy operations. Given the prescribed detail of the operational IPB process as per TC 34-140, Intelligence Preparation of the Battlefield, there should be sufficient military geographic data and information for the operational planner to utilize in his planning once the IPB analysis of the theater of operations is complete.

FM 100-5, Operations, prescribes the following as the key elements of terrain analysis: observation and fields of fire, cover and concealment, obstacles and movement, and avenues of approach (OCOKA).⁹³ However, terrain analysis constitutes only a portion of the analysis of characteristics of the theater of operations. Therefore, these elements form a framework that is primarily useful for tactical versus operational planning.

The operational planner requires a framework of key elements of military geography to evaluate and compare the operational cost and efficiency of the various courses of action under consideration. The calculation and estimates

of time and space requirements for the synchronization of the five elements of operation design are particularly important aspects of operational campaign planning that the OCOKA framework can not adequately assess. Therefore, the following six elements of operational geography are recommended as a framework for evaluating the feasibility, cost, and efficiency of military operations in the theater of operations:⁶⁴

1. Accessibility. Accessibility is an evaluation of the ability to deploy a military force from one location to another location. This includes an assessment of the freedom of choice of routes and entry points, distances and travel times, avenues of advance, and obstacles. At the operational level, accessibility of a theater of operations is evaluated for not only the difficulty of reaching a particular point but also for what special requirements of equipment, personnel, and prior staging must be met to deploy military forces in the theater of operations. Distance is not in direct correlation with accessibility. Considerations of the time available due to mission requirements, consumption of resources in support of the force deployment, and combat force generation to meet the scheme of the operational plan are other factors which affect accessibility. Specific elements of geographic information required to evaluate accessibility include air and sea port capacities and configurations, configuration of the littoral and tidal information for amphibious

operations, road and rail networks and capacities, the effects of weather on military deployment operations, and the availability of host nation assets to assist with special equipment, labor, and movement control. The political and physical feasibility of the use of third country facilities equipment, and forces to support the deployment is also included in the evaluation of accessibility of a theater of operations. An example of how accessibility can affect the conduct of military operations is the 1986 Libyan air strike. The accessibility of the theater of operations was complicated by having to stage strike aircraft at U.S. air bases located in the United Kingdom, the requirement for carrier based air and combat support systems located in the Mediterranean, and the denial of French and Spanish air space and bases for staging or transit. Accessibility was a critical factor in the planning and synchronization of the execution of this demanding operation.

2. Mobility. Mobility is an evaluation of the ability to move a military force within the theater of operations. The condition and availability of routes, transportation network characteristics, effects of climate, requirements for special mobility characteristics in equipment, increased petroleum requirements due to elevation, the demands of moving through obstacles and obstructing terrain, chokepoint potential to disrupt movement, and the organization for movement are factors in

the mobility assessment of a theater of operations. An additional aspect of the mobility assessment is an estimation of mobility degradation (i.e. traffic congestion, route repairs) in the theater of operations after the start of military operations. An example of the importance of a comprehensive mobility assessment of the theater of operations is the failure of Allied planners to account for the affects of the 'bocage' country of Normandy. Flexibility of an operational plan is often a measure of the mobility of the theater of operations.

3. Communicability. Communicability is an assessment of the ability to transmit electronic information in the theater of operations. Weather, terrain, and cultural development affect the ability of military forces to communicate in a theater of operations. Construction, maintenance, and operating efficiency of the various force communication systems are variables to be determined for operation in the theater of operations. Additionally, the evaluation of existing communication systems within the theater of operations which can be utilized for support of military operations is a factor of communicability.

4. Availability. Availability is an assessment of the existence, quantity, and location of men, equipment, and logistical support that can be optimally mobilized to support an operation within the theater of operations. Accessibility is related to availability in that availability defines the military forces which will be

deployed into the theater of operations. Availability is a geographical concern due to the site and location of the quantities of men, equipment, and logistical support relative to the site and location of the theater of operations. An example of availability affecting military operations is the 1985 Grenada operation. The 4th Amphibious Squadron was afloat in the Atlantic, enroute to Lebanon to relieve the Marine peacekeeping force in Beirut. When the decision was made to conduct a forced invasion into the Grenada, the 4th, given its proximity to the theater of operations as well as the inherent deception advantages, was diverted to conduct the Grenada operation. Availability can be also viewed in the context of the site and location of the initial dispositions of operational forces prior to the conduct of major operations as part of a campaign plan, or the initial disposition of forces prior to the start of a branch or sequel to exploit success or minimize losses.

5. Vulnerability. Vulnerability is an assessment of 'not what one can do but what can be done to one'.⁵⁵ A large portion of this assessment is developed within the threat evaluation and the threat integration functions of the IPB process. However, the IPB process, as is much of operational level of war intelligence, is focused primarily on the identification of the enemy centers of gravity.⁵⁶ Vulnerability is an evaluation of the friendly centers of gravity and decisive points of vulnerability, and how these

can be protected against the hazards of nature, enemy forces, and the battlefield elements of friction and chance. While included in the IPB assessment process, an evaluation of friendly centers of gravity in practice gets far less attention than does the evaluation of enemy centers of gravity. Military geographical factors included in the vulnerability assessment are the site and location of lines of communication, key command and control elements, the operational reserve, those operational functions that constitute the operational center of gravity for the theater of operations, and the cultural aspects of the local population needed to assess what military actions are required to maintain their cooperation and security.

Military Geography--Another View

Technological improvements in weapons, equipment mobility, countermobility munitions, and electronic surveillance continue to redefine the influences and constraints of military geography on military operations. One of the more decisive technological improvements is the capability to detect and attack enemy formations at great distances. Operational fires, such as artillery and aviation, are employed to reinforce the military geography of the theater of operations to delay, disrupt, deny, or destroy the enemy force. Area denial munitions such as mines, liquid-air explosives, artillery, and precision guided munitions change the mobility factors of the military geography in the area of their employment.

Additionally, the destructive capacities of nuclear and chemical weapons create unique operational conditions. The planning for the use of these weapons requires an assessment of the military geography of the theater of operations for points and areas where the reinforcement and alteration of the physical environment causes a desired effect on the enemy force and a constraining or advantageous effect on the friendly force.

The threat evaluation and integration functions of the IPB process are effective methods to determine the areas where the employment of these weapons would environmentally 'engineer' or change the military geography of the theater of operations to a enemy liability. Through designation of named areas of interest, event and decision templating, and development of target areas of interest, the operational planner selects areas for employment of these weapons to reinforce or alter military geography in the delay, denial, disruption, or destruction of the enemy force at operational depths in the theater of operations.

SECTION VI: CONCLUSIONS

Knowledge of the country is to a general
what a rifle is to an infantryman and what
the rules of arithmetic are to a geometrician.
Frederick the Great⁶⁷

The title of this paper asks the question does military geography define the canvas of the operational planner. In the theoretical writings of Sun Tzu, Clausewitz, and Jomini, each recognizes the relationship between military geography and the conduct of military operations as interactive and permanent. Comparing the views of each of the three theorists, the only difference in defining this permanent and interactive relationship is ascribing the proper value of the effect of military geography on military operations; i.e., is the relationship permanent, situational, or conditional?

Soviet military theory and doctrine evaluate the relationship of military geography and military operations from a unified approach that seeks to define the design and preparation of military forces to conduct military operations in a specific theater of operations. The Soviet view is holistic: political, economic, military, and natural factors are evaluated for their influence on the relationship of military geography and the conduct of military operations. This approach appears to be in accordance with the Clausewitzian theory of the conditional significance of military geography and the

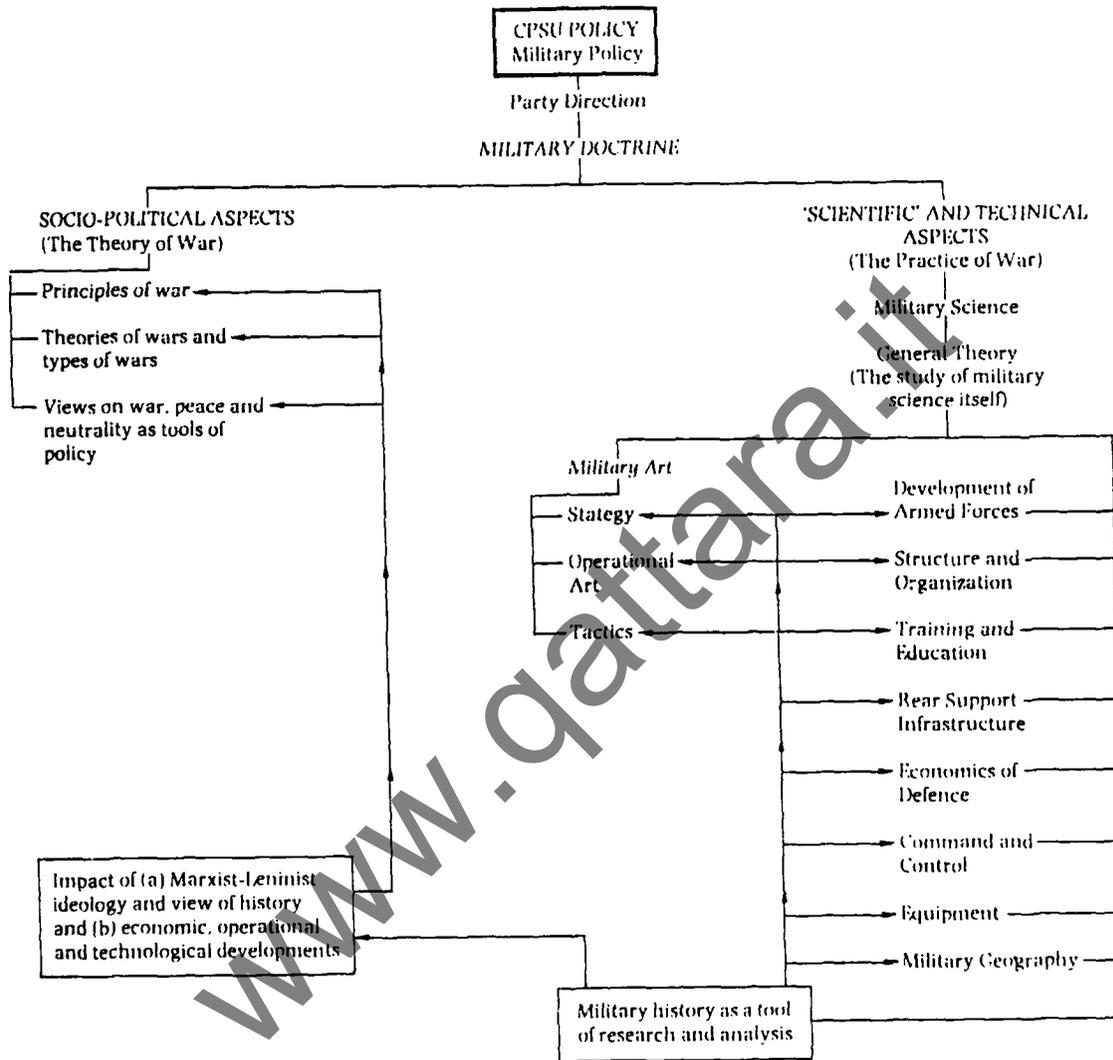
conduct of military operations.

The U.S. doctrinal approach in describing the effect of military geography on the conduct of military operations is not as consistent and holistic as the Soviet view. The U.S. approach considers the effect of military geography on the conduct of military operations at the operational level to have more of a Jominian permanence than a Clausewitzian conditional significance. Lack of an analytical framework to assess the qualitative influence of military geography causes U.S. military doctrine to only recognize a general or prescriptive influence. This paper provides the operational planner a recommended framework to use in an assessment of the conditional significance of military geography on military operations in the theater of operations.

U.S. doctrine must seek to better define military geography. The construct of Figure 3 is a recommended start to allow for the efficient collection of the military geographic data that supports each level of military planning. The mere collection of geographic data has no military value.^{es} By a conceptual outline of the assumptions of the who, what, when, and where that are required for military operations at each level of scale, information flow and responsibility to support the military planner can be focused to provide timely, accurate military geographic information in an understandable form that supports the operational decision cycle. Unquestionably,

the pace and complexity of operational level planning and decision making is increasing as technological innovations continue to increase the geographic space that can be influenced over time by operational forces. The U.S. operational planner, challenged by a 'canvas' that is ever increasing in size and complexity, must have a doctrinal concept of how military geography influences military operations. Additionally, to support the planning effort there also must be a timely and well-structured informational flow of military geographic data that the planner requires to formulate the military operational plan.⁶⁹

FIGURE 1: THEORETICAL FRAMEWORK FOR THE SOVIET STUDY OF WAR



Source: Donnelly, Christopher. Red Banner. Coulsdon, Serry, U.K.: Jane's Publishing Inc., 1988, page 103.

FIGURE 2: PARALLEL TERMINOLOGY OF SOVIET MILITARY ART AND MILITARY GEOGRAPHY

<i>Level of Military Art</i>	<i>Carried out by - Type of Conflict</i>	<i>At Approximate Level of Command Responsibility</i>	<i>Military Geographical Level</i>
STRATEGY	- Campaign - Bitva - Strategic Operation	Stavka Group of Fronts	Theatre of (Strategic) Military Activity Strategic Direction
OPERATIONAL ART	Operation Engagement (<i>Srazheniye</i>)	Front (Group of Armies) Army Corps	Operational Direction
TACTICS	Battle (<i>Boi</i>)	Division and below	Tactical Direction

Source: Donnelly, Christopher. Red Banner. Coulsdon, Serry, U.K.: Jane's Publishing Inc., 1988, page 214.

FIGURE 3: SUBDIVISION OF MILITARY GEOGRAPHY ACCORDING TO THE LEVELS OF WAR

Nation	National Strategy	Peace	World	MILITARY GEOGRAPHY	General Maps
Armed Forces	Strategy	Total War	Theaters of War	MILITARY CHORO-GRAPHY	
The Army					
Army Groups/ Armies	Operational Art	Campaigns and Major Opns.	Theaters of Operations		MILITARY TOPO-GRAPHY
Corps/ Joint Task Force	Tactics	Battle	Position		
Division		Engagements	Field	Tactical Maps	
Brigade and Lower		Combat	Point		

Source: Thompson, Edmund R. The Nature of Military Geography: A Preliminary Survey. Syracuse University Doctoral Thesis, 1962, page 57.

ENDNOTES

1. Baron de Jomini, The Art Of War, translated by G.H. Mendell and W.P. Craighill, (Westport, Conn., 1977), page 324.
2. Carl von Clausewitz, On War, edited and translated by Michael Howard and Peter Paret, (Princeton, N.J., 1976), page 109.
3. Sun Tzu, The Art of War, translated by Samuel B. Griffith, (London, 1963), page 129.
4. U.S. Army Field Manual 100-6, Large Unit Operations, (Ft. Leavenworth, Kansas, September 1987), page vii.
5. Louis C. Peltier and Etzel C. Pearcy, Military Geography, (Princeton, N.J., 1966), page 46.
6. James J. Schneider, The Theory of Operational Art, (Ft. Leavenworth, Kansas, 1988), page 17.
7. Edmund R. Thompson, The Nature of Military Geography, Syracuse University Doctoral Thesis, 1962, page 13.
8. Sun Tzu, The Art of War, page x.
9. Ibid., page 63.
10. Ibid., page 84.
11. Thompson, The Nature of Military Geography, page 113.
12. Sun Tzu, The Art of War, page 124.
13. Ibid., page 129.
14. Ibid., page 130.
15. Ibid., page 139.
16. Clausewitz, On War, page 128.
17. Ibid., page 109.
18. Ibid., page 183.
19. Thompson, The Nature of Military Geography, page 140.
20. Ibid., pages 39-50.
21. Harold W. Nelson, "Space and Time in On War".

- Clausewitz and Modern Strategy, edited by Michael I. Handel, (London, 1986), page 136.
22. Clausewitz, On War, page 214.
 23. Ibid., page 456.
 24. Thompson, The Nature of Military Geography, page 143.
 25. Jomini, The Art of War, page 39.
 26. Ibid., page 69.
 27. Crane Brinton, Gordon Craig, and Felix Gilbert, "Jomini", Makers of Modern Strategy, edited by Edward M. Earle, (Princeton, N.J., 1943), page 87.
 28. Jomini, The Art Of War, page 86.
 29. Ibid., pages 88-92.
 30. John Shy, "Jomini", Makers of Modern Strategy, edited by Peter Paret, (Princeton, N.J., 1986), page 166.
 31. Christopher Donnelly, Red Banner, (Coulson, Serry, U.K., 1988), page 103.
 32. Ibid., pages 106-113.
 33. Ibid., page 201.
 34. V.D. Sokolovskiy, Soviet Military Strategy, edited by Harriet F. Scott, (New York, 1975), page 39.
 35. Soviet Military Encyclopedia (Sovetskaya Voyennaya Entsiklopediya), Volume II, (Moscow, 1976), pages 516-717.
 36. Lecture Materials From the Voroshilov General Staff Academy, unpublished manuscript, (Ft. Leavenworth, Kansas, 1989), page 53.
 37. Donnelly, Red Banner, page 214.
 38. Lecture from the Voroshilov General Staff Academy, page 72.
 39. Phillip Peterson, The Soviet Conceptual Framework for the Development and Application of Military Power, (Defense Intelligence Agency, 4 May 1981), pages 1-2.
 40. Donnelly, Red Banner, pages 209-211.
 41. Donnelly, Red Banner, page 21.

42. William Baxter, Soviet AirLand Battle Tactics, (Novato, California, 1986), page 99.
43. M. Shirokov, "Military Geography at the Present Stage", Selected Readings From Military Thought 1963-1973, Volume 5, Part 1, (Washington D.C., 1986), page 137.
44. Ibid., page 135.
45. Ibid., page 134.
46. U.S. Army Field Manual 100-6, page 1-5.
47. Ibid., pages vii to 1-1.
48. U.S. Army Field Manual 100-5, Operations, (Washington, D.C., May, 1986), page 75.
49. U.S. Army Field Manual 100-6, page vii.
50. Ibid., page 1-5.
51. Ibid., pages 2-1 to 2-5.
52. Ibid., page 3-1.
53. Ibid., page 3-7.
54. U.S. Army Technical Circular 34-130, Intelligence Preparation of the Battlefield, (Coordinating Draft), (Ft. Huachuca, Arizona, December, 1987), page D-7.
55. Ibid., pages D-8 to D-14.
56. Ibid., page D-30.
57. U.S. Army Field Manual 100-6, pages 6-1 to 6-7.
58. Clausewitz, On War, page 350.
59. John R. Brinkerhoff, The Nature of Modern Military Geography, Columbia University Master's Thesis, 1963, page 30.
60. Peltier and Percy, Military Geography, page 10.
61. Thompson, The Nature of Military Geography, page 50.
62. Ibid., pages 54-59. Also, Brinkerhoff, The Nature of Modern Military Geography, pages 52-53.
63. U.S. Army Field Manual 100-5, pages 77-80.

64. Peltier and Percy, Military Geography, pages 48-51.
65. Ibid., page 51.
66. U.S. Army Technical Circular 34-140, page D-5.
67. Frederick the Great, Instructions for His Generals, translated by Thomas R. Phillips, (Harrisburg, Penn., 1944), page 47.
68. Robert F. Kirby, Battlefield Environment Assessment for Commanders: A Concept for Joint and Component Strategy and Operations, (Carlisle Barracks, Pa., U.S. Army War College, 1988), page 5.
69. Rich Johnson, Knowing the Total Physical Battlefield in the Future, (Washington, D.C., Headquarters, Department of the Army, Office of the Deputy Chief of Staff for Intelligence, Space Systems Division, 6 July 1987), page 2.

www.qattara.it

BIBLIOGRAPHY

Books

Clausewitz, Carl von. On War. Edited and translated by Michael Howard and Peter Paret. Princeton, N.J.: Princeton University Press, 1976.

Baxter, William. Soviet AirLand Battle Tactics. Novato, California: Presidio Press, 1986.

Donnelly, Christopher. Red Banner. Coulsdon, Serry, U.K.: Jane's Publishing Inc., 1988.

Faringdon, Hugh. Confrontation--The Strategic Geography of NATO and the Warsaw Pact. New York: Rutledge & Kegan Paul, 1986.

Frederick the Great. Instructions for the Generals. Translated by Thomas R. Phillips. Harrisburg, Penn.: Military Service Publishing Company, 1944.

Hartshorne, Richard. The Nature of Geography. Lancaster, Penn.: Science Press Printing Company, 1939.

Gregory, Herbert E. Military Geology and Topography. New Haven, Conn.: Yale University Press, 1918.

James, Preston E. A History of Geographical Ideas. New York: Odessa Press, 1972.

Jomini, Baron De. The Art of War. Translated by G.H. Mendell and W.P. Craighill. Westport, Conn.: Greenwood Press (reprint from the 1862 original), 1977.

MacDonnell, A.C. The Outlines of Military Geography. Pall Mall, S.W., U.K.: Hugh Rees Ltd., 1911.

May, C.B. An Introduction to Military Geography. London: Hugh Rees, Ltd., 1909.

O'Sullivan, Patrick, and Miller, Jesse W. The Geography of Warfare. New York: St. Martin's Press, 1983.

Palka, Eugene J. A Bibliography of Military Geography. West Point, N.Y.: Department of Geography and Computer Science, U.S. Military Academy, 1988.

Pelitier, Louis C., and Percy, G. Etzel. Military Geography. Princeton, N.J.: D. Van Nostrand Company, Inc., 1966.

Simpkin, Richard E. Race to the Swift: Thoughts on

Twenty-First Century Warfare. London: Brassey's Defence Publishers, 1985.

Sokolovskiy, V.D. Soviet Military Strategy. Edited by Harriet F. Scott. New York: Crane, Russak & Company, Inc., 1975.

Sun Tzu. The Art of War. Translated by Samuel B. Griffith. London: Oxford University Press, 1963.

Van Valkenburg, Samuel, editor. America at War: A Geographical Analysis. New York: Prentice-Hall, 1942.

----- Soviet Military Encyclopedia (Sovetskaya Voyennaya Entsiklopediya). Volume II. Moscow, U.S.S.R.: Voenndye Izatel'sto Ministerstva Oborony SSR, 1976.

Journals and Publications

Bevilacqua, Allan C. "Weather and Terrain: Forgotten Factors". Marine Corps Gazette. Vol. 57, No. 12, pp. 41-46, 1987.

Brinton, Crane, et.al. "Jomini". The Makers of Modern Strategy. Edited by Edward M. Earle. Princeton, N.J.: Princeton University Press, 1943.

Fryxell, Fritot M. "Terrain Appreciation, Military Appraisal of Terrain". Economic Geology. Vol. 40, No. 8, pp. 591-597, December, 1945.

Paige, Sidney, "War; Geologists and Engineering". The Geological Society of America. February, 1942.

James, Preston. "The Terminology of Regional Description". Annals of the Association of American Geographers. Vol. 24, pp. 78-86, June, 1934.

Nelson, Harold W. "Space and Time in On War". Clausewitz and Modern Strategy. Edited by Michael I Handel. London, England: Frank Cass, 1986, pages 134-149.

Rose, E.P. "Geology in War". Royal Engineers Journal. Vol. 92, pp. 182-190, 28 June 1982.

Shirokov, M. "Military Geography at the Present Stage". Selected Readings From Military Thought 1963-1973. Volume 5, Part 1. Washington D.C.: U.S Government Printing Office, 1986.

Shy, John. "Jomini". Makers of Military Strategy. Edited by Peter Paret. Princeton, N.J.: Princeton University Press, 1986.

Manuscripts

Brinkerhoff, John R. The Nature of Modern Military Geography. Columbia University Master's Thesis, 1963.

Buel, Larry V. Intelligence at the Operational Level of War: Operational Level Intelligence Preparation of the Battlefield. Fort Huachuca, Ariz.: U.S. Army Intelligence Center and School, undated.

Johnson, Rich. Knowing the Total Physical Battlefield in the Future. Washington, D.C.: Headquarters, Department of the Army, Office of the Deputy Chief of Staff for Intelligence, Space Systems Division, 6 July 1987.

Kirby, Robert F. Battlefield Environment Assessment for Commanders: A Concept for Joint and Component Strategy and Operations. Carlisle Barracks, Pa.: U.S. Army War College, 1988. (AD-A192 418)

Mendel, William W., and Banks, Floyd T. Campaign Planning. Carlisle Barracks, Pa.: U.S. Army War College, 1988.

Paschell, Rod. Operational Geography: The Second Indochina War. An unpublished presentation written in 1987, U.S. Army War College.

Peterson, Phillip. The Soviet Conceptual Framework for the Development and Application of Military Power. Soviet/Warsaw Pact Division, Directorate for Research, Defense Intelligence Agency, 4 May 1981. (DDB-2610-36-81)

Riley, Don T. A Sense of Locality and Tactical Agility. Ft. Leavenworth, Ks.: School of Advanced Military Studies Monograph, 1986. (ADA-179-238-3)

Schneider, James J. The Theory of Operational Art. Fort Leavenworth, Ks.: School of Advanced Military Studies Course Reading, Command and General Staff College, 1988.

Thadden, Russell, Intelligence Preparation of the Battlefield and Predictive Intelligence. Ft. Leavenworth, Ks.: School of Advanced Military Studies Monograph, Command and General Staff College, 3 December 1986.

Thompson, Edmund R. The Nature of Military Geography: A Preliminary Survey. Syracuse University Doctoral Thesis, 1962.

----- Historical Records Project. Contract No. DA22-079-eng-194. Prepared for the Director, Waterways Experiment Station, Corps of Engineers, U.S. Army, Vicksburg.

Mississippi, by The George Washington University, Washington, D.C., 1957. (AD-157080, AD-157079, AD-157078, AD-157077, AD-157076, AD-157075, AD-157074, AD-157073)

----- Lecture Materials From the Voroshilov General Staff Academy. Unpublished manuscript. Ft. Leavenworth, Ks.: Soviet Army Studies Office, Command and General Staff College, 1989.

----- Readings in Military Geography. Garver, J.B., and Galloway, G.E., editors. West Point: Department of Geography and Computer Science, U.S. Military Academy, 1984.

Government Publications

U.S. Army Field Manual 21-33, Terrain Analysis. Washington, D.C.: U.S. Government Printing Office, May, 1978.

U.S. Army Field Manual 100-5, Operations. Washington, D.C.: U.S. Government Printing Office, May, 1986.

U.S. Army Field Manual 100-6, Large Unit Operations (Coordinating Draft). Ft. Leavenworth, Kansas: U.S. Army Command and General Staff College, September, 1987.

U.S. Army Technical Circular 34-130, Intelligence Preparation of the Battlefield (Coordinating Draft). Ft. Huachuca, Arizona: U.S. Army Intelligence Center, December, 1987.

U.S. Army Technical Manual 5-545, Geology and Its Military Applications. Washington, D.C.: U.S. Government Printing Office, August, 1952.